THE AUSTRALIAN NAVAL ARCHITECT

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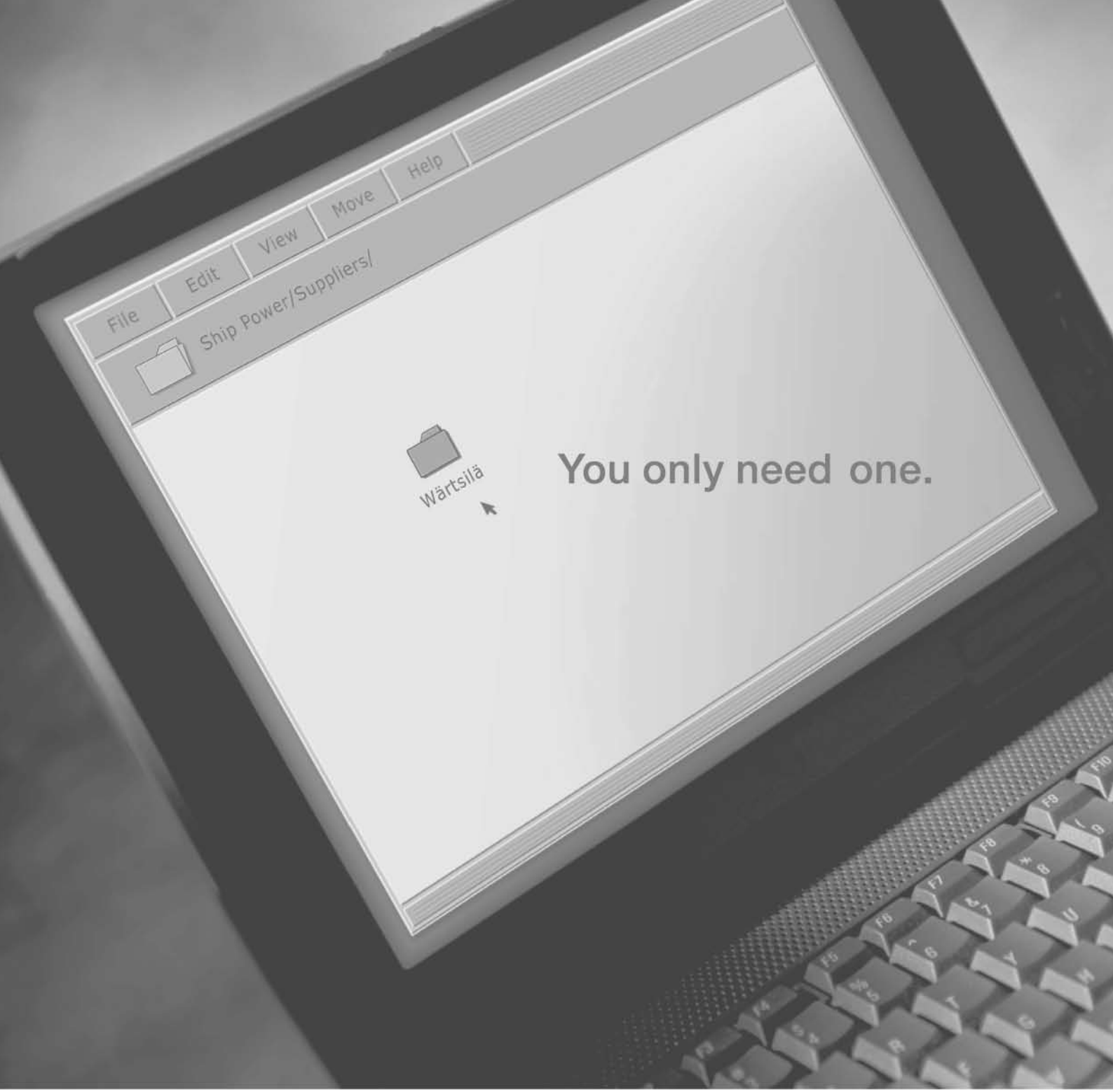

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Cover Photo:

The recently-modernised ship model test tank at the Australian Maritime College, Launceston, Tasmania
(Photo courtesy AMC)

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From the Division President

Those of you who know me in my day job, and others who can remember what I've said in this column in previous editions, will not be surprised at my theme for this edition, but I trust you'll all read on anyway.

One thing held in common by most naval architects is a love of ships and the sea. For many of us this passion extends to our leisure time and vessels of a more affordable size.

But many users of pleasure craft do not have a naval architect's professional education and experience to ensure that their boats are sufficiently well designed and constructed to ensure that they are safe for their intended use. A natural reaction to this situation from regulators (like me) could be expected to be to introduce regulation of the design and construction of such pleasure craft, just as we have regulation of comparable aircraft, but I don't see comprehensive regulation of pleasure craft ever being accepted by the community.

What we have had for many years is the Australian Standard for Small Pleasure Boats (AS 1799) which has, for over a decade, comprehensively covered the design and construction of pleasure craft, both power and sail. This standard is intended for use under consumer-protection law in defining the "merchantable quality" of a commercially-purchased pleasure boat.

Over the past couple of years the National Marine Safety Committee (NMSC) has developed and sought public comment on a standard for the Australian Builders Plate (ABP). This standard would require that every boat purchased in Australia be fitted with an information plate showing the boat's load capacity, in terms of persons and kilograms, determined in accordance with AS 1799 or with the alternative ISO or American Boat and Yacht Council (ABYC) standards.

