THE AUSTRALIAN NAVAL ARCHITECT

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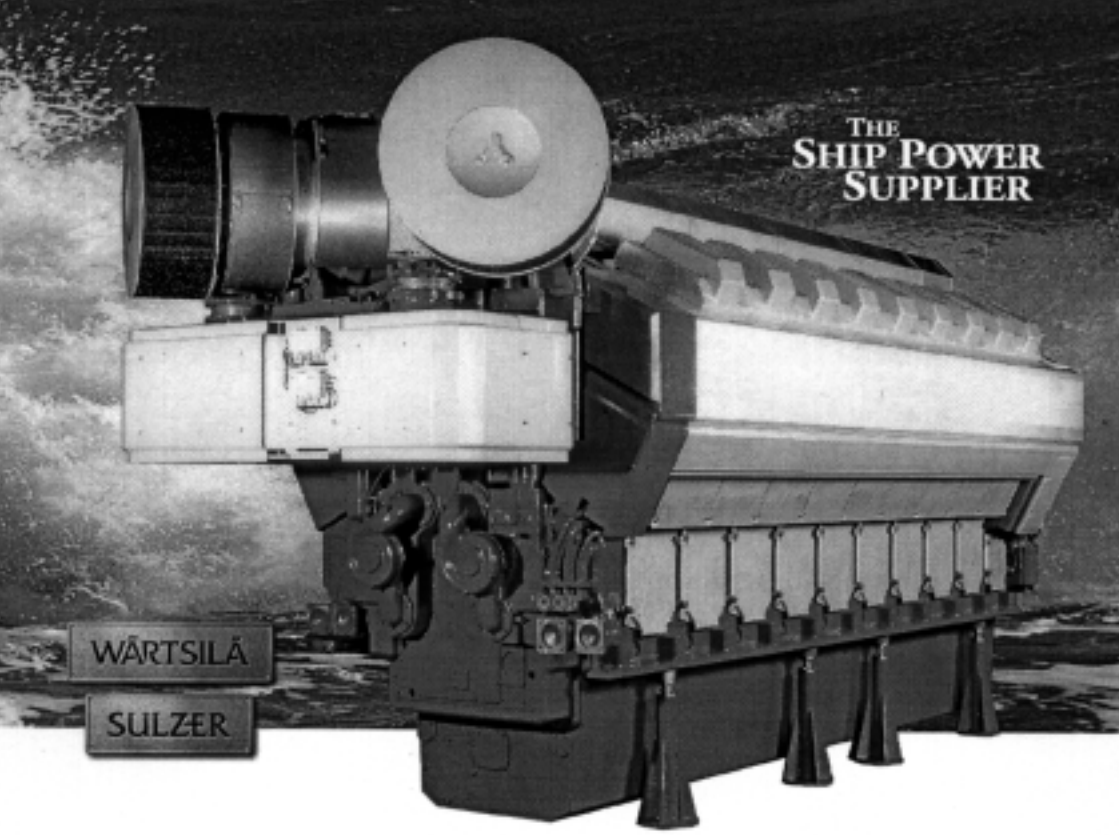

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THE AUSTRALIAN NAVAL ARCHITECT

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Cover Photo:

The Flightship FS8 Ground-effect Craft in Cairns.

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From the Division President

An issue I which was brought to my attention recently was that of Intellectual Property, and for a start let me say that any opinions expressed on this subject in this particular column are mine and don't necessarily reflect those of the Division or the Institution.

Two Division members phoned me, independently, to express concerns about what they thought was a rather blatant case of theft of intellectual property. The details of the particular case are not important here and in any case it is currently subject to litigation. However the general issue is one that should concern RINA and its members. RINA policy is that intellectual property rights should be respected and members infringing another's intellectual property rights do so in contravention of the Institution's Code of Professional Conduct.

As I understand it the term 'intellectual property' relates to the mental work done by an individual in the development of an engineering design or process. If a naval architect prepares a design for a vessel, whether to a specific client's requirements or on a speculative basis, then that naval architect retains the rights to that design and unless contractually arranged otherwise the client has the right to build one vessel only. Most designers protect these rights by including copyright statements on the drawings and appropriate clauses in design contracts.

In these days of sophisticated drawing reproduction processes and widespread use of CAD/CAM processes theft of intellectual property is much easier than it may have been in the past. At the same time innovation is a primary feature of successful design, particularly in low volume and comparatively high cost countries as Australia. This makes it more important than ever that intellectual property be protected and the time-honoured practices of drawing copyright and appropriate contract clauses may not in themselves be enough to do that.

On a separate subject, I recently had the interesting experience of visiting the former HMAS *Hobart*, presently tied up in Port Adelaide awaiting conversion to a tourist attraction. The ship has been transferred to the South Australian Government and will be sunk in the southern part of St Vincent's Gulf to form a dive wreck. On the surface this is a simple task, but in fact the challenges are considerable. First there are the environmental considerations, then there are the challenges of safely preparing the vessel and sinking it. A vessel of this size and type potentially includes many environmental hazards including, but not limited to, asbestos, fuel residues, PCBs, lead and beryllium. Asbestos is primarily a hazard to the workforce preparing the vessel. The others are environmental contaminants which pose more serious concerns in the long run. Safety during the preparation process will be a major concern. This looks like an interesting project and I hope we can keep abreast of it over the next few months.

Bryan Chapman

Editorial

As anyone who has ever tried will know, selling defence equipment in the international market place is very difficult, and even more so if our own defence force does not use the equipment. The potential customers like to be able to hear the experience of users in the country of origin and, if there are none, they tend to ask that difficult question — why not?

In this edition of *The ANA* we report the charter by the United States armed forces of fast ferries from the Australian shipbuilders Incat and Austal. I suspect that these charters may not have occurred without the demonstration provided by the two years of service of Incat 045 as HMAS *Jervis Bay*. Both companies now have an excellent opportunity to show how these remarkable ships can provide a special capability for the largest potential customer in the world.

The use of HMAS *Jervis Bay* on the supply run between Darwin and Dili proved the value of these ships in appropriate circumstances. However, by their very nature, they present something of a military challenge when one remembers that the East Timor operations were essentially unopposed. The ships depend for their high speed on light weight, and prodigious fuel consumption. Darwin to Dili was the right voyage length to manage the latter characteristic, but the first prompts the question, how does one defend these ships? They are faster

than most potential escorts. Certainly, it would have to be an exceptionally lucky submarine to successfully attack a fast catamaran, but the threat from missile-armed patrol boats (or even one with a small gun) and particularly aircraft is considerable.

Weapons systems designed for use at sea tend to be heavy, space consuming and demanding of power, which further exacerbates the fuel and weight problem. Even a relatively simple close-in weapon like Phalanx is demanding on power supplies, and provides only limited, last-ditch defence. Magazine regulations don't help either.

It is also true that HMA ships *Manoora* and *Kanimbla* cannot defend themselves, but at least escorting destroyers and frigates can keep up. It seems to me that, at present, the only practical way to defend the valuable cargo in a fast catamaran on transit at 40 kn is with aircraft. This may be possible for a nation with the resources of the United States. I don't want to stir up air force/navy arguments, but it would seem to me to be an enormous challenge for the ADF to provide such cover with other tasks likely at the same time.

I am not doubting that there is a role for fast logistic transport based on the fast catamaran ferry, but I think there is a lot of work still to be done to develop true military versions of these craft. Already they draw extensively on aviation technology to help control weight. Weapons are deployed in aircraft also; perhaps we need to see how that technology can be adapted or developed to provide useful self-defence for high-speed transports. Alternatively, there may be a need for a specialised escort ship capable of keeping up with its charges.

There is an opportunity for Australian industry to find a solution to this need. If there is a real role for these craft in military applications, someone will.

John Jeremy

Curtin

UNIVERSITY OF TECHNOLOGY

RESEARCH NAVAL ARCHITECT

Curtin University is seeking expressions of interest for a position with the Centre for Marine Science and Technology (CMST). Founded in 1985, CMST comprises a multi-skilled body of scientists and engineers committed to the development of technical ocean-related skills in Australia. The Centre has earned a reputation as a high quality marine technology R&D facility responsive to industry and government needs. CMST has recently been awarded a government funded Centre of Excellence. Expressions of interests are invited for a position involved with sea trials and naval architecture research.

The skills sought include:

- good understanding of seakeeping analysis
- ability to conduct ship performance trials, sometimes in rough weather
- project management and planning expertise
- excellent written and oral communication skills
- ability to work independently and as a team member.

Expertise in signal processing (particularly in Fourier techniques), instrumentation and IT would also be of benefit. The likely salary is currently under discussion, the range $35,000 - $60,000 being considered.

Enquiries to:

Research Administrator, Centre for Marine Science & Technology,
Curtin University, GPO Box U1987, Perth WA 6845 ph: 08 9266 7380 fax: 08 9266 4799

email: info@cmst.curtin.edu.au

NEWS FROM THE SECTIONS

Queensland

The Queensland Section held its quarterly section committee meeting on 4 June at the Yeronga Institute of TAFE with teleconferencing to section committee members in Cairns, Gold Coast and the Sunshine Coast.

Our quarterly technical meeting was held on 4 July in Cairns with teleconferencing to the Yeronga Institute of TAFE in Brisbane for Southern Queensland members. This meeting was chaired by Geoff Glanville and attracted twenty-five members and guests in Cairns and six members in Brisbane. The subject of the technical presentation was *Flightship Ground-effect Craft* by John Leslie, managing director of Flightship in Cairns. The meeting was held in conjunction with Flightship and the RINA participation in the Asia Pacific/ Ausmarine East Conference and Exhibition at the Cairns Convention Centre. John's presentation was on ground-effect craft or wing-in-ground-effect-craft (craft that operate in air just above the water surface). It covered the history, principles of operation, design characteristics and the development of Flightship overseas and in Australia as well as safety aspects and the cost of operation. The presentation was highly professional and was very well received which was evidenced by the number and range of questions and the extended duration of the meeting.

The Queensland Section crewed a RINA stand at the Asia-Pacific/Ausmarine East Conference and Exhibition in Cairns during July. Display material was provided by Sydney and London. Signage and other equipment for the stand was arranged with Baird Publications and NQ Exhibitions and assembled by Geoff Glanville and our members in Cairns. The very helpful manner in which Baird Publications assisted the section with its organisation and arrangements for the conference and exhibition was very much appreciated as were the efforts of Geoff Glanville. Visitors to the stand were able to seek information on RINA membership, the marine industry and naval architecture as a profession and were able to collect RINA brochures and journals.

Brian Robson

ACT

The ACT Section held its Annual General Meeting on 17 May 2001 at Campbell Park Offices. Bert Thomson will continue to serve as section chair and Dave Magill as deputy chair. Bruce McNeice also continues as secretary while Nick Whyatt remains treasurer. Kerry Johnson has joined the committee and the other committee members have also remained. The committee will continue to seek new blood in an effort to stimulate ideas and action on a schedule of interesting local activities.

On 24 May 2001 the IMarE Canberra Branch hosted a joint technical meeting on the subject of *Ship's Ballast Water Exchange* presented by Alan Taylor (IMarE / RINA member) from Melbourne. Alan spoke of the risk of introduction of harmful micro-organisms into coastal ecosystems when ballast water is exchanged in harbour or coastal areas and the hazards and additional burden on the ship's crew when the ballast water is exchanged at sea instead. He indicated that there are still many unknowns concerning the treatment of ballast water. For instance, what level of remaining micro-organisms in exchanged ballast water is satisfactory and how can that be effectively be monitored? Consideration of ballast water treatment options should include examination of safety implications, practicality of the method, technical and cost effectiveness of the proposal, and of course its environmental suitability. Chemical treatment of ballast water was cost prohibitive. Heating of the water to kill micro-organisms was not practical on larger bulk carriers but may be feasible on some ship classes by using waste heat from propulsion plant. Filtering of ballast water as it is taken on-board may not effectively eliminate micro-organisms and such filters are in any case prone to blockage. Continuous volumetric exchange of the ballast water could not ensure micro-organisms were effectively flushed from the ballast tanks. Discharge of ballast tanks at sea, while one of the cheapest and simplest options, could have adverse stability implications for some ship types.

On 26 June at a meeting arranged by MARENSA at the IEAust headquarters, Dr John Ritter of the

Aeronautical and Maritime Research Laboratories of Defence Science and Technology Organisation (DSTO) provided an overview of DSTO activities in support of the Collins Class submarine acquisition. The meeting was well attended by an audience of between 25 and 30. Dr Ritter reviewed submarine platform system issues that DSTO has been investigating over the last decade or so and how they are being resolved. He also identified future opportunities for DSTO to improve the performance of the Collins class. The emphasis was on technology solutions developed in Australia which have included:

- welding of high strength and non-magnetic steels;
- examination of propeller cracking and protective coatings;
- design, manufacture and installation of anechoic tiles on the submarine hull;
- high speed wind tunnel testing to investigate hydrodynamic flow problems;
- examination of engine structural problems;and
- assessment of Air Independent Propulsion (AIP) options (though AIP is not installed on the Collins class at this stage).

Martin Grimm
Tim Lyon

Tasmania

Recent visits of significance have included HMAS *Launceston* to her namesake town and HMAS *Dechaineux* to Beauty Point/Launceston. These vessels were open to the public for tours and a large number of people took advantage of this opportunity.

Over the past six months the Tasmanian Section has enjoyed a number of high calibre seminars presented at the Australian Maritime College. Members of the Industry Liaison Committee (see *Education News*) held an open forum with RINA members introducing themselves and the role within the industry that they represent.

AMC PhD student Jonathan Binns presented a seminar titled *The Re-righting of Sailing Yachts* which he had recently presented at the 2001 Chesapeake Sailing Symposium.

Dr Tim Gourlay presented a seminar from his thesis work entitled *Solitary Waves and Bores Produced by a High-speed Ship in a Channel*. This seminar discussed the effect that, when ships are moving in channels at slightly above the natural wave speed, they radiate solitary waves ahead of themselves. At still higher speeds these waves break and collapse to form a bore travelling ahead of the ship. The presentation included some interesting video footage of these strange phenomena, which helped to explain why they occur.

Martin Hannon

New South Wales

The NSW Section Committee met on 16 May and, other than routine matters, discussed the wash-up of the budget from the Sydney Marine Industry Group Christmas (SMIX) Bash (one sponsorship payment is still outstanding and details to be finalised with IMarE); change over of cheque signatures and treasury (awaiting finalisation of 2000 accounts); updates to the technical meeting program for 2001 (Janis Cocking on *Submarines* now on 27 June, and Rob Tulk on *Aluminium Yachts and Icebergs* on 26 September); the updated RINA website (now in operation, with information being uploaded); and *News from NSW Industry* for *The ANA*.

The NSW Section Committee also met on 20 June and, other than routine matters, discussed SMIX Bash 2001 (possible sponsorships and costs); the venue for technical meetings in 2002 (there has not been universal acclaim for the Rugby Club, and other venues, including IEAust, will be investigated for 2002); updates to the technical meeting program for 2001 (Alex Robbins' presentation on *Regression Analysis of a Series of Low-wash Hullforms* at UNSW now on 8 August); crewing of the RINA stand at Pacific 2002 (a schedule covering the five days was drawn up and timeslots allocated); portfolios for sharing the committee workload; and a nomination from NSW for the Walter Atkinson Award 2000.

A forum on *Do You Have a Future? Continuing Professional Development* was held as a joint meeting with the IMarE attended by twenty-six on 23 May. The chair introduced the subject by defining Initial Professional Development (IPD) and Continuing Professional Development (CPD) (for those who had never heard of them) and then introduced a panel of experts. Short presentations

by Ian Sargeant of Incat Designs representing the large consultancies, Craig Boulton of Burness Corlett Australia representing the small consultancies, John Green presenting the IEAust view, Laurie Prandolini presenting the IMarE view and Phil Helmore presenting the RINA view were followed by the discussion being thrown open to the floor.

A number of issues were explored: Who requires IPD and CPD? Who pays for IPD and CPD? What are the benefits to the employers? What are the benefits to the employees? What are the legal ramifications? Where does self-certification fit into the marine scene?

There was no doubt that IPD and CPD have arrived. All of the professional societies (IEAust, IMarE, and RINA) have policies on CPD. The continuing push by regulatory authorities for self-certification (as in the building industry, for example) means that CPD is here to stay. Queensland has a self-certification scheme for commercial vessel designers in place. One of the major Australian shipbuilders is currently considering IPD and CPD for their naval architects and marine engineers, and how the processes can be integrated into their organisation.

Janis Cocking of the Defence Science and Technology Organisation gave a presentation on *The Impact of Science and Technology on the Collins Class Submarines* to a meeting of the IMarE attended by twenty-six on 27 June. Janis, who is well known for her contribution of previous technical papers, discussed the impact of science and technology on the choices for the design of submarines. Her presentation included a review of the contribution that the DSTO has made to the platform side of the Collins class, including steel and welding technology in the hull, anechoic coatings to reduce target strength; human performance and safety; hull survivability and shock resistance, and acoustic signature reduction.

One of the real achievements has been the development of anechoic tiles by DSTO, manufactured by Mackay Consolidated Industries, and using Ciba-Geigy adhesives. ASC cut and fitted the tiles and grouted between. No Australian tiles have ever fallen off, where all others have suffered in this respect. The technology has now been exported to the USA.

Another achievement has been in the area of determination of propeller loadings. Not having any data or access to any, DSTO strain-gauged a propeller, sent the submarine to sea and measured the loadings. This has been successful, and the technology has again been exported to the USA, as it had not been done before.

The design of the diesel engines supplied for these submarines was changed, and this led to vibration in service which affected injectors, fuel line connections and head gaskets, and led to head cracking, etc. DSTO set about analysing the problem, despite some opposition to continuing. The payoff came in the finite-element analysis, which showed that a simple crankcase-stiffening brace would fix the vibration problem; this was installed and was successful.

Robert Dane of Solar Sailor Holdings gave a presentation on *Hybrid Power Systems for Marine Applications* to a joint meeting with the IMarE attended by forty-two on 25 July on board *Solar Sailor*. The vessel was initially berthed at No. 1, King Street Wharf, Darling Harbour but, with all attendees on board, cast off and motored quietly about Darling Harbour for demonstration purposes and to enable the bar to be opened! *Solar Sailor* uses electric motors powered by a combination of renewable and non-renewable energies. For centuries, ships have used wind energy to sail and the advantages and disadvantages of sail power are well understood. Solar cars have been demonstrated but have not been commercially viable because of poor power-to-weight ratios with scalability. Watercraft do not have these physical limits. In watercraft, scaling up means a greater hull speed and larger surface area for solar collection. Batteries can easily be carried, cruising speeds are achievable on renewable energy and solar energy is abundant on the water and added to by reflected light. Solar power can be complemented by wind energy and the two energy sources can be used as a 'motor-sailor' system.

A major advance has been the development of the 'solar wing', where one structure can be angled to the sun in two planes, or angled to the wind, or a combination of both. When necessary, the wing can be completely reefed or furled onto the roof of the vessel, resulting in a vessel with low windage, yet still able to collect solar energy. For

commercial operations the renewable energies can be backed up with non-renewable energy in a hybrid system. The hybrid system optimises the energies available to meet the demands of the operator and delivers a highly efficient vessel with a drive motor with one moving part, no gearboxes, no auxiliary gen-sets and an internal combustion engine running at optimum revs or a fuel cell for back-up power.

The hybrid power system also offers better passenger comfort and low environmental impact which is highly advantageous to the modern operator. In a military setting the hybrid vessel has the capability of stealth running, rapid response and unlimited range at loiter speeds.

Robert illustrated his presentation with slides showing the construction and development of the vessel and the solar panels from the initial Solar Boat Race entry, *Marjorie K*, to the finished *Solar Sailor*, and followed the presentation with a video showing *Solar Sailor* in operation. Attendees were then free to inspect the vessel, from the engine room (the 40 kW motors were *tiny*, and most impressive) to the wheelhouse and the touch-screen control for raising/lowering/angling the solar wings.

Phil Helmore

Western Australia

Dr Jinzhu Xia, Research Fellow at Curtin University's Centre for Marine Science and Technology, presented a paper on *Flooding-induced Roll Motion of Ro-Ro Vessels*, on 18 April. The topic attracted considerable interest, safety being at the heart of our professional activities.

On 16 May Adrian Miles, Managing Director of Bruntons Propellers, UK, gave an absorbing talk on *Practical Considerations in the Selection of Propellers for Maximum Performance and Minimum Noise and Vibration*. He left a lasting impression of having progressed propeller design from black art to practical science.

The June meeting was a joint presentation by Peter Henley, Research Officer at Curtin University and Dr Jorgen Krokstad, Principal Research Engineer, Marintek, Norway. The described the proposed new deep hydrodynamics test facility for Perth. Details of this exciting new proposal are given elsewhere in this edition of ANA. There was no July meeting, but August will see us visit the premises of Veem Engineering, and presentations will be made later in the year by Prof. Ronalds from the Centre for Oil and Gas Engineering, University of Western Australia, and Prof. Moan from the Norwegian Technical University. Also scheduled are the annual student presentations, which all sections are required to hold under the Australian RINA regulations. Perhaps the combined student presentations from all Australian sections should be electronically bound and placed on the RINA website?

Kim Klaka

Victoria

On Thursday 12 July the Minister for Defence, the Hon. Peter Reith, visited DSTO to present the 2000 Minister's Award for Achievement. This award was established in 1987 to recognise and reward scientific talent in the defence organisation. The recipient this year was Dr Chris Norwood from the Maritime Platforms Division for his outstanding scientific leadership, and his contribution to the management and control of noise and vibration to maritime platforms, particularly the Collins class submarine. The outcome of this research has assisted the Collins class submarine in becoming world recognised for a conventional submarine. Dr John Ritter, also of MPD and a former recipient of this award, discussed some of the outcomes of this research at a recent technical meeting.

Stuart Cannon

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.

HMAS *Hobart* lies in Adelaide awaiting stripping before sinking as a dive site off the South Australian coast (Photo Bryan Chapman)

The multi-purpose diving support vessel *Rockwater 2* lies alongside in Honolulu on 1 August. The ship will raise the fishing vessel *Ehime Maru* (sunk in collision with the US submarine *Greenville*) about 27 m off the ocean floor and move it 14 n miles to shallower water where US Navy and Japanese divers will start recovery operations (US Navy photograph)

COMING EVENTS

NSW

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, Circular Quay, starting at 5:30 pm for 6:00 pm and finishing by 7:30 pm. The revised program of meetings remaining for 2001 (with exceptions noted) is as follows:

22 Aug	MTU Australia, *MTU Engine Developments* (IMarE)
26 Sep	Rob Tulk, *Aluminium Yachts and Icebergs*
24 Oct	Greg Cox, *Compressed Natural Gas as a Marine Fuel* (IMarE)
6 Dec	SMIX Bash on board *James Craig*, Wharf 7, Darling Harbour
IMarE	IMarE meeting
RINA	RINA meeting

Pacific 2002

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

Pacific 2002 International Maritime Conference is being organised by the Royal Institution of Naval Architects, The Institute of Marine Engineers, and the Institution of Engineers, Australia. See page 13 for more information

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

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

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

Pacific 2002 Maritime Education Seminar

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

Pacific 2002 Maritime History Seminar

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

ACT

Sept Peter Clark, NAVSYS Branch, Department of Defence will review the findings of the HMAS *Westralia* engine room explosion and fire based on the Board of Enquiry report and will discuss some of the lessons that can be learned. At the Campbell Park Offices (provisional).

Dec No joint annual dinner is planned but Canberra members are encouraged to attend the NSW Section's annual SMIX Bash on 6 December.

Victoria

The remaining technical program for the rest of the year is as follows:

18 Sept	Annual General Meeting — A Night of Miscellany
16 Oct	Alan Taylor, *Ballast Water Management*
20 Nov	Seref Aksu, *Some Aspects of Hydrodynamic Loads and Structural Strength Assessments of Ships.*

Tasmania

The Tasmanian Section Annual General Meeting is scheduled for 6 September at the Australian Maritime College. Additional technical meetings will be included as they arise. It is also planned to include a number of presentations in the south of the State. Further information is available from Martin Hannon on (03) 6335 4764 or email rinatasmania@yahoo.com.

Queensland

The next technical meeting of the Queensland Section will be held at the Yeronga Institute of TAFE (Brisbane) on 4 September at 1830. The technical presentation will be by James Stephen of Stephen and Gravlev Pty Ltd who will speak about design features of some of his more recent vessel designs. Interstate members and other visitors are most welcome.

GENERAL NEWS

HMAS *Manoora* receives new warfighting command capability

The Joint Task Force Headquarters (JTFHQ) afloat capability in the Navy's landing ship HMAS *Manoora* was officially handed over to the Defence Materiel Organisation (DMO) by Australian Defence Industries Ltd in June.

Mr Jean-Georges Malcor from ADI handed over the capability to the Under-Secretary of DMO, Mr Mick Roche, at a ceremony aboard the ship at Garden Island, Sydney, before a large number of senior defence and industry representatives.

'The JTFHQ afloat capability comprises a suite of four state-of-the-art Command, Control, Communications and Intelligence (C^3I) facilities in HMAS *Manoora* that make the ship the most capable communications platform in the Australian Fleet,' DMO's Project Manager, Commander Derek Abraham-James, said.

'The new deployable capability has been brought into service in response to lessons learned from operations in East Timor. It is also a requirement identified in the Defence White Paper.'

'The JTFHQ afloat capability will enable a Joint Task Force Commander to deploy offshore to plan and conduct operations in concert with other headquarters and units either on mainland Australia or deployed forward within an Area of Operations (AO),' he said.

CMDR Abraham-James said the integration of the systems with each other as well as with the ships' existing systems was a complex and demanding task.

'It is a tribute to DMO, a wide range of Defence organisations and industry that the whole capability was designed, installed and set-to-work in nine months. It was completed on schedule in May in time for use during Exercise Tandem Thrust,' he said.

The principal contractors for the new capability were ADI and CES Computers Ltd, although a total of 17 companies contributed to the development of the capability. A highlight of the project was the willingness of contractors to go to sea as Defence civilians to continue their work and complete the installation after the ship's program changed at short notice.

As well as providing operational support, during non-operational periods the JTFHQ afloat capability can provide television, e-mail, and telephone services to the ship's company, thereby improving the quality of life aboard and consequently crew morale.

HMAS *Kanimbla* will be fitted with a similar capability later this year.

Austal's US Military Breakthrough

On 3 July Austal Limited announced that it had signed a contract with the US Marine Corps to charter a 101 m high speed Theatre Logistics Vessel. The Theatre Logistics Vessel is being chartered by the Third Marine Expeditionary Force (III MEF) for the rapid deployment of marine battalions and equipment in the Western Pacific.

The contract involves an initial 'proof-of-concept' period of approximately two months, but it is an-

MARITIME TECHNOLOGY FOR THE 21ST CENTURY

PACIFIC 2002

INTERNATIONAL MARITIME CONFERENCE

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

IN CONJUNCTION WITH

PACIFIC 2002 | ROYAL AUSTRALIAN NAVY

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

29 - 31 JANUARY 2002

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

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

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

FOR FULLER DETAILS CONTACT

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Facsimile 61 2 9262 3135 Email pacificimc@tourhosts.com.au or visit the website at www.tourhosts.com.au

ticipated that this will be extended for a longer period once the vessel demonstrates its ability to meet the Marines' needs.

Austal's Managing Director, Bob McKinnon, said 'We are extremely proud that Austal was selected by the US Military to be the first supplier of a Theatre Logistics Vessel.'

'Our vessel allows III MEF to rapidly transport a complete battalion of more than 950 marines together with up to 550 t of vehicles and equipment, in one lift, with considerable strategic and cost advantages,' explained Mr McKinnon.

Operations will be conducted between White Beach, Okinawa, Yokosuka Naval Base, Iwakuni, and other ports in Japan. The vessel will be named *Westpac Express* in recognition of the Western Pacific region in which it will operate.

Austal developed the high speed Theatre Logistics Vessel to enhance the capability of military organisations to rapidly move large numbers of troops and cargo during military operations. The vessel has large bow and stern ramps enabling her to load and unload military vehicles in low-infrastructure ports. With strengthened decks, internal hoistable ramps and mezzanine decks the vessel can carry a wide mix of military vehicles.

The needs of the US Military for this type of vessel are potentially huge and this was a major consideration in Austal's strategic decision to establish Austal USA.

New Patrol Boats for the RAN

On 8 July the Minister for Defence announced a Request For Tender for replacements for the Fremantle class patrol boats — a project worth up to $450 million to Australian Industry. The Fremantle class patrol boats have provided almost a quarter of a century of good service to Australia, but are becoming increasingly difficult to maintain and a replacement is needed.

Crewed by Naval personnel, the new Patrol Boats will continue to provide vital operational training for Naval personnel at the front line of Australia's defences against people smuggling, illegal fishing, the narcotics trade and breaches of Australia's quarantine regulations. The Navy contributes 1800 patrol boat days each year to Coastwatch operations protecting our maritime zone.

The Minister said that the Government's preference is to have the new patrol boats constructed in an existing shipyard in Australia, and it has specified that they will be supported and maintained in Darwin and Cairns. The Government is keen to pursue this project under private financing arrangements, capturing all the advantages this approach may provide. The invitation to tender will therefore seek bids under a privately-financed arrangement or direct purchase by the Government. It is expected that a single business entity will take responsibility for not only supplying the patrol boats, but also maintaining and supporting them for the duration of their 15 – 20 year life span.

The Request for Tender documentation will be finalised and formally released in September 2001. The replacement patrol boats are expected to come into service from late 2004.

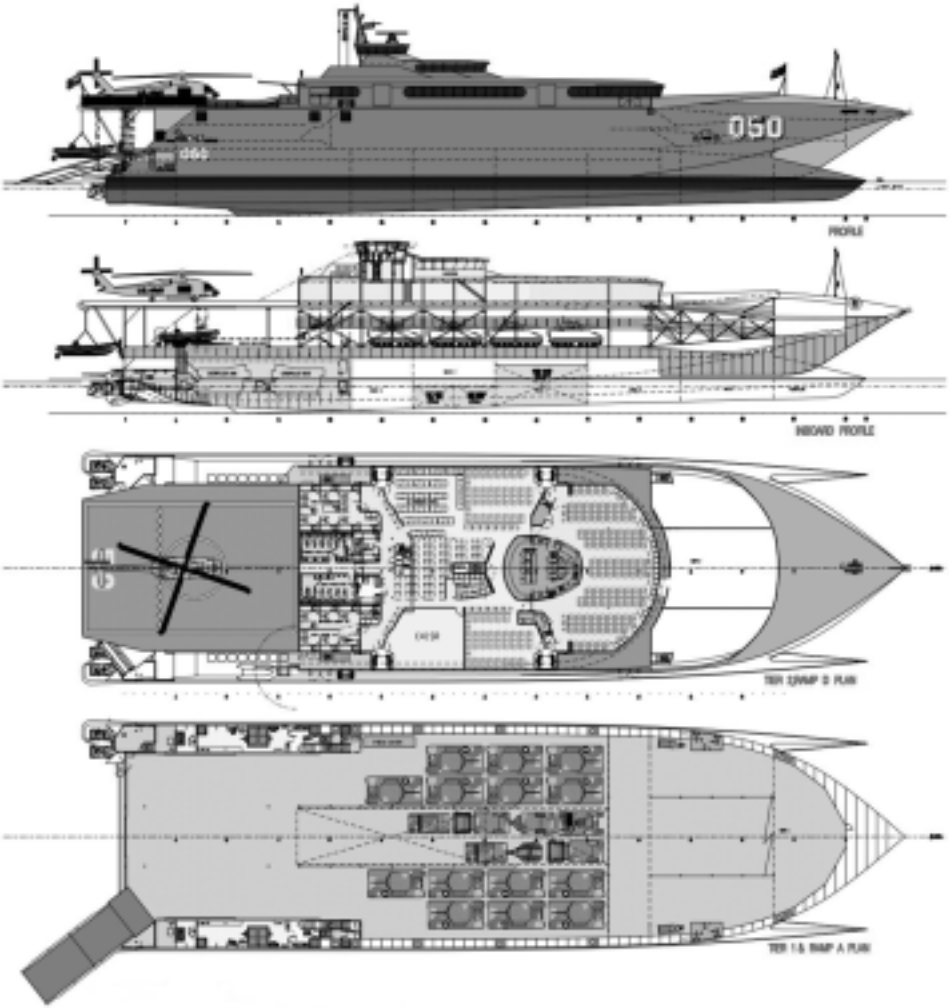
Incat Ship for US Service

Incat Australia Pty Ltd has announced a contract with the United States Military for the supply of a high speed wavepiercing catamaran for a deployment of two years.

Before delivery, Incat Tasmania will have modified and equipped the 96 m *Incat 050* for the task. The preparations include a dry-docking, the building and installation of a helicopter deck capable of accommodating large military helicopters, internal fit-out work and other modifications to suit troop transportation.

The charter, potentially worth A$50 million to Incat Chartering Pty Ltd, the owners of the ship, was won over competition from around the world. Incat Chairman Robert Clifford stated 'Incat is extremely proud to be chosen as the first supplier of a High-speed Theatre Logistics Vessel to operate with the military in the United States. This groundbreaking contract could be the most significant in the company's history, and an historic one for the Australian shipbuilding industry.'

TACOM, the Tank-Automotive and Armament Command of the US Army, will use the high-speed craft to demonstrate its ability to perform specific mission scenarios and limited operational experiments in order to assess its usefulness in US Military and Coast Guard applications which require a platform to move troops, heavy military vehicles



General Arrangement of *Incat 050* in military service (courtesy Incat Australia)

and equipment.

Other arms of the US Military will also participate in this unique Joint Forces 'proof-of-concept' project. It is anticipated that the US Navy and Coast Guard will work with the US Army looking at the innovative technology as a complement to their existing amphibious force ships.

The contract requirement is for 325 personnel and 450 t of equipment to be moved over 1 100 n miles at an average of 35 kn to prove the concept of fast yet cost-effective marine transport. The ship must also be able to launch and recover helicopters and rigid inflatable boats in sea state 3.

The 472 m^2 helicopter deck fitted to *Incat 050* to handle large helicopters such as the SH-60 Sea Hawk and the CH-46 Sea Knight is a world first for high-speed craft. The helicopter deck, and a two-part hydraulically-operated vehicle ramp to allow rapid loading and discharge of vehicles from the stern or alongside, have been designed by Incat's Hobart-based design team to meet military specifications.

A team of Incat personnel will work with the US forces in an initial training and support role, and in conjunction with the team from Incat's American associate Bollinger/Incat USA, will administer the contract and provide on-going support.

Incat 050 has become the first ship to use Incat Tasmania's new covered dry dock. Named Wilson's Dock after the renowned Tasmanian shipbuilding family, the deeper and wider dry dock is parallel to the Coverdale's building hall and takes Incat's total undercover facility to over 40 000 m². Constructed on reclaimed land, timber piles were driven into the bedrock to a depth of 21.5 m. These piles are capped with concrete, with pedestals on top to secure the building's steelwork. Designed to accommodate the new Evolution one12 and 120m wave-piercing catamarans, the reinforced concrete panels, 1520 mm wide, 350 mm deep, 5m high and weighing some eight t, were manufactured on site. The steel gates for the dock were designed and built by Incat.

Incat 050 will be undocked in mid-September. The ship will complete extensive sea trials before leaving for the United States

Incat 050 entering the new Wilson's Dry Dock
(Photo courtesy Incat Australia)

Submarines Combat System

On 9 July the Minister for Defence, The Hon. Peter Reith, announced that the Government had decided that a comprehensive arrangement with the US Navy on submarine issues is in Australia's best strategic interests, and has therefore decided that the selection of the combat system for the Collins class submarines cannot proceed at this time. The two short-listed tenderers were the US-based Raytheon and European-based STN Atlas.

In his statement the Minister said that recent developments in the relationship between Australia and the US on submarine issues, together with the accumulated experience and emerging understanding of the operational potential of the Collins class submarines, had made this decision most appropriate in our strategic circumstances.

The Australian and US Navies are entering into a Statement of Principles arrangement to achieve a shared goal of maximum cooperation and synergy on submarine matters.

'These arrangements will give Australia even better access to US military technology which gives us a vital edge in capability and operations. One

of these vital and sensitive areas is in submarine technology. US Navy assistance with hull, mechanical and propeller technology has been critical in improving acoustic performance and overcoming significant shortcomings in the Collins class,' the Minister said. 'Increased cooperation and interoperability on submarine matters with the US, together with the increasing national security cooperation opportunities this provides, is of overarching strategic importance to Australia. This will enhance tactical growth and long-term interoperability of the Australian submarine force in cooperation with the US.'

The selection process for the heavyweight torpedo has also been terminated. A new arrangement will be developed by the Australian and US Navies under a cooperation agreement.

'The benefits of this decision include greater access to US Navy tactical information, resupply in time of need and the provision of torpedo-firing exercises with US submarines. The Government is committed to achieving the best possible long-term military capability for Australia's six submarines' Mr Reith said.

New Wavepiercing Catamaran Design from Incat

Incat Australia has announced a new design of wave piercing catamaran, the Evolution one12. The design has an operating deadweight of 1 000 t, and will operate at speeds of 40 kn, or 45 kn with 500 t deadweight.

The vehicle deck provides 589 truck lane metres plus 50 cars, or 312 cars in a full tourist mode. With extra optional mezzanine decks fitted the possibility for even greater car capacity exists. Increased vehicle deck headroom of 6.3 m at the centre lanes, and 5.95 m outboard under the raised mezzanine decks, will allow the stowage of double stacked containers or MAFI trailers.

With a beam of 30.2 m, heavy road vehicles such as B-Double trucks and semi-trailers can easily turn in the bow for quick disembarkation over stern ramps.

The passenger cabin provides for up to 1 000 persons.

Propulsion is based on 9 000 kW medium-speed marine diesel engines such as the new Ruston 20RK280 and the Lips 6-blade 150E waterjets with Incat's inboard hydraulics system.

Incat's new Evolution one12 design.
(Courtesy Incat Australia)

WaveMaster Delivery

On 18 May 2001 WaveMaster International delivered the 37 m aluminium monohull ferry, MV *Ceol Na Farriage* (*Song of the Sea*) to Island Ferries Teo. The vessel was shipped to the west coast of Ireland and now operates between Rossaveal and the Aran Islands.

In Ireland, *Ceol Na Farriage* will join sister ferry *Draiocht Na Farriage* (*Magic of the Sea*) which was delivered by WaveMaster in 1999. Delivery of *Ceol Na Farriage* follows WaveMaster's March completion of a major refit and refurbishment of the 45-m aluminium catamaran ferry, *Polarstern*, for leading German ferry and hotel operator AG Ems.

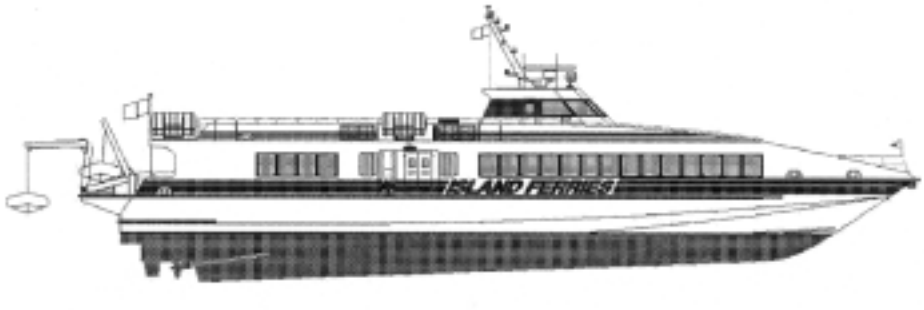
Polarstern operates a busy schedule between Emden, Borkum and Helgoland, on North Sea routes similar to those served by WaveMaster's new-generation 50 m aluminium monohull ferry, *Speedy* delivered to German ferry company Reederei Warrings last year.

With these European deliveries completed, WaveMaster is now moving forward with a series order for design and construction of six new 35 m high-speed monohull ferries for Berlian Ferries in Singapore.

GENERAL PARTICULARS

Length overall	37.4 m
Length waterline	31.0 m
Beam (moulded)	8.0 m
Hull depth (moulded)	3.0 m
Maximum hull draft	1.3 m
Maximum draft (approx)	2.5 m
Passengers	294
Crew	6
Total Deadweight	29.8 tonnes
Machinery:	Two Caterpillar 3412 E
Continuous rating:	821 kW at 2 300 rpm
Fuel Consumption:	415 L/h
Propellers:	Two 5 bladed
Auxiliaries:	Two Perkins 72 kVa
Performance:	Speed limited to 19.9 kn to comply with regulatory authority requirements.
Range:	350 n miles (at continuous speed using 90% of fuel)

Ceol Na Farriage



New South Wales News

New Design

Current projects on the drawing boards (i.e. the CAD screens) at Crowther Multihulls include a 20 m ferry for operation in Thailand, two 28 m luxury motor yachts to be built in Brazil, and a 28 m passenger catamaran being built in Australia for operation in Taiwan.

Incat designs are finalising two designs: a 44 m catamaran ferry for Iran to be built under a cooperation agreement between Seaspray Aluminium Boats Emirates and Arvandan Shipbuilding of Iran, and a 23 m wave-piercing catamaran sports-fishing vessel for Indonesia being built at Image Marine in Fremantle.

New Construction

Eric Toyer, a one-time drafter at Commercial Marine Design in Sydney, has built and recently launched a 17 m sailing catamaran at Maclean on

the Clarence River in northern NSW. Eric will sail the vessel to Dar es Salaam, Tanzania, where he will operate charters (as owner, operator and master) along the east coast of Africa.

The Pacific Whale Foundation of Maui, Hawaii, has taken delivery of *Ocean Odyssey*, an aluminium catamaran for their Eco-Adventure cruises which include snorkelling, dolphin watching and whale watching. *Ocean Odyssey* was designed by Crowther Multihulls in Sydney and built by Kvichak Marine in Seattle, USA. The vessel is 19.5 m in length overall, has 8.53 m beam, a displacement of 43 t, and was built under survey to US Coast Guard regulations for 149 passengers on two decks. Power is provided by two Cummins KTA-19 M4 diesels, each rated at 522 kW at 2100 RPM, driving 762 mm diameter skewed propellers through ZF IRM 350-A2 gearboxes. Cruising speed is 23 kn, with a maximim speed of 27 kn.

The last three months has seen the launching of a number of the vessels that Incat Designs have been working on. *Seastreak New York* (43 m catamaran built by Gladding Hearn), *Jet Cat Express* (44 m catamaran built by Nichols Bros), *Mendincino* (44 m catamaran built by Nichols Bros) and *Athena* (30 m catamaran built by Gladding Hearn) have all been delivered to their respective owners. Production is continuing on the remainder of the contracted vessels, with Gladding Hearn yet to deliver a second vessel for Seastreak, two vessels for the Bermuda Department of Transport, and a recently-contracted vessel for the Putin Bay Boat Line. This vessel will be the third Incat/Gladding Hearn vessel for this company. The hulls will be built using composite materials and the superstructure will be built of aluminium. Nichols are on schedule for the delivery of the second vessel for the City of Alameda on San Francisco Bay.

Incat-designed *Jet Cat Express* was specifically designed to meet the requirements of the 26 n mile route between Long Beach, California, and Catalina Island for operators Catalina Express. She was delivered to Catalina Express in a ceremony at Nichols Bros Boat Yard on Whidbey Island, Washington, on 28 April 2001. She is Incat Designs' 153rd delivered catamaran. Principal particulars are as follows:

Length OA	44.27 m
Beam	10.45 m
Draught	1.80 m
Main Engines	4 x Cummins KTA 50 1398 kW each
Gearboxes	4 x ZF BU460
Waterjets	4 x Hamilton HM651
Speed	39 kn
Ride Control	MDI T-foils and interceptors
Seating	381 x Beurteaux interior and exterior Seats
Luggage cap.	4.5 t
Fuel	15 000 L
Fresh Water	900 L

JetCat Express

AMD Marine Consulting

John Szeto and Allan Soars have formed a new company called AMD Marine Consulting which will specialise in high-speed craft design and associated consulting. This new company has acquired all the equipment, technology and intellectual property previously held by Advanced Multihull Designs, including Advanced Multihull Designs' joint venture operations in China.

'The early years of Advanced Multihull Designs were turbulent to say the least, leaving the company with structural problems and legal entanglements which made it difficult to handle the current slump in the high-speed ferry market' says Allan Soars. 'A complete restructuring was necessary, but the legal entanglements made Advanced Multihull Designs a poor vehicle for future development. The office in Pymble was also much too large for current requirements. The only practical option was to start with a clean sheet and form a new company.'

AMD Marine Consulting currently has three staff in Sydney, with a further nine technical staff in Guangzhou, Southern China. The Sydney staff are

presently working from home, connected via the Internet, until such time as current project prospects firm up, and office requirements become clearer. The contact phone, fax and email numbers for the new company remain the same as for Advanced Multihull Designs.

Around and About

On 21 June a large section of the marine industry gathered at The Chatswood Club at the invitation of MAN B&W to farewell an engine sales legend, Joe Natoli, who has retired. Joe served his apprenticeship at Cockatoo Docks and Engineering Company (at the same time as Noel Riley, Don McGeechie, Jim Lawler and John Bryant), and went to sea as an engineer for five years with Port Line on their ships *Port Lyttelton* and *Port Montreal*. He came ashore into engine sales where he rose to become Manager of Deutz-MWM Far East. He will be remembered by all as the inaugurator of the original Sydney marine industry Christmas parties. A short speech was made by Larry Silver, the Managing Director of MAN B&W. *The ANA* wishes Joe a long and happy retirement.

Marine pumpout facilities have been provided at several locations in Port Stephens. Under the Natural Heritage Trust and ClearSeas program, the Federal Government allocated $406 000 to Port Stephens Council for the facilities. Additional funds and resources were provided by the NSW Department of Land and Water Conservation and the Waterways Authority. The pumpout facilities are shore based, with just a suction pipe and a switch for operation at the berth. Slops hoppers are also provided at the berth so that waste from portable chemical toilets, an alternative to onboard holding tanks, can be accepted. The facilities have been installed at the Nelson Bay weigh-station, the Soldiers Point marina, the Waterways jetty at Tea Gardens, the Karuah jetty and the Lemon Tree Passage jetty.

Cockatoo Island, once one of the largest and busiest industrial complexes in Australia, has been sleeping in the sun, undisturbed for a decade. However, that is about to change as the Sydney Harbour Federation trust begins regular weekend public tours, commencing on 11 August, to be led by history teacher, Greg Taylor. Cockatoo was occupied by the Aborigines before European settlement, and subsequently became a prison, a reformatory and, in its last transformation, a dockyard and shipbuilding complex. Substantial parts of these layers of history remain to illustrate Taylor's stories of the history of and life on the island. The tours run each Saturday (at 1030 and 1330) and Sunday (at 1000 and 1400) and cost $12 per head ($6 concession). Bookings are essential and can be made on Tuesdays and Thursdays on (02) 8969 2199.

Restoration work on *John Oxley* by the Sydney Heritage is getting up a decent head of steam, with thirteen floors, frames and stringers replaced in the forward hold. Work has started on clearing the boiler room, and the boilermakers are finding the frames and plating in much better condition than expected, so that less will have to be replaced. They are also finding the work heavier on *John Oxley* than on *James Craig*, despite *John Oxley's* smaller size. The frames on *John Oxley* are angle frames, where on *James Craig* they are angle and reverse angles, which are smaller and were easier to bend. A 'work-for-the-dole' scheme has been approved for *John Oxley* for a sum of $38 000, with workers due to commence on 27 August on the restoration of the galley and cabins.

From 1 October 2001, a ban imposed by the NSW Government on the operation of personal watercraft (i.e. jet skis) on Sydney Harbour, Middle Harbour and the Parramatta River comes into effect. The ban has been greeted with cheers of delight from the opponents, and howls of protest from the disciples.

Phil Helmore

Victorian News

HMAS *Warramunga*, the RAN's newest Anzac Class ship was delivered in February of this year and commissioned in March. She has since been in and out of Melbourne, and will continue to do so before home-porting in Perth in November. She is the third Anzac class frigate delivered, with five more frigates to be delivered in coming years.

Heavily involved with the Anzac projectis a company with one of the highest concentrations of naval architects in the country, Australian Marine Technologies. Rob Dunbar has been appointed General Manager, leading AMT through a period of growth as it continues to support the Anzac Ship Project, whilst increasing its mutual support ar-

rangements with Blohm + Voss. Dudley Simpson has just returned from a nine-month secondment to Blohm + Voss in Hamburg, with Gerard Kenny now joining other AMT staff in an ongoing secondment program. It is both AMT's and B+V's intention to maintain a level of four to five staff at Blohm + Voss on a staff-rotation program in support of current and future AMT activity both in Australia and beyond. Paul Duncan, a graduate last year from AMC, joined AMT in December 2000, working under the direction of AMT's Senior Naval Architect, Bernie Phelps. In recent months the team has successfully completed a broad range of activities, including Anzac sea trials and stability assessments, extensive shock and vibration design for the RNZN air weapons magazine, design changes for both ships in-build and in-service, and on-going production support.

Stuart Cannon

Queensland News

In the Brisbane area, Aluminium Marine has completed a 24 m dive catamaran, *Poseidon III*. The vessel is operating out of Port Douglas and can carry 90 divers and a crew of 10. Under construction is a 27 m *Passagemaker*. This vessel is unusual in that it has asymmetric hulls, with a beam of 9 m, a tunnel clearance of 3 m and internal outfitting in hand-built timber. This vessel is suitable for circumnavigating Australia in comfort.

Brisbane Ship Constructions has delivered an 18.5 m monohull workboat to a local company for operation in the Brisbane area. Recently they have completed a punt for Fantasea Cruises and a glass-bottom boat.

Norman R Wright & Sons have a full order book. They recently completed a 10 m seismic survey craft for the USA and under construction is an 18 m game fishing boat, two 20 m motor yachts and another 12.5 m picnic boat. On the drawing board are two ferries for Bangkok, and the initial design of a 35 m motor yacht.

Lightning Boats of Brisbane has just completed a 21 kn, 18 m passenger ferry for Palm Beach Ferries of Sydney and under construction is a 24 catamaran night-cruise vessel for Sydney Harbour. Oxford Yachts are building a 28 m, 32 knot, passenger ferry designed by Crowther Multihulls. Queensland Ships have delivered a 37 kn, 10 m catamaran for the Manly (Brisbane) Coastguard Organisation. Queensland Ships have now joined forces with Pacific Boats of Clontarf and continue to build their range of 4.5 m and 5.2 m Cylinder boats. South Pacific Marine is building a 24 m catamaran night-cruise vessel for Sydney Harbour, similar to that being built by Lightning Boats. The vessel is equipped with an 'over-the-water' stern dance floor, bars and restaurant facilities. South Pacific is also undertaking a major refit of a 27 m catamaran, including re-engining, providing a new dry exhaust and venting system, and refurbishing the accommodation.

On the Gold Coast, Sea Transport Solutions (STS) recently secured a contract for the design of a 45 m freight/cargo catamaran for ferry operators Rederij-Doeksen of the Netherlands. The same company has also commissioned STS for the concept design, consultancy and feasibility of their proposed 62 m passenger ferry. STS has almost completed a 45 m passenger catamaran at South Pacific Marine, which is intended for the Bahamas. STS are also assisting Sunrunner Sport Cruisers in the survey process of their new range of FRP monohulls. STS is aiming to capture more of the survey market and export to Europe.

Launching of the prototype tourist amphibious vessel is imminent at the Gold Coast City Marina. This is a venture between operators/designers Sydney Adventure Ducks and builders Henwood Engineering.

Brian Robson

Western Australian News

Local industry is picking up again after a quiet start to the New Year.

SBF Shipbuilders presently have a 20 m monohull dive charter vessel under construction for a local client, and are about to launch a day charter catamaran for operation on the Swan River. Structural Marine are currently building a 21.7 m tug for harbour docking operations in Esperance. Thomascraft have recently delivered their first Thomascraft 4500 in commercial survey to Sydney.

The Australian National Ocean Basin Test Facility

An Australian National Ocean Basin Test Facility is proposed for the redeveloped Jervoise Bay Marine Industry Technology Park, south of Fremantle, on the coast of Western Australia. The Facility is jointly proposed by the Centre for Marine Science and Technology at Curtin University and the Centre for Oil and Gas Engineering at the University of Western Australia.

The Facility is designed to be the largest and most advanced of its type in the world and will serve to attract the international oil and gas industry to carry out design and testing of offshore facilities in Western Australia. It will also provide a world-class investigative and research instrument for Australian scientists and engineers working in the fields of maritime and ocean engineering, offshore resource development, maritime defence, fast ferry design and construction, and a range of other marine industries.

The Facility will be formed around a large, hydrodynamic model test basin of dimensions 50 m x 50 m x 20 m deep. A central 6 m diameter, 15 m deep pit in the floor will provide a maximum depth of 35 m. The basin will be fitted with multi-element wavemakers, which will allow the generation of realistic ocean wave spectra, and wind-generation capability will be provided to ensure that all aspects of open-ocean behaviour can be accurately modelled. The basin will also be provided with the means to model ocean currents and a towing carriage will be provided for ship model trials.

The facility will include instrumentation for measuring model responses to imposed conditions, computers to monitor, record and analyse the measurements, technical staff to build and install models and take measurements, research staff to analyse data and administrative staff to provide support services.

It is intended that the facility will be used as a focus to build national capability in the fields of hydrodynamic design and testing. A high level of numerical modelling expertise will also be required to support the facility, and this will be maintained on site and by encouraging visiting engineers and researchers from around Australia. Such technology and expertise will be transferred to Australian industry by direct experience of the facility, by teaching and student contact, and by collaboration with international clients and other facilities. MARINTEK, the Norwegian Marine Technology Research Institute, is a world leader in the field and is assisting a project study by both direct funding and secondment of personnel. It is intended that this international collaboration will continue throughout detailed design and eventual operation of the Facility. The current design of the facility is complementary to those already operated by MARINTEK in Norway and their continued involvement will greatly assist in the design and commissioning of the facility and its acceptance by international users.

A Project Initiation Study is being undertaken to determine the feasibility of the proposal, and is expected to report in July 2001. A review has been completed of similar worldwide facilities, and an extensive program of industry interviews has been undertaken within Australia. Project team members have also carried out a program of interviews with offshore oil and gas engineering and operating companies in Houston, USA, to ensure that industry requirements and potential usage of the facility have been accurately established.

International oil and gas exploration and production companies which were interviewed stated unequivocally that, provided it is competitive on cost and capability, the proposed facility will be used. The companies also stated their belief that model testing will be required for the foreseeable future, notwithstanding the increased use of numerical modelling techniques to compensate for the unavailability of deep test facilities. They require large-area, deep facilities that permit modelling at smaller scale ratios and avoid, as far as possible, the need for truncated models.

Offshore engineering companies use test facilities to provide calibration input into the numerical modelling and design process. Increased fast tracking of projects is intensifying their requirement for hydrodynamic testing early in the front-end engineering design phase.

The offshore industry is beginning to develop prospects in increasingly deep water. This trend is putting strain on numerical techniques and is reinforcing the requirement for design verification by full model testing. In the absence of deep-water testing capability, such fields may have to be developed conservatively, and this may affect their economic viability.

All international companies interviewed stated that they have problems obtaining access to the major international test tanks and see a need for greater industry capacity. For example, the Perth office of an international engineering company forecasts approximately 56 days of tank testing per year for projects in the Asia-Pacific region alone. All this work currently goes offshore.

Kim Klaka

James Craig's Voyage to Newcastle

David Gosling

Sydney Heritage Fleet's restored three-masted barque *James Craig* departed her berth at Wharf 7, Darling Harbour, at 2000 on Saturday 23 June 2001, bound for Newcastle. For this first voyage following re-commissioning, there was a total of sixty-four crew on board, comprising six deck officers, three engineering officers, fifty crew and five hospitality staff. The majority of the officers were accommodated in the nearly-completed officers' accommodation under the quarter deck, and the crew were accommodated in the original deckhouse and in hammocks slung in the 'tween deck.

The original intention was to sail the vessel for as much of the voyage as practical; however, the prevailing wind and currents resulted in the need to motor for practically the whole voyage. During the night an attempt was made to set some sails but was unsuccessful. The crew rotated watches and it was noted that holding a straight course when you cannot see land or a horizon was not easy. The task is not made easier with the vision forward being hampered by masts and rigging. As a result, the helmsman had to rely heavily on the forward lookout to report any fishing vessels and other commercial traffic.

The vessel performed well in the slight swell and there were no failures in the propulsion system. We arrived off Newcastle at 0800 on Sunday 24 June and had a series of sailing exercises until 0900 when the pilot boarded to take the vessel in. On entering Newcastle Harbour, the vessel received a salute from a cannon and was followed down the harbour to her berth by both spectator craft and spectators on the shoreline. A small civic reception awaited the vessel and, following this, the general public were invited on board to inspect her. It was positive to see a steady stream of people from all age groups coming aboard.

During the ensuing week the vessel was open for inspection, with around 2 500 people taking the opportunity to go aboard. On Saturday 30 June, *James Craig* departed on her first commercial offshore charter with eighty guests and thirty-five crew. The total trip was around five hours in duration; the crew set half the sails and, without the iron topsails, she achieved about 4 kn in the light winds.

Sunday 31 June marked the last day in Newcastle, so we loaded one tonne of coal in bags as cargo for the voyage south using *James Craig*'s own gear, and departed at 1500 bound for Sydney. With our expected arrival time off Sydney Heads of 0700 on Monday 1 July, we had a leisurely cruise down the coast and were met at the heads by Sydney Heritage Fleet's steam tug, *Waratah*. Berthing with the help of *Waratah* at Wharf 7, we then unloaded the coal cargo into *Waratah*'s bunkers, again using *James Craig*'s own gear.

James Craig has completed the NSW Waterways Authority's survey requirements for Class 1E operations carrying 150 passengers and 25 crew, and Class 1C operations carrying 100 passengers and 25 crew. The vessel is now open for charters and departs from Darling Harbour at 1000 each Saturday for offshore day-sailing excursions.

David Gosling is a Waterways Authority naval architect and surveyor who has been involved in

the survey of James Craig. *He has completed his exams for MED III and MED II, and is currently clocking up sea-time. He was on board as Third Engineer for the trip to Newcastle.*

James Craig at sea
(Photo courtesy Sydney Heritage Fleet)

James Craig Sails On

The Open Training and Education Network (OTEN) is holding another Square Rig Certificate Course in October. The course provides theory, practice and formal qualification in the art of sailing a square-rig sailing vessel. OTEN's first Square Rig Certificate course was held in 1998 and was a great success with 20 students attending. The course earned particular praise from Captain Neil Galletly, master of *Young Endeavour*, and the members of the Sydney Heritage Fleet management who attended.

The course provides quality education and training for participants through a structured program that aims to equip the learner with sufficient skills and knowledge to safely operate a square-rigged vessel. There are no formal prerequisites for the course. The thirteen-day course will comprise three days of theory delivered at OTEN's offices in Strathfield. Then *James Craig* becomes the classroom for an eight-day round trip from Sydney to Eden. While in Eden there will be more theory and also some time to relax before the return leg of the voyage.

The cost of the course is $825 and the course will run from 7 to 20 October 2001 inclusive. Enrolment is essential and should be completed by 14 September. For further details phone Chris Heeks or Nicole Allen on (02) 9715 8475 or email nicole.allen@tafensw.edu.au.

Phil Helmore

On the Acceleration of a Naval Ship

Phillip J. Helmore
The University of New South Wales

The March 2001 issue of MARENSA's newsletter, *Seaspace*, carried the following report:

> 'It is understood that HMAS *Brisbane* and HMAS *Anzac* competed recently in a sharp sprint over a three-mile course. *Anzac* had hoped that a quick engagement of gas turbine power would get them first to the finish line, but *Brisbane*'s 35-year-old boilers and steam turbines responded promptly to full throttle and the old girl showed she still had an unequalled turn of speed. It has been reported that she reached 32 knots on one minute from a standing start.'
>
> [Your Editor advises that, as the ship's commissioning engineer officer, he is not necessarily an impartial reporter.]

Having no experience with the acceleration of naval vessels, reaching 32 knots in one minute from a standing start sounded very quick to me. With interest aroused, I pulled out my copy of Lackenby's (1952) paper and did the following calculations to check whether the claim was reasonable:

Lackenby's equations for the time and distance to accelerate from rest to a given fraction x of the vessel's top speed, modified for use with SI units (Helmore 2000), are as follows:

$$t = \frac{MV}{H} F_t = \frac{(\Delta + a)V^2(1-t)}{222.6P_E} F_t$$

$$s = \frac{MV^2}{H} F_s = \frac{(\Delta + a)V^3(1-t)}{13590P_E} F_s$$

where

t = time to accelerate, min
s= distance to accelerate, n mile
F_t = time factor, from Lackenby's Fig. 7 or 8
F_s = space factor, from Lackenby's Fig. 9 or 10
M = mass of ship including mass of axially-entrained water, t
H = thrust of propeller(s) at speed V, kN
Δ = displacement, t
a = added mass of axially-entrained water, t
V = maximum speed, kn
v = intermediate speed, kn
$x = v/V$
$(1–t)$ = thrust deduction factor
P_E = effective power at speed V, kW
F_t and F_s are dependent on the fractional speed x and the exponent n in the approximating resistance vs speed equation, $R_T = kv^n$, in the region of interest, i.e. just below the required speed v, as this is where the bulk of the acceleration time will be spent.

Not having all of the required information, we have to make some educated guesses:

Jane's (2000) gives the displacement as 3 370 tons standard and 4 618 tons loaded. Assume that the trial was done at the mean displacement of the two, i.e 3994 tons = 3994 x 1.016 = 4 058 t.

Assume that $(\Delta + a) = 1.05\Delta$ for a high L/B vessel = 1.05×4 058 = 4 261 t.

Jane's gives the rated shaft power as 70 000 hp = 52 200 kW.

Jane's gives the maximum speed as >30 kn, which isn't much help. Assume, for the purposes of this

calculation, that the speed at the rated shaft power is 34 kn. The volume Froude number at this speed is then 1.40.

Referring to Hadler and Hubble (1971) Fig 30, we find for twin screws, a volume Froude number of 1.40 and a shaft angle of 6° that (1–*t*) = 0.99 and increasing for lower shaft angles. While this is not a Series 62 hullform, but the thrust deduction factor is likely to be of the right order for the flow around twin screws.

Assume a shaft transmission efficiency $\eta_S = 0.98$. The quasi-propulsive coefficient η_D is more difficult to estimate, but assuming high-efficiency propellers, we take $\eta_D = 0.65$. The effective power is then $P_E = \eta_S \eta_D P_E = 0.98 \times 0.65 \times 52\,200 = 33\,250$ kW.

At a final speed of 32 kn, the fractional speed $x = v/V = 32/34 = 0.94$.

Assume an exponent $n = 3$ for a low *L/B*, high-speed vessel.

Lackenby says that for steam turbine propulsion, the thrust characteristics lie between those for constant torque and constant power, but probably much closer to constant torque. We therefore use his Figures 7 to 10 with $n = 3$ and $x = 0.94$ to determine the time and space factors for both, and interpolate to give 80% towards constant torque:

Item	Constant Torque	Constant Power	Turbine
F_t	1.22	1.02	1.18
F_s	0.74	0.63	0.72

Hence:

$$t = \frac{4261 \times 34^2 \times 0.99}{222.6 \times 33250} \times 1.18 = 0.78 \text{ min}$$

$$s = \frac{4261 \times 34^3 \times 0.99}{13590 \times 33250} \times 0.72 = 0.26 \text{ n mile}$$

Most of the assumptions can be changed over quite a wide range (of the order of 20%) without changing the results by anywhere near the same amount, the maximum speed at the rated power of the turbines having the most effect.

The conclusion remains the same: based on the assumptions above, HMAS *Brisbane* could reasonably accelerate to 32 kn in one minute from a standing start, and would get there in one-quarter of a nautical mile.

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Jane's Information Group Ltd (2000–2001), *Jane's Fighting Ships*, 103rd Edition, Coulsdon, UK.

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The ANA would like to hear from our marine engineering colleagues how one can develop full power in one minute with a 1 200 psi 950°F steam plant from a standing start. We have mental images of Brisbane *at the start leaking steam everywhere, especially from the safety valves. After all, it is easy with diesel engines and gas turbines* — Ed.

Flightship Ground-effect Craft

John Leslie
Managing Director Flightship

The Flightship Ground Effect Company was formed in 1997 and operates out of Cairns, Queensland, Australia. Flightship recently imported the disassembled FS8 Ground-effect Craft from Germany, assembled it in Cairns and is currently testing and evaluating it near Cairns.

This paper provides some of the principles behind the operation of Ground-effect vessels in general, and discusses the development of the FS8 design and certification in particular.

When an aerodynamic wing is operated in close proximity to a surface, several significant events occur. Firstly, a cushion of air develops between the wing and the surface beneath it. In Flightship type ground-effect craft the cushion pressure is typically around 390 Pa. This cushion is created by forward motion making it a "dynamic cushion" rather than by an engine and fan as used in a hovercraft to create a "static cushion". This dynamic cushion development method means a requirement for considerably less horsepower and, as a result, less noise than a hovercraft. Being a dynamic cushion also means a ground effect craft does not produce the large spray and mist plumes common to hovercraft. Secondly, closeness to the ground prevents the development of wing-tip vortices. In aerodynamics, just as in hydrodynamics, swirling vortices generally represent losses in flow efficiency. In ground-effect craft the development of wing-tip vortices is restricted even further by the fitting of winglets and end plates to the wings. As you may have noticed, modern jet aircraft now also fit these winglets for the same reason of defeating vortex development and increasing efficiency in free flight. Restriction of downwash on the trailing edge of the wing reduces turbulent mixing on the wing, reducing in turn the development of induced drag. A third effect of a wing operating in ground effect is that the "effective" wingspan of the craft is significantly increased over the physical wingspan. This is due to the ground plane's effect on the airflow circulation around the entire craft. When compared to an aircraft in free flight, a ground-effect craft has marked improvements in terms of lift and drag. In general terms, a suitably-designed wing in ground effect can generate 45% more lift than a comparable aircraft wing. A properly designed ground-effect craft, flying at optimum height above a surface, will have up to 70% less drag than the same aircraft. In terms of operating efficiency, smaller engines can be utilised and the overall payload capabilities of a given craft can be increased significantly.

In the extreme case of a flightship versus a helicopter, the payload-to-horsepower difference translates into an astonishing 600% reduction in fuel usage. This is a little unfair, as a helicopter is the most inefficient flying machine ever built, however they are popular transport choice in the tourist industry, which is also a target market of our Flightship FS8 craft.

A generalised comparison of typical operating speeds shows the Flightship bridging that well-known gap between aviation and shipping in terms of speed and operating costs. Combining the typical operating costs with speed gives us a more complete overview of what the Flightship ground-effect craft offers to the world of commercial transport.

In relation to Flag Administration requirements for ground-effect craft, the first question of course must be "Is it an aeroplane or is it a boat?" Some time ago the two United Nations bodies concerned with these matters, IMO and ICAO, deliberated over this jurisdiction. The outcome in 1995 was that ICAO defined an aircraft as any craft able to remain airborne without the requirement of interaction with a surface beneath it. This then places the issue of the design and operation of a craft in ground effect over water, firmly under the auspices of IMO. Accordingly IMO has since undertaken the development of a set of international guidelines for the design and operation of ground effect craft. The IMO adopted terminology for these craft is a Wing in Ground effect craft with the resulting acronym of WIG craft.

All Flightship ground-effect craft are only able to operate close to water, at a height above the water

surface, which is less than the overall width of the craft. IMO classes craft with these limitations as Type A WIG craft and wholly under their jurisdiction. Some ground-effect designs in the world are able to jump up to considerable heights using forward momentum. According to the designers of such craft this manoeuvre can be used for crossing land or over obstacles. With proper navigation and operation we do not see a requirement for such manoeuvres in commercial operations. These craft are unable to stay permanently out of ground effect due to large power requirements and these are classed as Type B craft by IMO.

Type B craft are required to meet all aviation design and construction specifications and their operations are to be jointly overseen by IMO and ICAO. This is really a jurisdictional "no-mans-land" somewhat like getting CASA and AMSA to work together. Building a ground-effect craft to full FAR aviation rules compliance also defeats many of the construction and operational cost benefits that a Type A craft such as the Flightship designs enjoy.

The third type of ground-effect craft has sufficient power installed to leave ground effect altogether and fly for long distances at altitude as an aircraft. These craft are classed Type C WIG craft and are solely under the jurisdiction of ICAO for aviation standards of design and construction. Australia, through the positive support of the Australian Maritime Safety Authority, is pro-active in the development of the IMO WIG safety guidelines and for the past two years Flightship have had the privilege of being invited as technical advisors to the AMSA delegation to IMO in London.

From all information available to us, Flightship is currently at the forefront of commercial ground-effect development worldwide. Flightship's three years of experience with Germanischer Lloyd's plan approval is proving to be a positive contribution to Australia's input into the IMO WIG guidelines. In many ways this is similar to how the Australian wavepiercing cat designers and builders influenced the IMO HSC code development not so long ago.

In 1997 the Flightship Ground Effect Company was formed and was funded with private capital as an Australian/Singaporean venture. A low technical risk approach to the first craft was adopted and performance specifications for the development and construction of a Flightship FS8 were given to a German design company previously associated with the RFB Dornier Lippisch group.

The FS8 is an 8-seat Lippisch type craft under classification society survey with a cruising speed of 86 kn and capable of safe and efficient operation over 2 m seas in 30 kn of wind.

During the course of construction in Germany, the classification society Germanischer Lloyd agreed to undertake plan approval and survey of construction. The British Hovercraft Safety Requirements, High Speed Craft Code and Federal Aviation Regulations Part 23 formed the basis of the design and construction criteria.

Flightship FS8

During preparations for construction these standards had been put forward by AMSA as a sound basis for ground-effect design and this was borne out through the experience of Germanischer Lloyd.

The first FS8 was completed after three years of interesting but very challenging work. In February this year the finished FS8 was trialled in Holland by the German contractors and formally handed over to Flightship for transport to Australia. The craft is now completing design validation sea trials with Germanischer Lloyd and commercial operational certification through Queensland Transport in Cairns. This process is currently under way and is scheduled for completion before the end of October 2001. Following this we will provide private client demonstrations for marine operators from around the world and commencement of serial production in Queensland.

The Flightship FS8's typical operating height is a 2 m sea with a forward speed of 85 kn which prohibits the craft from any up-and-down wave following. This is because each trough and peak passes under the craft with such rapidity that the fluctuations in cushion pressure do not translate into longitudinal pitching moments.

The class certificate for operation in 2 m significant wave height is calculated on the craft's ability to operate up to 2 m above wave crest, thus allowing for statistical events such as wave heights 100% in excess of the significant wave height.

When banking, the Flightship FS8 suffers from no adverse pitch or yaw moments through wing tip contact with the surface of the water.

At the speeds that the craft can travel, the water already has 800 times the density than of and effectively becomes like concrete and any structural contact is reflected quite forcibly, somewhat like skimming stones across a pond.

The only significant response resulting from a wing-tip strike is that the craft wishes to level out of the turn into straight and level flight. This is further enhanced by the sudden increase in cushion pressure under the wing tip area when a wave approaches the underside of the craft.

The configuration of the craft highlights the reverse delta-wing shape and the raised tailplane, or horizontal stabiliser, that operates out of ground effect — thus providing inherent longitudinal pitch stability to the whole craft.

Twin fixed-pitch airscrews are driven by shafts through a tooth belt reduction gearbox from a single Chevy V8 6.2 L engine producing 450 hp at take off and 315 hp at cruise.

The payload of the craft is 2 crew plus 6 passengers or 650 kg of freight, with a range of 200 n miles with fuel safety reserves. Greater range can be added with a proportionate reduction in payload.

With the airscrew drive clutched, 10 kW electric water drives fitted into each wing tip allow the craft to turn on the spot, reverse or quietly taxi at up to 5 kn for mooring and docking as well as transit to take-off areas. This feature removes unwelcome high noise levels of airscrews from marinas and dock areas.

Noise levels of the craft under airscrews is specified at 75 dBA at 100 metres which is a legislated environmental level similar to the noise level of a semi-trailer on a 100 km/h highway at the same distance. These noise levels are way below those of hovercraft or commercial aircraft, which can reach 125 dBA at, take off.

The structural concept behind the Flightship FS8 is a relatively straightforward assembly of bulkheads, longitudinals and intercostals with main spars and ribs in the wings. The entire construction is PVC foam core sandwich using E glass and epoxy laminations. Some carbon fibre is used in high stress areas for load distribution. An aluminium spar is fitted between the wing connecting point across the main fuselage.

The petrol engine and fuel system fitted to the craft is installed under full FAR 23 aviation standards and provides a level of safety no less than that of all light aircraft in commercial operation in the world today.

One of the major learning curves in the development and construction of this type of craft is the need to

blend the differences between marine and aviation regulations. Just as oil tankers won't fly, so too Boeing 737's have terrible sea-keeping abilities.

Every aspect of the FS8 design is weight critical. Every 10 kg of structure or equipment on board the FS8 means another 1 kW of engine power required to get it into the air. Every 1 kW of engine power needs another 1 kg of engine weight. Less-than-stringent weight budgeting becomes like that of a dog chasing its own tail.

The fundamental concept of safety in shipping is mitigation. After a collision, grounding or other incident at sea, the process of abandoning ship is the prime issue that all ships are geared for.

In aviation, the fundamental concept is prevention. After a collision or "grounding" in an aircraft the availability of lifeboats or lifejackets is really a minor issue. This approach to safety in aviation permits the reduction of weight in many areas of safety equipment and places far more emphasis on operator skills and detection and avoidance equipment.

This change in emphasis from accident mitigation to accident prevention has slowly been gaining impetus in the IMO HSC code with experience in recent times such as the Sleipner high speed ferry incident in Europe.

In ground effect, where weight and safety are directly put against each other, IMO has fully grasped this fundamental requirement and the forthcoming WIG guidelines are based on safety case risk analysis rather than the prescriptive regulations as applied to conventional shipping.

The safety-case approach permits the widest scope for design innovations and demonstration of suitability of measure taken to avoid collision, while in no way compromising the safety of those aboard the craft at any time.

The Flightship FS8 has a maximum 800 m turning radius at 86 kn cruise speed due to its ability to bank like an aircraft. With a 4 minute unaided visual detection time of an aluminium dinghy, and even if the helm and navigator fail to notice an obstacle for the first 3 min and 50 s, at 12 s or only 500 m from a possible collision, a non violent 45 degree change in course will allow the FS8 to comfortably miss the obstacle by some 300 m. With ARPA radar this margin of warning is even greater. Of course with large shipping and other obstacles with greater height above the water these detection times increase exponentially.

And what of the future of Flightship? One of the amazing things about ground-effect craft is the scalability of design. In aviation, if one scaled a Cessna into a jumbo jet the results would be a technical disaster. In ground effect a craft can be safely and predictably scaled by a factor of 4 or more.

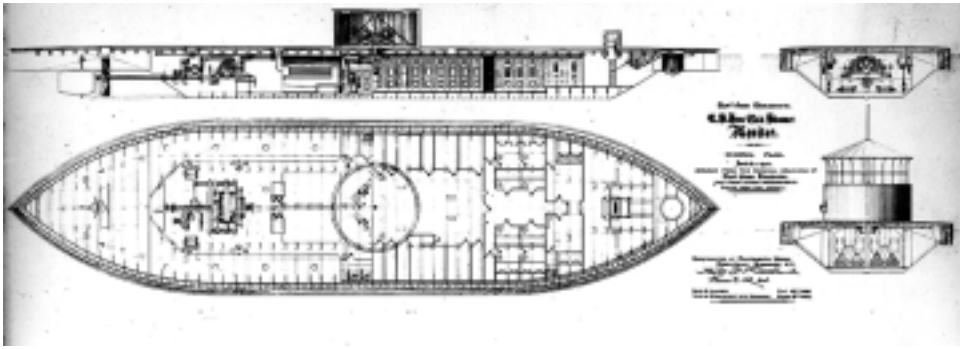
The KM Ekranoplan from Russia was a direct scale from a 2 t prototype to the 500 t design, with no aerodynamic modifications. Obviously structural concepts are the key changes that occur in such scaling of designs.

Flightship has already begun the work of scaling up to the larger 40-seat Flightship FS40 craft and we have scheduled a 30-month program to roll out of the first craft here in Australia. Boeing have consented to be contracted to provide structural design concept and full fabrication drawings using 500 and 6000 series aluminium alloys and Pratt & Whitney have agreed to provide marinised turbo prop engines for propulsion that run on marine grade diesel fuel.

The FS40 has a payload capability of one busload of 40 people, itself a worldwide unit of transport, or a 6 000 kg payload of freight or other mission requirement. Even without any major marketing to date our FS40 is already proving popular and we have firm expressions of interest from established transport operators around the world.

(Presented to the Queensland Section in Cairns, on 4 July 2001)

MONITOR RELICS RECOVERED

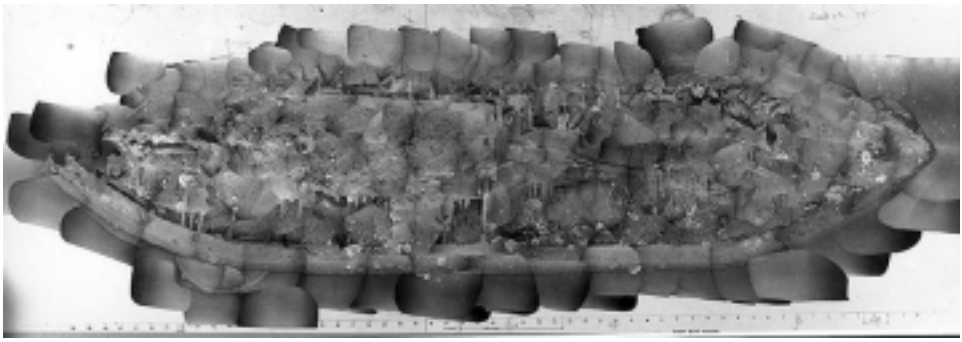


The 1862 General Arrangement of USS *Monitor*
(Photograph US Naval Historical Center)

On 16 July 2001, the engine of the Civil War warship USS *Monitor* was recovered from the wreck site off Cape Hatteras, North Carolina. The ironclad *Monitor* made history when it fought the Confederate ironclad *Virginia* (ex *Merrimack*) at Hampton Roads in March 1862. *Monitor* sank while being towed to North Carolina on 31 December 1862. Lying in 70 m of water, the wreck (located in 1973) is deteriorating.

Since April this year, divers have been working to recover artifacts from the wreck. Now that the engine has been recovered, efforts will be made to remove of the outer armour belt of the ship's turret, which comprises 6 in (150 mm) thick iron plates. The armour will be recovered next year. During previous expeditions equipment salvaged has included the ship's anchor, propeller and propeller shaft. After about ten years of preservation in a specially-constructed holding tank, the engine and other artifacts will be restored and displayed at the Mariners' Museum in Newport News.

A photomosaic of the remains of *Monitor* in 1974
(Photograph US Naval Historical Center)



Galley arrangements in *Monitor* were somewhat primitive. The turret is in the background (above) (Photograph US Naval Historical Center)

The engine of *Monitor* on the Manson Gulf derrick barge *Wotan* after recovery 25 km off Cape Hatteras (below) (US Navy Photograph)

FROM THE CROWS NEST

New Trans-Atlantic Monohull Sailing Record

Between January and February of this year, the Swiss sailor Bernard Stamm, with three French crew, Christophe Lebas, Jean Baptiste L'Ollivier and Francois Scheeck, set a new west-to-east trans-Atlantic sailing record for monohulls. Stamm had been forced to retire his Open 60, *Armour Lux—Foie Gras Bizac*, from the Vendee Globe race because of autopilot problems, and decided to attempt the record on his way home.

Sailing from the Ambrose Light, New York, to The Lizard, England, Stamm and his crew survived three winter gales on the storm-lashed Atlantic Ocean. The first storm front overtook them within hours of the start, and whilst running in strong winds on day two they blew out their only spinnaker.

The second low caught them up on day three, providing heavy reaching conditions for three days in 45–55 knot south-westerlies. Under these conditions *Armour Lux* set a new 24-hour distance record for monohulls of 467.7 nautical miles, averaging 19.49 knots. Unfortunately, one day after this record they experienced their first of several knockdowns. These knockdowns caused extensive damage to the titanium stanchions and lifelines, and twisted the tiller arm 20 degrees off centre.

There was a brief lull before the third front rolled in. *Armour Lux* rode this third low pressure system for the final three days to the finish in winds over 50 knots. At the tail end of this storm, less than 300 miles from the finish and 12 hours ahead of the record, the block and tackle adjustment on the canting keel broke, pinning the boat on its side. Fortunately the crew managed to set the keel in a centreline position and finish the crossing under heavily reduced sail. *Armour Lux* crossed the finish line in 8d 20h 55m 35s, shaving more than 3 hours off the record. They had covered 3 242.2 n miles at an average speed of 15.22 knots.

The monohull record was previously held by the super-maxi ketch *Mari Cha III* in 8d 23h 59m 17s. That 44.7 metre yacht with 23 crew had covered 3 127.5 n miles at an average speed of 14.48 knots.

Principal particulars of the two vessels are as follows:

	Armour Lux	***Mari Cha III***
LOA	18.3 m	44.7 m
Beam	5.7 m	9.0 m
Draft	4.5 m	4.5 m
Displacement	9 t	105 t
Keel	3 t	41 t
Water ballast	2 t	7 t
Sail area:		
Upwind	280 m^2	1000 m^2
Downwind	570 m^2	1850 m^2
Crew	4	23

The current outright west-to-east trans-Atlantic record is held by the French catamaran *Jet Services V*. In 1990 Serge Madec and four crew sailed this 22.9 metre vessel across the Atlantic in 6d 13h 3m 32s, at an average speed of 19.48 knots.

Felix Scott

Armour Lux

Mari Cha III
(Photo Nigel Bennetts/PPL)

Stealth on the Water

On 8 June 2000 King Carl XVI Gustav of Sweden named the latest adition to his country's navy, the *Visby* corvette. About 450 guests from 22 nations attended the naming ceremony of this ship, the first known production model of a stealth vessel.

Visby is designed to be difficult to detect by an enemy using radar, infrared, hydro-acoustic monitoring, or any other sensor system. The craft's success could change naval warfare as profoundly as the ironclad ships did in the 19th century.

The background to the launch was laid in the middle- and late-1980s, when small submarines of unknown origin regularly entered Swedish national waters, seemingly with impunity. The nordic country initiated a program in 1988 to design a stealth corvette that could defend its waters against submarines and detect undersea mines.

The navy commissioned Kockums AB of Malmo to build a test-platform craft to develop its stealth corvettes. Kockums built the HMS *Smyge* surface ship at its Karlskronavarvet shipyard on Karlskrona Island. The fibreglass and kevlar *Smyge* was too small to be a true prototype of a combat vessel, measuring 30.4 m in length and 11.4 m beam. Rather it served as a test rig for various systems, and successfully tested stealth technology, sensors, communications systems and navigation equipment.

The result, *Visby*, is 72.8 m long, 10.4 m beam, and displaces 600 t when fully equipped. It will be crewed by 18 officers and 25 enlisted men. The hull and superstucture have large flat surfaces and sharp edges to reduce its acoustic and optical signature on the horizon. She is electronically undetectable at more than 7 n miles in rough seas, and at more than 12 n miles in calm seas, without electronic jamming. With the assistance of jamming, *Visby* is invisible at more than 4 n miles in rough seas and 6 n miles in calm seas.. She is powered by two MTU 16V diesels for low-speed operations and four Vericor aero-derivative gas turbines for medium- to high-speed manoeuvres, which exceed 35 kn.

Kockums will build four more *Visby*-class corvettes for the Swedish navy by 2004. Like the first vessel, they will be used primarily for mine countermeasures and anti-submarine warfare.

Engineering World, April/May 2001

Rolls-Royce to Power *QM2*

Rolls-Royce has won two new contracts to supply podded propulsion systems and deck machinery for *Queen Mary 2*, the luxury cruise liner to be built for Cunard Line. The company has also secured deals to supply podded propulsors to three other cruise ships, saying that the total value of these contracts is around £15 million ($A38 million).

Rolls-Royce will supply four Mermaid podded propulsion systems for *Queen Mary 2*which, at 345 m long, will be the largest ocean liner ever built. It is due to enter service in 2003 after being

built at Alstom Chantiers de l'Atlantique in France. This will be the first four-pod installation to date, and will consist of two fixed and two azimuthing pod units, delivering a combined output of more than 85 MW. They will provide a speed of more than 30 kn, with low noise and vibration levels and maximum manoeuvrability. The Mermaid units are due to be delivered in December 2002.

Rolls-Royce has also won a contract to supply deck machinery for *Queen Mary 2*. It will provide eight double-drum Rauma Brattvaag mooring winches and two separate windlasses. The winches and windlasses will be electrically driven using frequency-converter drive and will have an auto-tensioning function. The pull of the mooring winches will be 25 t per drum and the diameter of the anchor chain will be 114 mm.

Professional Engineering, 16 May 2001

Dutch Firm to Raise *Kursk*

The Russian government has paid Dutch firm Mammoet the first instalment in a deal to raise the wrecked *Kursk* nuclear submarine, Itar-Tass news agency reported. All 118 men on board died when two unexplained explosions ripped through *Kursk* on 12 August 2000, crippling the advanced Oscar-class submarine, which is more than twice the length of a jumbo jet.

Vyacheslav Zakharov, the head of Mammoet's Moscow office, told Tass the size of the contract was a commercial secret but that everything was on course to salvage the vessel from 100 m of water in the Barents Sea by 20 September.

Mammoet won the contract unexpectedly last month, beating a consortium comprising Dutch firms Smit Internationale and Heerema, and US company Halliburton, which had negotiated with Russia over the salvage for more than six months. Smit said the group could not raise the vessel safely this year, but has since accepted Mammoet's invitation to join the project, which Russia has said will cost about $140 million.

Engineering World, June/July 2001

Dyyfken Sails On

The *Duyfken* replica, built at the Western Australian Maritime Museum in Fremantle, set sail on 5 May from the Australian National Maritime Museum in Sydney for a voyage under the command of Captain Glenn Williams to Texel in the Netherlands. *Duyfken* has already re-enacted Willem Janszoon's historic 1606 voyage from the Spice Islands to Cape York peninsula — the first known European encounter with Australia and its Aboriginal people, and producing the first chart of an Australian coastline. After departing Sydney, she rendezvoused with the *Endeavour* replica in Moreton Bay, Queensland (both ships were built by the same shipwright, Bill Leonard, in Fremantle), and called at Port Douglas. She then sailed via Torres Strait to Jakarta (formerly Batavia), in Indonesia. She is currently en route to Galle in Sri Lanka, from where she will sail via Cape Town, St Helena Island, Ascension Island, and the Azores to Texel in The Netherlands. She will arrive in Texel in March 2002, where she will play a major role in the Dutch celebrations marking the 400th anniversary of the Veerenigde Oostindische Compagnie (Dutch United East India Company).

Phil Helmore

Flightship Trials and Tribulations

During its trials last month, just after take off, the Flightship FS8 rose steeply out of the ground-effect zone and then fell down into the water. As a result of the accident the Australian test pilot and training director were taken to hospital for treatment of minor injuries. It was reported that Queensland Transport has cancelled registration of FS8 pending investigation into the heavy landing in Trinity Inlet, Cairns. The classification society, Germanischer Lloyd, has advised that the German builder's representative and recommended pilot will have to be employed in future trials.

Marine News, IMarE (Sydney Branch), August 2001.

EDUCATION NEWS

Curtin University

Curtin University is again offering its short course *Design for Small Craft* this semester — two hours per week in the evenings for 14 weeks. Enquiries to Ms Ann Smith, Secretary, CMST, (08) 9266 7380 or email a.smith@cmst.curtin.edu.au.

Curtin PhD student Kim Klaka has recently returned from conducting tests at the new Model Test Basin at the Australian Maritime College in Launceston. This new facility holds much promise as a shallow-water testing environment.

Other postgraduate student projects at the University of Western Australia and Curtin involve collaboration with Austal Ships, Crowther Multihulls, DSTO and Marintek.

Curtin is expecting to advertise for two new PhD students and a research associate in hydrodynamics before the end of this year. Enquiries to Dr. Jinzhu Xia on (08) 9266 4696 or email j.xia@cmst.curtin.edu.au

Kim Klaka

University of NSW

Undergraduate News

One of the interesting undergraduate thesis projects this year is that being undertaken by Hason Ho, who is investigating the use of computational fluid dynamics (CFD) for analysing the flow, thrust and torque characteristics of marine screw propellers. He has modelled a number of propellers in ProEngineer, a fully three-dimensional solid-modelling package, and then transfers coordinates of one blade, boss and shaftline to CFX, a CFD package. Turbogrid is a newly-acquired specialist module for the meshing of turbomachinery and he can now model the complex mesh required for a propeller in about three hours. The mesh is then imported to Tascflow for setting the boundary conditions, solution and viewing of the results. He is now spending time on the most important part, validation of the numerical results, before analysing non-conventional propellers. One of the interesting features of Tascflow is that cavitation can be analysed easily, and a further project is proposed to validate the cavitation calculations against experimental data.

Sydney Heritage Fleet provided access to their steam yacht *Lady Hopetoun* for the third-year students to conduct an inclining experiment at Rozelle Bay on 23 May. The students conducted the experiment with the guidance of lecturer Mr Phil Helmore. The day was perfect for an inclining, and the students made a good job of their first inclining. The theory of stability is fascinating, but seeing it in practice at an inclining makes it come *to life* for the students.

The School of Mechanical and Manufacturing Engineering has recently taken delivery of the Formation Design Systems software packages, Multiframe and Maxsurf, which are much used by the Australian industry. These have been installed on the MECH file-server, and are now available for the use of naval architecture students and staff.

Post-graduate and Other News

Michael Andrewartha has had a paper accepted for the Sixth International Conference on Fast Sea Transportation (FAST 2001) which will be held in Southampton, UK, in September. The paper is titled *How Many Foils? A Study of Multiple Hydrofoil Configurations*, and it includes an investigation into the interaction effects between multiple hydrofoils operating near the free surface. The paper is co-authored by A/Prof. L.J. Doctors, and they will both be travelling to Southampton to present it at the conference. A potential-flow method with a viscous-inviscid interaction is used in the flow calculation, and the effect of the free surface is also included. A comparison of using one, two, three or four foils producing a certain amount of lift is given in the paper, and it is found that a configuration of two foils produces the minimum wave-making drag. Additionally, the optimum separation between foils is shown to be directly related to the speed of the vessel. Thus, the answer to the question proposed in the paper's title is shown to be two, given that the foils are spaced correctly!

Dr Ken Fisher of Fisher Maritime Transportation

gave a presentation on *The Non-design Roles of Naval Architects* to a joint student/industry meeting attended by thirty-four on 14 May at the School of Mechanical and Manufacturing Engineering. Ken began his presentation by emphasising the many facets of, and the wide diversity of challenges provided by, naval architecture. Rarely, excepting small vessels, does one person design a complete vessel. A prime example is Cunard Line's *Queen Mary 2*, now on the drawing board, which has had feasibility studies on many aspects of the design, including one to determine the number of funnels (real and/or false) the vessel should have!

Consider the design of coming 15 000 TEU containerships (the largest currently being close to 8 000 TEU). There is no doubt that it will look boxy, carrying so many boxes. What of its structure? What are the stresses? No doubt there will be a finite-element analysis. However, for that, they will need to know what the proposed structure is, and the loads proposed to be placed on it. Neither is elementary. In a seaway, the ship will be exposed to bending, twisting and racking. The loads will depend on the route, for which the seaway needs to be defined. The shape of the ship, and the distribution of mass also affect the loads and hence the structure. Further, the fatigue life, metallurgy, and the expected lifetime must all be considered. The required speed of the ship, the resistance, the powering, the possible vibrations; all of these fall into the purview of the naval architect.

Further examples were given of launching failures (*Principessa Iolande* being one of the most famous), setting up of dock blocks for a hogged/sagged/damaged ship, salvage calculations, ship conversions, materials technology, propeller-induced vibration problems, LNG tank problems, podded propulsion, and ship producibility. Ken then asked for examples from industry.

Laurie Prandolini commented that double-bottom tanks were, at one time, left uncoated by some shipyards. After corrosion problems in such tanks, it has become standard practice for classification societies to require that double-bottom tanks be coated.

Chris Murman commented that, during his apprenticeship with a boatbuilder in New Zealand, the designer/builder had contracted to build a 15 m double-diagonal planked timber cruiser with a required speed of 22 kn (with penalties for non-achievement). Part way through construction the designer/builder became nervous about the weights going into the vessel, and went to the trouble of having her weighed using load cells fore and aft. As a result, batteries and tanks were moved right aft. Even so, come the high-profile launch day, the vessel floated with a trim of 0.35 m by the bow. The vessel only ever achieved 17 kn, much to the owner's disgust and the yard's loss of reputation.

David Gosling commented that weight estimates seen by the Waterways Authority often showed a marked divergence from the final lightship determined by inclining or measurement check. The worst case on record is one where the inclining gave a lightship displacement of twice that shown by the weight estimate!

Antony Krokowski commented that many vessels seem to have design input limited by dollars, e.g. structure with insufficient attention paid to details, stability insufficiently analysed, and thereby using the Authority as the designer. The naval architect also needs to consider the effect of owner's additions to the outfit, as these can be considerable if left unchecked.

Tauhid Rahman commented that design details were important. On an early LNG carrier on which he sailed, leaks from one tank necessitated replacement of the double bottom. The shipyard in Gydinia, Poland, contracted to complete the repair in two months but, due to unforeseen difficulties, took seven months!

Ken finished his presentation with an example of propeller blade thicknesses, which are determined by the stresses imposed during an emergency stop. On one containership, the builder had the propeller designed by one high-profile research organisation, and the owner had a check design done by another high-profile research organisation. The blade thicknesses were different, resulting in a minor (0.1%) improvement in performance for the owner's propeller, but the difference was not pursued. The owner's propeller was built and installed, and the blades *bent* during trials. It turned out that the owner had neglected to tell his research organisation that the vessel would be die-

sel powered and not steam powered. Diesels can reverse much faster than steam turbines and, hence, impose higher stresses on the propeller blades!

The vote of thanks to Ken was proposed by Phil Helmore.

Associate Professor Lawry Doctors recently travelled to Washington to discuss his research on high-speed vessels with naval architects in the Carderock Division of the Naval Surface Warfare Center (NSWC) in West Bethesda, Maryland. On July 11, he gave a seminar to the NSWC on the subject *Hydrodynamics of High-speed Vessels*. In particular, he discussed the matter of accurate prediction of resistance of high-speed displacement vessels with transom sterns and he demonstrated the excellent correlation that can be achieved by using thin-ship theory together with an appropriate physical model for the hollow in the water behind the vessel. The correlation includes the calculation of resistance, sinkage and trim of the vessel, as a function of its speed. He also discussed the relative advantages of monohulls, catamarans, and trimarans, with regard to the primary aim of minimizing resistance. This work is of particular interest to designers of these vessels who wish to increase the operational range, which is directly related to the so-called "transport efficiency". Lawry concluded his presentation by referring to some hull-optimization studies with respect to the hydrodynamic performance. Finally, some novel approaches to improve the design were also presented.

Phil Helmore
Lawry Doctors

Australian Maritime College

Staff Changes

The past couple of months has seen the departure of two of the longest serving staff members within the Department of Naval Architecture and Ocean Engineering. Dr Martin Renilson has taken up a post as Technical Manager (Hydrodynamics) at the Defence Evaluation and Research Agency (DERA) in Gosport, UK, while Dr Stan Gottschalk has retired.

Dr Tim Gourlay commenced employment at AMC in February this year as a researcher in hydrodynamics but has recently replaced Stan Gottschalk as a lecturer. Tim completed his PhD in applied mathematics (hydrodynamics) last year under the supervision of Professor Ernie Tuck at Adelaide University, with his thesis concentrating on the squat of ships in shallow water. Tim is currently lecturing in hydrodynamics and wave mechanics, as well as supervising four naval architecture PhD students on the topics of dynamic stability, deck-diving of catamarans, yacht re-righting and ship-bank interaction.

UNSW Student visit

As is the case each year, the third year naval architecture students at UNSW will shortly be making a two-day visit to AMC to gain some exposure to AMC's suite of hydrodynamic facilities and vessels. Laboratory sessions are planned for the students to be conducted within the towing tank and cavitation tunnel, plus a series of demonstrations in the flume tank, model test basin, ship-handling simulator, diesel engine simulator and training vessels.

Undergraduate News

The first year students are researching and developing their designs for this year's *Rat Trap Race*. The rules require the design of a craft that is powered by a standard rat trap that is the most efficient, thus travelling the furthest down the towing tank in the fastest time.

The final year BEng students from AMC gave their Ocean Systems and Vehicle Design presentations on 28 July. Presentations ranged from landing craft, cargo vessels, passenger ships, maxi yachts, jacket structures to wave and wind generation systems.

Postgraduate/Research News

A summary of active and ongoing research at the Australian Maritime College is as follows:

A research project entitled *The Effect of Channel Design on Ship Operation in a Port* is nearing completion by Jonathan Duffy as part of his PhD studies. This work involves investigation into the effect of lateral banks on ships manoeuvring in restricted waters. A series of experiments has been conducted in the towing tank. The results

were used to produce empirical formulae for bank-induced sway force and yaw moment for input into the mathematical model utilised by AMC's ship-handling simulator.

An investigation into the re-righting tendencies of modern sailing yachts is being conducted by Jonathan Binns as part of his PhD studies. The project team now includes Dr Paul Brandner and Dr Tim Gourlay as academic supervisors. The past six months have been very productive with advances made in both the numerical analysis and experimental techniques. Construction of a purpose-built 6 degree-of-freedom force balance and a Volvo 60 class model are due to commence shortly. The addition of these pieces of equipment represent a significant enhancement of the experimental capabilities of the AMC.

Tim Lilienthal is undertaking an investigation entitled *Dynamic Stability Assessment of Vessels*. The primary aim of the research is to investigate an alternative method to the GZ curve for stability assessment using the KG parameter. A time-domain motion program is used to establish the maximum allowable (limiting) KG at different headings, speeds and wave spectra. A simplification uses regular waves based on irregular wave parameters. This project is being sponsored by the Australian Department of Defence.

Deck Diving of High-speed Catamarans in Following Seas is ongoing research by Martin Hannon. Further semi captive model tests with varying centre bow geometries and also increased demi-hull bow height were carried out to investigate the effect of the demi-hull bow wave and to compare the effects of the various configurations. The experimental results were then used to validate the mathematical model and aid the prediction and simulation of a deck dive. Future work involves introducing the effect of the bow wave height on the prediction of submersion of the centre bow and then to move the time-domain simulation from regular seas to irregular seas.

Kishore Kantimahanthi is researching a project titled *Partial Dynamic Support of High-speed Catamarans using Hydrofoils*. This problem involves the minimisation of the resistance of high-speed catamarans through the use of foils providing dynamic support and thus reduction of hull draft. In its most basic form this relates to optimisation as a trade off between reduction of hull draft to minimise resistance, and reduction of lift provided by the foil to minimise foil drag, both in terms of structural requirements and foil loading. For this the catamaran ferry, *Lady Jane Franklin*, operating on the Gordon River is considered for a case study, which will assist in the validation of the results obtained from theoretical analysis and model testing planned for AMC's towing tank and cavitation Tunnel.

David Clarke of DSTO is undertaking a PhD involving an investigation into viscous flow about underwater bodies, with a particular emphasis on remotely-operated underwater vehicles although results will have applications in other areas such as submarines. Studies of flow about idealised bluff bodies including an ellipsoid and a prolate spheroid are being made in the cavitation tunnel. These include on- and off-body flow visualisation, force measurement and pressure distribution measurement. Results from the experiments are also being compared with results of computational fluid dynamics using Reynolds-averaged Navier-Stokes codes.

Jason Lavroff is investigating viscous flow and cavitation within waterjet propulsor inlet ducts. This project involves an investigation of flow, including cavitation, within waterjet inlet ducts and in particular, the influence of the hull boundary layer. Ingestion of the hull boundary layer provides the possibility of improved efficiency due to lower fluid velocities. However, it provides an initial source of non-uniformity which can lead to serious flow problems within the inlet duct and pump. As part of this investigation, improved means of simulating boundary layer profiles, both velocity and turbulence distributions, in the AMC Tom Fink Cavitation Tunnel are being investigated. Equipment for thickening of boundary layers using transverse injection of water is being developed.

Gregor Macfarlane is nearing completion of the development of a wave-wake database as part of his (part-time) higher degree studies. The database involves the collation and analysis of the results from model tests on over 80 hull forms.

The Tom Fink Scholarship was presented to Ozgur Deli from Yildiz Technical University, Naval Architecture and Marine Engineering Department

in Istanbul, Turkey. During his one year studying at the Australian Maritime College he will be investigating the structural analysis of a yacht mast's integrity using finite element modeling.

Alumni News

An email mailing list has been set up with the primary purpose of notifying AMC Bachelor of Engineering Naval Architecture/Maritime Engineering/Ocean Engineering graduates of any relevant employment vacancies. The list currently reaches more than 70 graduates and is continually growing as more graduates become aware of the service. Anyone wishing to take advantage of this effective method of advertising any vacancies is encouraged to provide a brief description and contact details to Gregor Macfarlane on (03) 6335 4880, or fax (03) 6335 4720, email: g.macfarlane@mte.amc.edu.au.

Model Test Basin

The most recent addition to AMC's suite of experimental hydrodynamic facilities, the model test basin, was officially opened by the Tasmanian Premier, the Hon. Jim Bacon, on Friday 11 May 2001. More than 100 industry and political leaders from around Australia attended the opening which was followed by a one-hour demonstration of some of the facilities' capabilities. Since the opening, the facility has been actively used almost everyday for a mix of undergraduate and post graduate research studies and commercial projects.

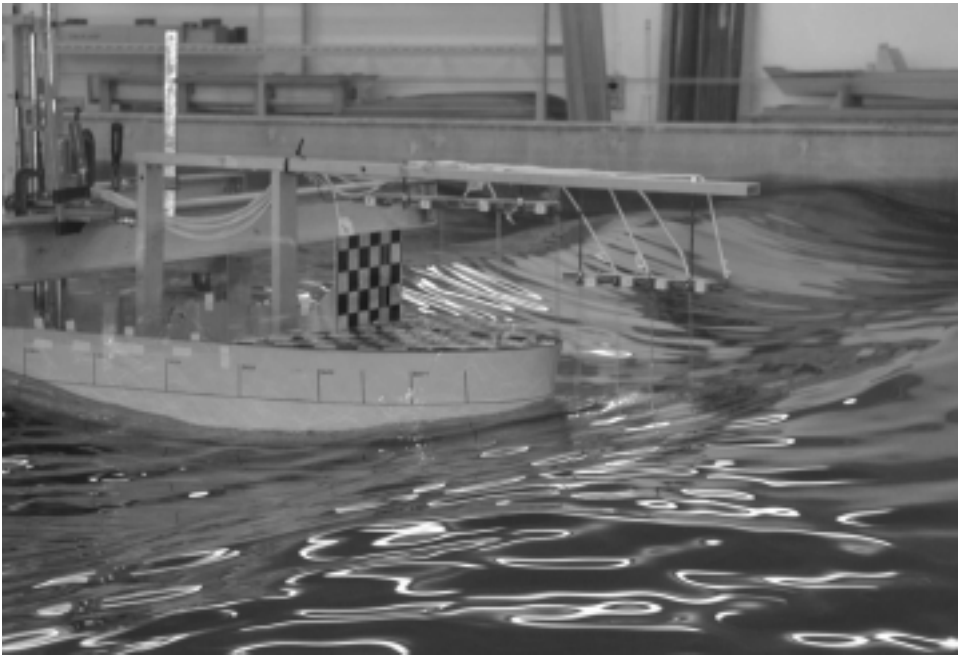
This new facility is ideally suited for conducting hydrodynamics experiments with an emphasis on maritime operations within shallow water environments such as ports, harbours and coastal regions. For example, a large series of experiments is planned in order to obtain the hydrodynamic force coefficients for input into AMC's ship-handling Simulator to improve the realism of the manoeuvres undertaken by a variety of ships operating in restricted waterways. This will include effects related to ship interaction with other ships, banks, waves and swells. This work will support the efficient development of Australian and overseas ports and in the training of deck officers and pilots.

The facility is also well suited to further develop research into the wash generated by high-speed ferries, particularly when operating in shallow water regions. Over the past five years AMC researchers have built up the world's largest database of experimental data of ship-generated waves for operation in deep water environments. Work is planned to further expand this database for the more complex situation of ships operating in shallow water environments (critical and super-critical depth Froude numbers). The facility has already been used for the conduct of a similar series of experiments for a leading Australian ship builder.

It will also be possible to undertake experiments suitable for investigating the motions and other hydrodynamic aspects of the design of ships and offshore platforms in waves. Curtin University PhD student, Kim Klaka, recently undertook a series of experiments in order to generate validation data for numerical models for the prediction of yacht roll motion at zero speed, with particular reference to the forces from the underwater appendages. One of AMC's final-year students, Charles Jesudasan, recently undertook a series of experiments to investigate green water on the bow of an FPSO using a 4 m ship model. Work will soon commence on a large project for the Australian Department of Defence into ship motions that will involve ship models in excess of 6 m in length.

The model test basin provides staff and students with the opportunity to further develop their research activities and it will also be regularly used for conducting experimental laboratory sessions within the Bachelor of Engineering degree courses in naval architecture and ocean engineering.

The new test basin complements the existing specialist facilities at AMC, which are used by industry as well as staff and students from universities all over Australia. The basin is 35 m long, 12 m wide, and has a flat floor and an adjustable water depth up to 1 m. It is equipped with a multi-directional wave maker capable of generating a wide array of wave spectra and can also tow ship models at speeds up to 4 m/s.



Tests recently undertaken in the Model Test Basin to investigate green water over the bow of an FPSO (AMC Photo)

Towing Tank Report

The towing tank has continued to be well utilised over the past six months. The usual laboratory sessions for AMC students have been undertaken and four final year students have made good use of the facility for their research thesis. Both Jon Binns and Martin Hannon have utilised the tank for their respective PhD studies during this period. In addition to the regular student and research activity, more than twelve commercial consultancy projects have been completed to date this year.

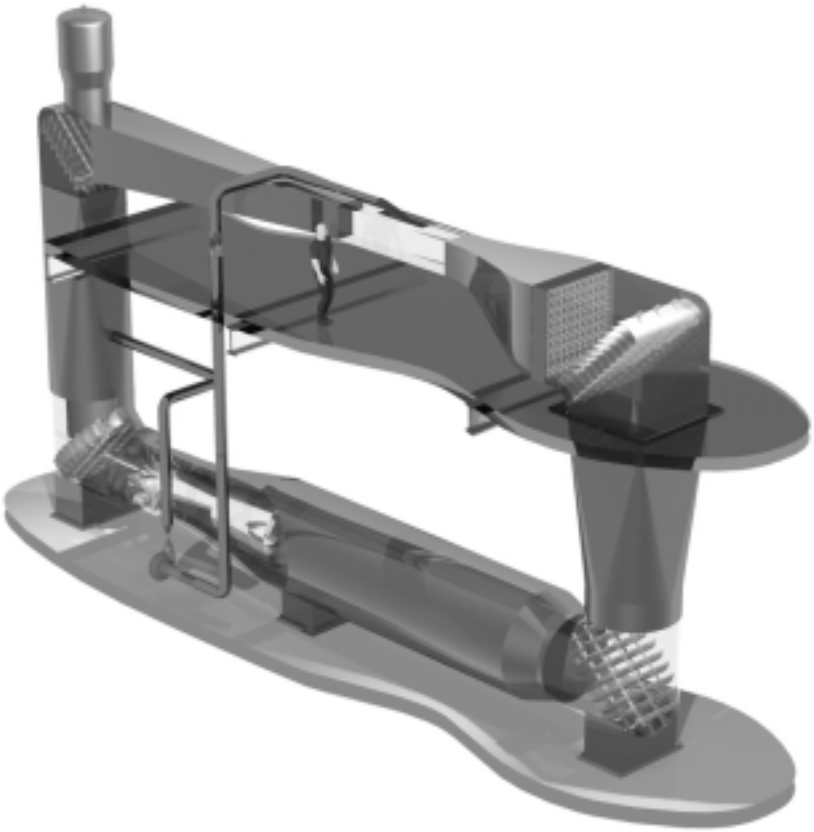
Funding is presently being sought from AusIndustry through the Major National Research Facilities program to extend the length of the tank sothat the test section is effectively doubled. If this enhancement proceeds then there will also be a number of other improvements made to the facility, including the ride quality of the carriage and model-making capabilities.

Tom Fink Cavitation Tunnel Report

The Tom Fink Cavitation Tunnel is being developed for a range of capabilities with particular application to the high-speed craft and defence sectors. Major capabilities include tests involving propulsion equipment, appendages and general underwater bodies.

Instrumentation recently completed includes a propeller dynamometer capable of making static and dynamic measurements of propeller thrust and torque, a six-component force balance for measurement of the complete hydrodynamic force/moment system acting on an underwater body or appendage, and a waterjet test loop for testing of waterjet propulsor components. The development of these instruments is the subject of an entry to the Institution of Engineers, Australia, Excellence Awards — Tasmanian Division. Other instrumentation currently being developed is a secondary circuit for injection of waterjets for boundary layer thickening in the tunnel test section, and a four-hole pressure probe and automatic traverse for the measurement of three velocity and turbulence components.

Funding is currently being sought for rapid degassing and nuclei injection equipment for more



Three Dimensional view of the Tom Fink Cavitation Tunnel showing the water jet test loop.

precise investigation of the physics of cavitation inception and its dynamic character. Funding is also being sought for major changes to the tunnel circuit. These initiatives are being sought through the Australian Research Council infrastructure program and AusIndustry through the Major National Research Facilities program.

Martin Hannon
Gregor Macfarlane

University of Tasmania

The development of a new research facility is nearing completion at the University of Tasmania in Hobart. The drop-test tank, to be used for studying slam impacts, is due to commence operations in August 2001. James Whelan, a PhD student, is coordinating the construction of the tank which forms part of a joint Incat Tasmania and University of Tasmania three-year research project into the slamming of high-speed catamarans. Instrumentation is still to be developed, but preliminary tests will be performed using a high-speed digital video camera. James is also developing a computer predictive tool to determine the impact forces on Incat-style centre bows using an un-steady Navier-Stokes solver.

Another aspect of the Incat/UTas slamming project has been the analysis of full-scale measurements made on a catamaran operating across Cook Strait in New Zealand. A large number of slam events were captured in the full-scale data which has led to an improved understanding of the nature and influences of slamming events of large high-speed catamarans. This work, which is

being carried out by PhD student Giles Thomas, has been extended to produce an extreme slam load case to be used for structural design purposes. This was achieved through correlating strain-gauge measurements with finite element predictions for an extreme slam event. A paper on this work is due to be presented at the FAST 2001 conference in Southampton, UK, in September.

Damien Holloway, now a Research Fellow in the School of Engineering, is continuing his motion prediction research based on a time-domain strip theory developed specifically for high Froude numbers. Current focuses of his work include studying the effects of ride controls, and validation against full-scale data obtained from Incat.

The development of a tool for in-service prediction of structural member life is the aim of work of another PhD student Gaspar Guzvanj. This development is to be based on fatigue analysis of high-speed ships in seaways, with the sea loads determined through hydroelasticity theory. This research will be accelerated through available expertise and experience from the aeronautical industry.

Ali Jamal, a structural engineer at Incat Tasmania, has recently commenced a part-time research master's degree. He is intending to investigate the non-linear effects, such as buckling, in deck configurations on large aluminum catamarans through finite element analysis.

Giles Thomas

THE INTERNET

Ship Design Software

The University of Michigan has available a software environment for the conceptual design of displacement type ships. This collection of software has been developed over the years to support the teaching of conceptual ship design within the undergraduate curriculum of the Department of Naval Architecture and Marine Engineering. The emphasis has primarily been on analysis methods which can be utilized at the parameter stage of design before a detailed hull design is developed and offsets are available. The Fortran programs were developed by and under the supervision of Prof. Michael Parsons over the period 1985–95 and used as Macintosh applications in the senior design courses NA470 Ship Design and NA475 Ship Design Project. During 1997–98, Dr Jun Li developed Visual C++ Windows Graphical User Interfaces for the programs as part of the DARPA-sponsored COMPASS project. These Windows programs are now available for download through the World Wide Web.

The following programs are available:

(a) Power Prediction Program (PPP) calculates the resistance and hull/propeller interaction of a displacement hull using the regression-based method of Holtrop and Mennen. This uses a modified Hughes method. An explicit air drag model has been added.

(b) Propeller Optimization Program (POP) calculates the optimum open-water efficiency Wageningen B-Screw Series propeller subject to user-specified diameter and cavitation constraints. The nonlinear programming Nelder and Mead Simplex Search method is used with an external penalty function. The program will also calculate the operating conditions and efficiency for a specified operating point.

(c) Manoeuvering Prediction Program (MPP) uses (1) methods presented by Clarke et al. to assess the course stability, turnability, and controllability by a helmsman, and (2) the regression results of Lyster and Knights to estimate the turning-circle characteristics of a displacement vessel.

(d) Seakeeping Prediction Program (SPP) is an adaptation of the five degree-of-freedom Scores program to provide estimates of heave, pitch, roll, vertical wave bending moment, horizontal wave bending moment, and hull torsional moment in a random long-crested seaway. It can be used at the parameter stage for initial estimates or, with greater ac-

curacy, after the specific sectional area curve and design waterline curves are available.

(e) Gear Sizing Program (GSP) adapts the method presented by Balukjian to provide initial estimates of the size and arrangement of a marine reduction gear for a given input, output, and K-factor gear tooth contact stress loading.

Visit www-personal.engin.umich.edu/~parsons/publishedna470/software_manuals.htm.

Tony Armstrong

Tying up Without Ropes

A Small company in Christchurch, New Zealand, has developed a revolutionary maritime mooring system using giant suction pads that looks set to bring major gains in efficiency and safety to shipping and port companies the world over. Mooring International Limited have devceloped a revolutionary automated ship- and shore-based mooring system that finally eliminates one of the great anomalies in mordern marine transport, as Mooring International's chief executive, Peter Montgomery, explains.

'Ever since people first set sail, water craft of all sizes and types have required mooring with ropes. Despite enormous gains in maritime technology, vessels are still lashed to wharves the traditional way. The bigger the vessel, the greater the number of ropes required. It is a slow, laborious and inherently hazardous task that till now has defied automation.'

The company has developed a breakthrough technology based on a very old concept — the vacuum seal. Essentially, the mooring system consists of a rectangular pad fixed within a vacuum holding frame attached to a hydraulic ram which is either mounted onboard a ship or onto the side of a wharf. Upon docking the pad is extended out and 'sucked' onto the side of the ship or, in the case of the shipboard model, onto a pad mounted on the wharf.

The Iron Sailor as the shipboard model is known is already proving its worth on the Cook Strait ferry *Aratere* which became the first ship in the world to be equipped with a vacuum-activated mooring system. *Aratere* is fitted with four of the units located forward and aft along the port side of the 150 m vessel. The Iron Sailor has worked faultlessly for more than two years, successfully completing more than 4 000 moorings and saving TraNZRail substantial sums in annual operating costs.

Engineering World, June/July 2001

For further details, see the article, or visit www.mooring.co.nz.

Finding Employment over the Net

Many companies have shifted to the online environment to grab the attention of candidates who are in the job-hunting market. However, even though the Internet gives quick access to job sites, searches can still take hours to complete, and then knowing which recruitment and/or job website to go to may still be a 'hit or miss' scenario.

The following list includes a number of engineering recruitment websites that are available to job seekers:

www.aaai.com.au (Aust-Asia Appointments International, Sydney)

www.australiawide.com.au (Australia wide Personnel, Melbourne)

www.calibrate-recruitment.com.au (Calibrate Recruitment, Sydney)

www.commercialdesign.com.au (Commercial Design Consolidated, Sydney)

www.cdspersonnel.com.au (Contract Drafting Services, Melbourne)

www.downingteal.com.au (Downing Teal, Perth)

www.entec.com.au (Entec, Sydney)

www.globaltr.com.au (Global Technical Recruitment, Sydney)

www.jda.com.au (John Davidson and Associates, Brisbane)

Engineers Australia, July 2001

These sites are for engineers of all types. They are quoted here to show the extent of on-line job placement sites. No doubt Australian companies looking for naval architects would advertise on the Appointments Vacant page of the RINA website, or in The ANA, *or both!*

Phil Helmore

INDUSTRY NEWS

Wärtsilä power for Environmentally-safe Handy Size Tankers

Wärtsilä Corporation has received a contract to supply the complete marine power system for the first of a series of environmentally-safe 40 000 dwt chemical/product tankers building at the San Marco shipyard in La Spezia, Italy, for Italian owners. Wärtsilä is responsible for the complete functionality of the system. In addition to supplying the hardware, Wärtsilä is providing the shipyard with all the functional drawings and will be supervising the plant's installation, commissioning and sea trials.

The ship will be equipped with a Wärtsilä 6L64 medium-speed diesel engine of 12 060 kW output at 333 rpm and a controllable-pitch Lips propeller of 6.2 m diameter, together with the shafting and reduction gear. Electrical power will be supplied by a 1 800 kW generator driven off the reduction gear, and three Wärtsilä 6L20 auxiliary engines, each of 1 020 kW output at 900 rpm.

The ship measures 171.6 m long between perpendiculars, with a moulded breadth of 30.2 m, and has a deadweight of 40 000 tonnes on a scantling draft of 11.50 m. It is an IMO Class II chemical and product carrier with 12 cargo tanks, two slop tanks and a recovery tank. The tanks are equipped with submerged deep-well pumps.

The Wärtsilä 6L64 main engine gives the vessel a top speed of about 17 kn on 10.3 m draft, and a service speed of 16 kn. Redundancy is provided by an auxiliary propulsion drive (APD) in which the shaft generator can be used as a motor to drive the propeller when powered by the diesel generating sets. This APD gives the vessel a speed of about 8 kn.

Environmental friendliness and safety are an important aspect of the tanker. Apart from having the auxiliary propulsion drive, the vessel is of double-hulled construction in the cargo area, and all fuel tanks are separated from the hull by cofferdams. The Wärtsilä engines were chosen because of their low NOx emission levels, while the Wärtsilä 64 main engine has particularly low fuel consumption and thus also lower carbon dioxide release into the atmosphere.

There has been a healthy level of interest in the Wärtsilä 64 engine. It is the most powerful medium-speed engine on the market. A total of 11 marine engines have entered service with the first engine being delivered in 1999. They have already accumulated a total of 66 000 running hours, with excellent reports on their service experience.

Model of the 40,000 dwt chemical/product tanker being built by the San Marco shipyard in Italy (Photo courtesy Wärtsilä)

Passenger Comfort and Efficiency a Combined Winner

Don't drag it around when it's not needed. That was Incat's philosophy behind the development of the Retractable T-foil — this year's winner of the Best Technical Development Award at the London Cruise+Ferry Awards in May 2001.

The award was presented to the supplier/manufacturer whose service or product was judged to have made the most significant technical contribution to a cruise vessel, ferry or fast ferry.

Following extensive research and testing the Retractable T-foil, praised by the judges as 'a spectacular feature which enhances both passenger comfort and the bottom line', is the latest development in ride-control technology designed and built by Maritime Dynamics Inc. (MDI) in conjunction with Incat.

The T-foil is fitted to the latest vessels to appear from Incat, *Milenium* (056) for Spanish operator Trasmediterranea, and *The Lynx* (057) for New Zealand's Tranz Rail, and has proven to be a major success in service.

A ride-control system is fitted to vessels to maximise passenger comfort and Incat has worked with MDI to develop and install the system on its craft. The original ride-control design consists of two bolt-on T-foils near the bows and two trim tabs at the transom. The new system combines the existing active trim tabs aft with a single retractable T-foil located at the aft end of the centre bow, replacing the bolt-on foils on each hull.

The result — the T-foil is only in the water when required, bringing a reduction in fuel consumption and wear and tear and, potentially, 1.5 kn is added to the vessel's speed. In seas up to 2.5 m it is generally found that the T-foil is not required.

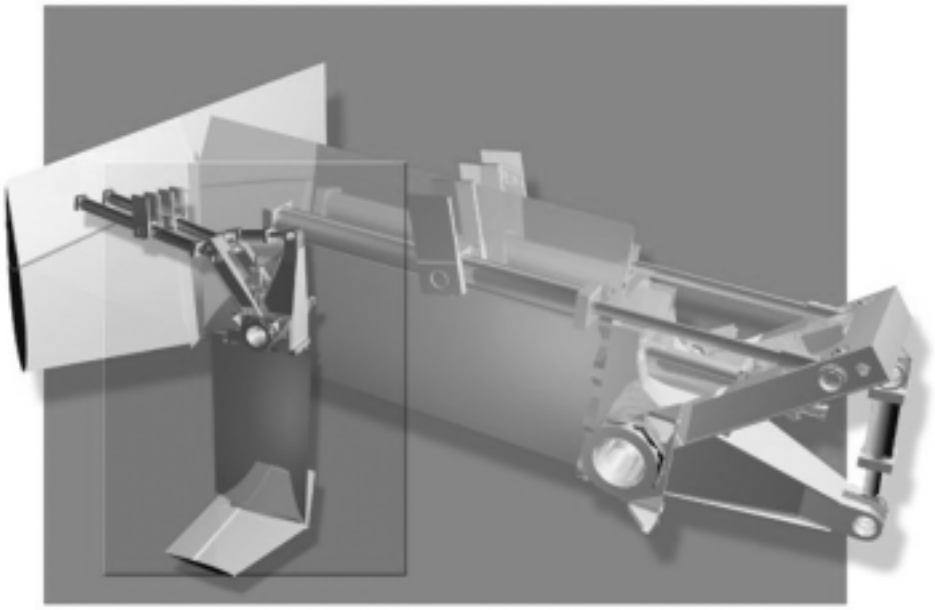
The active ride-control system's trim tabs and T-foil surfaces respond independently to a computer, which receives information from strategically-placed motion sensors onboard the craft. With the ability to almost anticipate the craft's next move, the active ride control system dramatically reduces pitch, roll and heave, the major contributors to motion discomfort.

Results of MDI/Incat testing of the latest ride control system found:

- in 4 m seas a reduction of up to 40% in motion will occur with the ride control system active;
- in 3 m seas reductions of 50% in motion will occur with the ride control system active; and
- in 2 m seas the active ride control system reduces motion to below 2%.

Previous T-foils, although extremely efficient, were exposed to damage or loss from submerged objects and required the vessel to be dry docked for installation or servicing. The retractable T-foil's mechanical and hydraulic components are above the water, allowing servicing to take place while the vessel is afloat. In the event of an object strike while the new foil is in use, it will retract immediately.

Simplifying installation and servicing procedures has reduced maintenance. This, together with eliminating the need for replacement due to object strikes, results in a reduction in operational costs over the life of a vessel.



The Incat Retractable T-foil (above)

US Government representatives during an inspection of *Incat 050* in Wilson's Dry Dock in early August (Photograph Incat Australia)

PROFESSIONAL NOTES

Tripartite Class Initiatives Implemented

Implementation of nine of the ten sweeping safety initiatives announced by ABS, DNV and LRS took place on July 1 as scheduled, the three classification societies have announced.

An aggressive timetable was set as it was considered imperative that the classification profession reconfirm its credibility as an effective self-regulating mechanism for the marine industry. The cooperation and trust that has developed between the management and staff of the three organisations has enabled these initiatives to be quickly processed.

As indicated earlier, the one initiative that requires more time due to its complexity is the establishment of common basic design criteria including hydrodynamic loads and corrosion margins for standard ship types. The process has commenced and progress will be monitored.

From the outset the most contentious issue for the industry was the announced intention to align ISM with other safety control measures by linking issuance of ISM Code Shipboard Safety Management Certificates (SMC) to the classification of the vessel.

There has been a wide range of industry representation on this issue and the three societies are in full agreement with the responsible owners that the ISM Code can be an effective means of enhancing the safety and improving the quality of ship operations. The experience over the last three years has demonstrated that the current system, which permits a period of up to three years between audits, does not provide an effective mechanism to monitor the management of maintenance on board a vessel.

In addition, there have been too many port state detentions of vessels that are classed with one society, yet hold an SMC issued by another class society. The three societies are not demanding that the ISM certificate be issued by the class society of record, and owners will remain free to choose their ISM auditor, but the three societies will not continue to issue SMC certificates for vessels they do not class, except in specific circumstances pertaining to management companies.

Effective on 1 July 2001, the three societies have jointly implemented a three-part policy relating to the issuance of ISM SMCs. As advised to all flag states, as of that date each of the three societies will decline to issue SMC certificates on vessels which they do not also class, and from that date each of the three societies will, upon expiry, decline to renew SMC certificates that they previously issued on vessels not in class with that society.

There are many fleets that are operated by an owner or shipmanager using a single auditing body for the company's Document of Compliance (DOC) and for the SMCs for every ship in its fleet, although the ships themselves may be classed with several different societies. The three societies recognise that this approach is in complete accordance with the spirit of the Code and considering that the aim is to ascertain that safety is properly managed, there is no advantage in requiring the operator to fragment the auditing of the fleet.

In this instance it has been agreed that, provided the society that issues the DOC and SMCs also classes a minimum of 25 percent of the vessels, adequate oversight of the management and operation of the entire fleet will be achieved through the class engagement. This balance provides an appropriate sample for the society to assess both the effectiveness of the management system and the quality of the fleet.

In addition to these changes in their internal ISM procedures, the three societies have also agreed to recommend to IMO, the flag states and IACS to reconsider the current two-and-a-half year period between audits. IMO is the only body with the authority to review the effectiveness of the Code and if needed, decide on changes to the regulations. The three societies will provide the Secretary-General

with a report detailing their experience as ISM auditors since the Code was implemented in July 1998, and show that a shorter interval between audits is required if the Code is to meet its intended purpose of improving the safety and quality of the shipping industry in a fair and equitable manner.

Information on these initiatives was presented to the recent IACS Council meeting in Tokyo and the three societies are gratified that the other members of IACS have agreed to review those proposals that are applicable for possible adoption by all members of the association.

ABS/DNV/LRS News release, 6 June 2001

Salaries up Nearly 5%

Average salary growth of professional engineers rose moderately over the past 12 months, according to the results of the latest Professional Engineer Remuneration survey.

The survey, conducted by APESMA in March and April, reported an average annual increase in salaries of 4.9%. Base salaries in the private sector rose5.6% on average, while they rose 4.2% in the public sector. The median base salary of all professional engineers was reported to be $67 460 and the median total package was $82 324. The median base salary and total package of private sector engineers was $65 000 and $79 920 respectively. Public sector engineers earned $70 299 and $84 958 respectively.

Graduate engineers starting work during the past twelve months received a median base salary of $36 000 on commencement.

While increases across states were generally similar, WA recorded the highest annual increase in base salaries (5.7%) and the NT recorded the lowest (4.1%).

Engineers Australia, July 2001

Private Contractors and their Taxation

Private contractors are finding that their taxation has become a major issue. The IEAust maintains that the Federal Government's decision to ease the compliance tax burden for independent contractors has missed the point. While Mr Costello's proposal to ease the compliance burden is helpful, the basic flaw in the legislation remains for many of the IEAust's 8 800 self-employed consulting engineers.

The idea of self assessment does not get away from the fact that the Tax Office, when carrying out an audit, can still determine that many self-employed engineers do not meet the independence test prescribed by the Federal Treasurer.

Many self-employed engineers will continue to fail the three tests laid down in the legislation. The independent consultants do not employ persons, so they fail the employment test. Many work from home, so they fail the business premises test. In addition, professionals are often engaged on a single project such as infrastructure for more than one year. Because of the highly-specialised nature of the industry, there may be only one monopoly buyer. Therefore, they fail the unrelated clients test.

Engineering services is a major and growing contributor to the Australian economy as a result of the contracting out and privatisation of government services. It is vital that, having deliberately structured the workforce in this manner, governments do not undermine or disadvantage this sector through an unrealistic process. The legislation was not well thought out and it still remains grossly unfair to self-employed consulting engineers and other genuine contractors. The Federal government must act immediately to rectify the anomalies in the alienation of personal services legislation to remove the unfairness to genuine contractors lodging their tax returns for the 2000/2001 financial year.

Engineers Australia, August 2001

This article, while written about consulting engineers, clearly also applies to many consulting naval architects. The ANA *would like to hear, either publishably or privately, from any consulting naval architects who have been disadvantaged in this way. In the event of widespread complaints, RINA may be able take up the cudgels on behalf of members.*

Phil Helmore

Comments Sought for Review of Fire Safety

The National Marine Safety Committee is soon to re-commence its review of the fire safety sections of the current Uniform Shipping Laws Code (USL Code Sections 5F and 11). Comments are being sought from stakeholders on the current USL Code provisions and future directions for fire safety standards applicable to domestic commercial vessels.

A discussion paper on fire safety, including some recommendations, is available by download from the NMSC website www.nmsc.gov.au or by contacting the NMSC secretariat by phone (02) 9555 2879 or fax 9818 8047. The discussion paper provides an insight into the rationale behind the review process, some background to the existing provisions, a summary of work to date, a review of a sample of fire safety incidents and a summary of some issues that have been identified to date, together with recommendations for future work on the review.

Comments may be on, though not limited to:

- Errors within the current USL Code.
- Problems of application or interpretation of the current USL Code.
- Obsolete or redundant provisions in the current USL Code.
- Improvements to the current USL Code provisions.
- Other applicable national or international standards that may be relevant to the material covered by the current USL Code.
- Safety issues that have not been addressed or are not adequately addressed in the current USL Code.
- Technological changes in the design, construction and operation of vessels or fire safety systems that should be addressed in a review of fire safety standards.
- Comments on the material and recommendations contained within the discussion paper.

A workshop for stakeholders to discuss fire safety issues and directions is planned for the future. The draft will be developed in consultation with a reference group comprising industry and government. If you are interested in participating in these processes, please advise the NMSC Secretariat.

Once completed, the fire safety requirements will become Part C Section 4—Fire Safety in the new National Standard for Commercial Vessels.

Within the discussion paper, the analysis of fire incidents indicated that machinery was still the most frequent source of fire on commercial vessels, followed by electrical faults and then fires and explosions associated with the storage of petrol.

Among the issues identified for future consideration were the problems of finding effective and economical fixed fire extinguishing systems suitable for installation in smaller vessels that are accepted by all Australian jurisdictions.

Since the USL Code was first developed, a number of important base standards have changed, including SOLAS and various Australian Standards. The discussion paper recommends that the review should take these changes into account. Some potentially-relevant Australian Standards from the paper are listed below.

Potentially-relevant Australian Standards on Commercial Vessel Fire Safety

AS/NZS 1841.1:1997	Portable fire extinguishers—General requirements
AS/NZS 1841.2:1997	Portable fire extinguishers—Specific requirements for water type extinguishers
AS/NZS 1841.3:1997	Portable fire extinguishers—Specific requirements for wet-chemical type extinguishers
AS/NZS 1841.4:1997	Portable fire extinguishers—Specific requirements for foam type extinguishers
AS/NZS 1841.5:1997	Portable fire extinguishers—Specific requirements for powder type extinguishers
AS/NZS 1841.6:1997	Portable fire extinguishers—Specific requirements for carbon dioxide type extinguishers
AS/NZS 1841.7:1997	Portable fire extinguishers—Specific requirements for vaporizing-liquid type extinguishers
AS/NZS 1850:1997	Portable fire extinguishers—Classification, rating and performance testing
AS 1940	The storage and handling of flammable and combustible liquids
AS 2419.1:1994	Fire hydrant installations—System design, installation and commissioning
AS 2444:1995	Portable fire extinguishers and fire blankets—Selection and location
AS 3676-1989	Portable fire extinguishers—Guide to servicing
AS 4265:1995	Wheeled fire extinguishers
AS/NZS 4353:1995	Pyrogen fire extinguishing aerosol systems (currently being reviewed)
AS 4587:1999	Water mist fire protection systems—System design, installation and commissioning
AS 4214.1:1995	Gaseous fire extinguishing systems (currently being reviewed)

It is important to make clear that there are two stages. NMSC is now seeking comment as to the issues and matters of concern with the current USL Code. This comment will be incorporated into a discussion paper for wider industry and professional consideration at a forum expected to be held later this year to provide the direction for the draft National Standard for Commercial Vessels.

Comments should be forwarded to the NMSC by post to M. Flapan, NMSC Secretariat, PO Box 1773, Rozelle NSW 2039, fax (02) 9818 8047 or email secretariat@nmsc.gov.au. The closing date for comments is 2 November 2001.

M. Flapan

Public Comment Sought on NSCV Part F Section 1 Fast Craft

A new standard for fast craft has been released for a two-month public comment phase. The standard, which will form part of the new National Standard for Commercial Vessels, covers Part F Special Craft, Section 1 Special Craft, Subsection 1A General Requirements, as well as Subsection 1B, Category F1 Fast Craft (Subsection 1C, Category 2 Fast Craft, will be drafted separately and released with its own Regulatory Impact Statement).

Category F1 Fast Craft are broadly defined as seagoing Class 1 and Class 2 vessels, over 35 m in length with a speed greater than 20 kn. Currently it is estimated that there are thirteen Category 1 Fast Craft and 472 Category 2 Fast Craft in Australia, with numbers predicted to rise in future years.

The last twenty years has seen an increase in the speed of commercial vessels, including passenger ferries, tourist vessels, patrol craft, water taxis and fishing vessels. While in Australia the majority of these vessels are built to the USL Code, some are built to the International Code of Safety for High-speed Craft (the HSC Code), or classification society rules. One of the issues for safety is that the USL Code was not intended to cover some of the special risks associated with the operation of these high-speed vessels.

For Category 1 Fast Craft the solution proposed by the new standard is the application of the HSC Code with some minor modifications.

The draft standards are available by download from the NMSC website www.nmsc.gov.au or by contacting the NMSC secretariat by phone (02) 9555 2879 or fax 9818 8047.

Comments should be forwarded to the NMSC by post to M. Flapan, NMSC Secretariat, PO Box 1773, Rozelle NSW 2039, fax (02) 9818 8047 or email secretariat@nmsc.gov.au. The closing date for comments is 31 August 2001.

Safety Lines, July 2001

Update on NSCV Parts A, B and C

Part A Safety Obligations, Part B General requirements and Part C, Section 5, Subsections 5A Engineering, 5B Electrical, 5C LPG Systems for Appliances and 5D LPG Systems for Engines of the new National Standard for Commercial Vessels are due to be finalised later this year following a very successful public consultation period.

The three-month consultation period closed in April this year, with more than twenty submissions having been received from both industry and government. The NMSC has implemented an independent review process for submissions. In the case of Parts A, B and C, two reference groups were formed comprising government and industry representatives. These groups met in May to consider all submissions and make recommendations to the NMSC.

Summary reports from both the review panels are available on the NMSC website www.nmsc.gov.au. The NMSC accepted the advice of the reference groups and is amending the draft standards accordingly.

Safety Lines, July 2001

MEMBERSHIP NOTES

AD Council Meeting

The Australian Division Council met on 23 May, with teleconference links to all members and the President, Bryan Chapman, in the chair in Sydney. Matters, other than routine, which were discussed included the operation of the Australian Division website (a formal proposal would be prepared for submission to the next Council meeting); the Walter Atkinson Award for 2000 (nominations using the new system were under way); the RINA/IEAust Joint Board (membership resolved with two members of each peak body; reduced fees for dual membership has yet to be agreed by both Councils); a report from the President on the RINA Council meeting which Mr Riley and he had attended in London in April (a decision on fee reduction for dual membership deferred; the new Council comprises members from Greece, Denmark, Singapore, New Zealand and Australia); and forward planning for 2001/2002 (support expressed for the President's proposal of a portfolio approach to sharing the workload, and some portfolios assigned).

The next meeting of the AD Council is scheduled for 22 August.

RINA Council and Committee Members

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

RINA London

Members	Bryan Chapman
	Noel Riley

Australian Division

President	Bryan Chapman
Vice-president	Robin Gehling
Secretary	Keith Adams
Treasurer	Allan Soars
Members nominated by Sections	
	Tony Armstrong (WA)
	Phil Helmore (NSW)
	Ken Hope (Vic)
	Brian Hutchison (Qld)
	Bruce McNeice (ACT)
	Gregor Macfarlane (Tas)
Members appointed by Council	
	Jim Black
	Tim Dillenbeck
	John Jeremy
	Andy Tait
	Michael Warren

ACT Section

Chair	Bert Thompson
Deputy Chair	Dave Magill
Secretary	Bruce McNeice
Assistant Secretary	Martin Grimm
Treasurer	Nick Whyatt
Members	John Colquhuon
	Robin Gehling
	Kerry Johnson
	Tim Lyons
	Warren Smith

NSW Section

Chair	Bob Dummett
Deputy Chair	Jennifer Knox
Secretary	Jennifer Knox
Assistant Secretary	Todd Maybury
Treasurer	Lina Diaz
Members	James Fenning
	Don Gillies
	Phil Helmore
	Rod Humphrey
	Allan Soars
	Graham Taylor

Queensland Section

Chair	Brian Robson
Deputy Chair	Geoff Glanville
Secretary/Treasurer	Brian Hutchison
Members	Ross Burchill
	Andrew Harvey
	Stephen Plummer
	Milton Roberts
	Ron Wright

Tasmanian Section

Chair	Tim Nicol
Deputy Chair	Gordon Kenworthy-Neale
Secretary	Wade Limpus
Treasurer	Steven Watt

Members	Stephen Cook
	Noel Dunstan
	Martin Hannon
	Holley Lees
	Gregor Macfarlane
	Oliver Mills
	Jared Scull

Victorian Section

Chair	Stuart Cannon
Secretary/Treasurer	Samantha Tait
Members	Tony Armstrong
	Ken Hope

Western Australian Section

Chair	Kim Klaka
Deputy Chair	Steve Harler
Secretary	Jim Black
Treasurer	Damian Smith
Members	Tony Armstrong
	Roger Best
	David Lugg
	John Wood

Phil Helmore

NAVAL ARCHITECTS ON THE MOVE

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

Habibul Ahmed, a recent graduate of the Australian Maritime College, has moved on from Austal Ships and has taken up a position with WaveMaster International in Fremantle.

On 7 August a select section of fifty of the marine industry gathered at the Royal Sydney Yacht Squadron at the invitation of Burness Corlett Australia to farewell a naval architecture legend, Bob Dummett, who has retired. Bob obtained his HNC in the UK and worked in shipyards in Southampton and then with Brooke Marine in Lowestoft. He came to Australia in January 1965 to take up a position as a naval architect with Warwick Hood and Associates, where he took over the tank testing of models for *Dame Pattie*, Australia's second challenger for the America's Cup. From there he moved to Sea Transport Design, and subsequently to YARD for a short time. In 1972 he set up and then managed Burness Corlett's operation in Australia, and has designed many successful vessels. He has served on the Australian Division Council of RINA, and is the current Chair of the NSW Section. He will be remembered by all as a gentleman and a fine naval architect. Craig Boulton of BCA welcomed the guests and, at his invitation, short speeches were made by Warwick Hood, Noel Riley and Bert Langford, all recalling parts of Bob's career. Anne Cummins of BCA presented Bob with a set of lawn bowls, and Jean with a bouquet of flowers. The gathering was notable for the sheer volume of collective experience in the room; *some* grey hair was a prerequisite for invitation! *The ANA* wishes Bob a long and happy retirement.

Alan Dowd has moved on from consulting as Sirius Marine in Brisbane and has taken up a position with Austal Ships in Fremantle.

Stan Gottschalk has retired from his position of Senior Lecturer and Course Coordinator for the Bachelor of Engineering (Naval Architecture) degree program at the Australian Maritime College. Stan and Rebecca are currently holidaying overseas, and will continue to live in Launceston and enjoy weekends at their holiday house on the east coast. Stan plans to spend more time pursuing his musical and theatrical interests.

Barnaby Grubelich, a recent graduate in mechanical engineering from the University of Western Australia, has taken up a position with McAlpine Marine Design in Fremantle.

Michael Henderson-Kelly has moved on from Austal Ships and has taken up a position with WaveMaster International in Fremantle.

Irek Karaskiewicz continues to be busy at the Remontowa shipyard in Poland, where he has now been working for some time. The yard has just completed building a car/passenger ferry, MV *St Clare*, for the UK operator WightLink for service on the route from mainland UK to the Isle of Wight.

Henk Kortekass, a recent graduate of the Australian Maritime College, has moved on from P&O Nedlloyd and has taken up a position as a lecturer

at AMC in the Marine Engineering Department.

Graeme Mugavin has sold the newsagency in Batemans Bay and forsaken the naval architecture consulting work he did with Owen Cropp, and recently set out on a four-month round-the-world trip.

James Nolan, a recent graduate of the Australian Maritime College, has taken up a position with the Marine Safety Section of the WA Department of Transport in Fremantle.

John Pattie has moved on from Queensland Transport, Maritime Safety Branch and is now consulting as an accredited designer.

Martin Renilson has moved on from the Australian Maritime College and has taken up the position of Manager — Hydrodynamics Technology with QinetiQ, the organisation formed on the privatisation of the Defence Evaluation and Research Agency (DERA). QinetiQ remains a wholly-owned government organization, but is now separate from the Ministry of Defence. Martin is based at the Haslar facilities of QinetiQ. Martin's move is a loss not only to the AMC, but to the Australian Division and Tasmanian Section of RINA as well, and *The ANA* wishes him and Susan all the best for the future.

Mark Smallwood has moved on from his position as Director of Professional Affairs for RINA in London, and is expected back in Australia in November.

Paul Stanyon of Stanyon Marine Design has moved his office to the East Coast Marina complex at Coomera, Queensland.

James Stephen and Jens Gravlev have formed a new company, Stephen & Gravelev Pty Ltd (Marine Design) and are consulting in Manly, Queensland.

Chris Tucker has moved on from Austal Ships and has taken up a position with Australia's Catamaran Challenge, designing our contender for the next C-class catamaran (Little America's Cup) challenge.

Adrian Woodhouse has moved on within the Department of Defence Navy Systems Command and has taken up the position of Staff Naval Engineer at the Australian Embassy in Washington DC, USA, replacing Glenn Doherty, a mechanical engineer. This is a three-year posting to the USA.

Dominic Worthington has come ashore from the 2 500 TEU containership *Australian Endeavour* and three round trips from Australia to Japan and Korea. He is now spending six months at the Australian Maritime College in Launceston, doing the coursework for his full engineer's qualification.

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

Phil Helmore

MISSING IN ACTION

Mail for the following three Student Members from the AMC has been returned 'Left Address' — A. Allen, S. J. Cook and H. Lewis.

D. C. Worthington, former address ASP Ship Management, Melbourne, has gone missing, as has G. Guzvanj formerly of Sandy Bay, Tasmania.

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

FROM THE ARCHIVES

HMS *Hood* off the Australian coast during the 1924 World cruise
(Photograph J C Jeremy collection)

Modern technology has given new meaning to the often-used phrase 'lost at sea'. Throughout history, any ship or artefact lost in deep water has been regarded as lost in the most complete sense, never to be seen again. Today, it is increasingly apparent that no part of the earth's surface is sufficiently remote to prevent a 'lost' object from being found, and if the interest is sufficient, at least examined, if not recovered.

For most people, modern capabilities for underwater exploration were most graphically illustrated by Dr Robert Ballard's discovery of the wreck of *Titanic* in 1985, using technology originally developed for more mundane tasks like recovering lost nuclear weapons from the sea floor. Since then, steadily improving technology has revealed much more that was previously considered lost for all time. Ballard's subsequent discoveries have included high-profile wrecks like *Lusitania*, the aircraft carrier *Yorktown*, and the ships (including HMAS *Canberra*) lost in the battle for Guadacanal. Other less well-known discoveries have included ancient trading vessels in the Mediterranean that have shed new light on early navigators and shipbuilders.

There is a strange fascination in the discovery of old wrecks, and people often see their exploration as an opportunity to answer questions about the how and why of their loss. *Titanic* is a good example, and there is probably no more studied wreck in history, with the most thorough forensic examination of all the details of her sinking. During June and July this year, another search began in the North Atlantic for a ship with a special place in the history of the Royal Navy in World War II, the battlecruiser HMS *Hood*.

In March 1916 the Admiralty approved the design of a new class of battlecruiser, large ships with a speed of 32 kn and mounting eight 15-inch guns in four turrets. All four ships

were laid down between September 1916 and November 1916, but the design was subjected to considerable modification as the lessons from the Battle of Jutland in May 1916 were absorbed. In the view of many people, the design, particularly in armour protection, remained weak. The first ship of the class, *Hood*, was launched on 22 August 1918 by her builders, John Brown & Company, Clydebank.

The other ships of the class, *Anson*, *Howe* and *Rodney* were cancelled in 1919 and broken up on the slips, but *Hood* was completed in January 1920 and commissioned on 15 May. She was the last ship designed and completed for the RN as a battlecruiser, and the longest capital ship ever in the Royal Navy. She soon became the pride of the fleet, and occupied a special place in British national pride for the next two decades.

Hood had a displacement of 46 680 tons, was 860 ft 7 in (262.3 m) long overall, 104 ft (31.7 m) in beam, and was powered by steam turbines that developed 151 280 shp (112 810 kw) on trials for a speed of 32.07 kn. She was armed with eight 15-inch guns, twelve 5.5-inch guns, four 4-inch guns and six 21-inch torpedo tubes.

The ship was a very handsome and well-balanced design, with great 'presence'. She was the largest warship in the world during the first ten years of her life, and cruised all over the world. She visited Australia in 1924 with HMS *Repulse*, which was carrying the Prince of Wales during his visit to the Dominions.

Hood was refitted from time to time, but by the late 1930s, was clearly out of date and her machinery was on its last legs. Plans were developed for a major modification (rather along the lines of that given to *Repulse's* sister ship, *Renown*) that would have replaced all the main and auxiliary machinery and improved the armour protection. The approaching hostilities intervened, and just how *Hood* might have emerged from the planned three-year modernisation, which was to start in 1942, is something a matter of speculation.

Early in the war, *Hood* served with the Home Fleet, patrolling the northern approaches to the British Isles, and taking part in searches for the German battlecruisers *Scharnhorst* and *Gneisenau.* Later she joined Force H in Gibraltar as Flagship before returning to the Home Fleet in August 1940.

On 22 May 1941, *Hood* sailed from Scapa Flow in company with the brand-new battleship *Prince of Wales* and a number of destroyers to support the cruisers *Norfolk* and *Suffolk* in the Denmark Strait (between Greenland and Iceland) following reports that the German battleship *Bismark* and her escort cruiser *Prinz Eugen* were at sea and headed for the North Atlantic.

The German ships were sighted on the morning of 24 May, and action commenced at 0552 at about 25 000 yards (22 860 m) range. At about 0555, *Hood* and *Prince of Wales* altered course to port to bring their after turrets to bear. The third salvo from *Bismark* hit the boat deck in *Hood* and started a fierce fire near the main mast. *Hood* was hit again by the fifth salvo from *Bismark*. Ernle Bradford, in his book *The Mighty Hood*, describes the next few minutes:

'The fifth salvo, hurtling through the air, was history. The *Hood* and *Prince of Wales* were swinging fast to port and their 'A' [sic] arcs were just opening. From one of the *Hood's*

after turrets a salvo had just fired. Then the great flame and the high sobbing scream burst. At a range of 16 500 yards (15 090 m) the *Hood* had received her death blow. A pillar of fire soared into the air — a thousand feet high. Guns and turrets were plucked from their mountings and tossed aside like toys. Masts collapsed, hundreds of tons of steel rained on to the water, and the northern sky was split by thunder. She heeled to port. Her back broke. Her bows and stern lifted like two giant tombstones to her dead.

Captain Leach, following close astern, had to alter course to avoid the wreckage. As the *Prince of Wales* came abreast of the *Hood's* fast-disappearing bows, the water was up to A turret. The bows lifted to an angle of 45 degrees, and then slid back with a great sigh into the sea. There was nothing left now but a dense column of smoke towering over the scarred water. She had sunk in two minutes.

The *Hood's* grave is in 63° 20' N, 31° 50' W. If ever a ship died in action, *Hood* did. Her last salvo was in the air at the moment when she received the final blow. Every man was at his post; the breeches had just slammed shut behind the shells and charges for a further salvo; she was steaming still at 28 kn; and then the sea and the darkness covered her. One minute she was alive, the next minute dead.

She lies deep in the waters of the north, washed by the cold currents of the Denmark Strait, 500 miles north-east of Cape Farewell.'

There were only three survivors — 1 418 men went down with the ship.

Two Boards of Enquiry were convened soon after the loss. The second, more extensive analysis of the loss (ADM 116/4352) concluded that the sinking of *Hood* was due to a hit from a 15-inch shell from *Bismark* in or adjacent to *Hood*'s 4-inch or 15-inch magazines (which contained about 113 t of cordite), causing them to explode and wreck the after part of the ship.

The report stated that there was no conclusive evidence that one or more torpedo warheads had exploded within the magazines or at any other time. This had been a popular suggestion at the time, because the above-water torpedo tubes fitted on the upper deck under the main mast had long been regarded as a design weakness.

The report also concluded that the fire which was seen on *Hood*'s boat deck, and in which UP and/or 4-inch ammunition was certainly involved, was not the cause of the loss of the ship.

After a famous pursuit, aided by some luck, and as we know now, some fortuitous code breaking, the badly damaged *Bismark* was sunk by British forces before she could reach Brest for repairs.

Robert Ballard found the wreck of *Bismark* in 1989, where she lies in about 4 700 metres of water, but *Hood* had never been found.

Since 1995, David Mearns of Blue Water Recoveries has been planning to locate and film *Hood*. This year, the British television network Channel 4/ITN has funded the search, which began in June. The underwater team is from Oceaneering Technologies of Maryland, who were responsible for the location and study of the wreck of *Derbyshire*. The

first objective was to locate *Bismark* (Ballard had not revealed her exact location), and she was found on 9 July. The search for *Hood* began on 19 July using sensitive side-scan sonar, and a likely target was found the following day. The remotely-operated submersible carrying cameras was lowered into the 3 000 m deep water and on 23 July 2001 the remains of the great ship were identified.

The ocean floor is covered in pieces of shattered metal, amongst which the forward part of the ship lies upside down. Images from the bottom, including the bows of the ship and the ship's bell can be found at the expedition's web site www.channel4.com/hood/.

Just whether any more information about the cause of the loss of *Hood* can emerge from an examination the wreckage remains to be seen, but there is sure to be intense interest in the images of this famous ship. The image of an apparently intact torpedo lying amongst the wreckage would seem to confirm the contemporary conclusions of the Boards of Enquiry that the explosion of torpedo warheads played no part in the loss.

There are many other interesting ships lying deep on the ocean floor, some of particular interest to Australians. The wreck of the cruiser HMAS *Sydney*, lost with all hands after her action with the German raider, *Kormoran*, lies somewhere off the west cost of Australia. Her location is much less precisely known than that of *Hood*, and finding the ship will make the search for the proverbial 'needle in a haystack' look easy. Speculation about the battle and its consequences continues today, and claims that the wreck has been located have been made as recently as May 2001 — but that is another story.

John Jeremy

HMS *Hood* during the 1924 cruise
(Photograph US Naval Historical Center)