I understand that this approach was developed on the basis that it should be possible to import into Australia boats from respected developed countries that are certificated in accordance with the rules of their country of origin. Similarly, boats built in Australia to such respected foreign standards, such as ISO or ABYC, should be able to be sold in Australia or exported into overseas markets.

Early this year I received correspondence from someone in the industry (not a RINA member) claiming that the three standards are not in fact equivalent. It was claimed that this potential safety problem could result in a boat that was substantially overloaded according to one of the standards being satisfactorily loaded according to another standard, and that the issue had not been adequately addressed in the development of the proposed ABP standard. As this was clearly a matter of public safety within the ambit of naval architecture, I referred the query for examination by the Division's Safety Committee.

At the time of writing this column, the Divisional Council had received an interim report from the convener of the Safety Committee, and I hope to be in a position to respond to the correspondent at about the same time this edition of *The ANA* strikes your desk. If appropriate, the Division will write to NMSC in relation to its conclusions.

The timing may be coincidental, but I understand that NMSC is reviewing its proposed standard to address this problem and to require that the standard on which the persons/kilograms capacity has been determined be shown on the boat's builder's plate. According to the latest available draft of the ABP standard, identification of the AS 1799, ISO or ABYC standards on the plate is at the discretion of the builder/importer.

While this action by NMSC may have been prompted by informal advice of the investigative work being undertaken by the Division, there has been no formal communication between RINA and NMSC. Nevertheless, it is your Council's view that the Division has a social responsibility to develop and express views on matters of public safety within the field of naval architecture while, at the same time, ensuring that its actions do not go beyond its social responsibilities into providing advice that could and should be obtained commercially.

In my view, Council and, in turn, the Division will have successfully fulfilled their social responsibilities in this matter through this response to the matters raised by the correspondent, irrespective of whether any need arises for the Division to write to NMSC. I would like to express my appreciation to the Safety Committee for the hard work and dedication they have put into achieving this outcome.

You might note that I have suggested to the correspondent, at an early stage of our communications, that it would be appropriate for him to apply for RINA membership at the appropriate grade.

On another important matter, those Members and Fellows working in the defence sector should note that a Memorandum of Understanding has been agreed between RINA and the Defence Materiel Organization (DMO) in relation, among other things, to DMO recognition of CEng registration obtained through RINA. I expect the MoU will have been signed by the time you receive this edition of *The ANA*.

Rob Gehling

Editorial

Two major shipbuilding projects have taken major steps forward in recent weeks, with government decisions to move to the next stage with the air-warfare destroyers and amphibious ships for the RAN. The choice of ASC Shipbuilder as the preferred shipbuilder for the destroyers, Gibbs & Cox as the preferred designers and the allocation of $455 million, provide the opportunity to ensure that facilities can be developed and essential workforce training begun well in advance of the likely start of construction.

Despite rumours that the government was about to order the two amphibious ships (LHD) overseas, the recent announcement that Australian shipbuilders will be invited to tender for the construction in Australia of either, or both, of the competing designs is welcome. The challenge for Australian industry is considerable. Whilst the ships are substantially less complex than the destroyers they are (by our standards) relatively large ships. With their broad range of capabilities they are far from simple ships, but it is the size that is perhaps the greatest challenge.

We dismantled our shipbuilding industry capable of building large steel hulls during the 1970s and 1980s. There are even no remaining active slipways large enough to accommodate

the ships. Of course, this does not mean that it can't be done — far from it. But in this project the shipbuilder's cost will be a much larger component of the total project cost than that of the destroyers. The need to establish the necessary facilities by extending those that exist, building new facilities or adapting others, like existing docks, will make it more difficult for those seeking the contract to compete with established and experienced overseas yards. Another major task will be assembling the necessary skilled workforce. The effort can be spread around the country to some extent, but manufacturing industry is short of skills everywhere today as more young people prefer other careers to traditional trades.

We need these ships and we need the industry to build and support them. We look forward to reporting on the success of Australian industry in meeting the challenges as these projects develop.

John Jeremy

Letters to the Editor

Dear Sir,

The recent discussion regarding the passenger mass allowance for small craft stability [*The ANA*, May 2005] is little more than a case of being wise after the fact. The limited number of small commercial vessel capsizes in Australia and other developed countries has as much to do with good luck as good management. In the past I have conducted a number of USL Code Category T inclinings using passengers rather than weights. Although some surveyors frowned on the practice, it is a long way closer to reality (and the inclining weights have their own legs!)

Category T (an old USCG rule, I believe) allows for a reduction in passenger mass to 65 kg to account for a certain percentage being children. Several years ago, when the USL Code stability section was being reviewed, I sent a brief note to the NSW Maritime Authority regarding small craft stability calculations and, in particular, mass allowances. From my notes, I found the average weight of passengers used in my stability tests was about 80.4 kg. I concede that these tests normally relied on more senior adults who had the free time to stand around for an hour or so on a weekday, but stability calculations must reflect an "average worst" loading, not just an average loading. I will add that I found the Maritime Authority to be more than sympathetic.

Moreover, the weight of miscellaneous items needs to be spelled out for small vessels in sheltered water and coastal service. I have seen many stability booklets where a charter vessel consists of lightship, 12 persons at 75 kg each and 300 L of fuel. What about the ice, stores, bait, rods, fresh water, fish, woolly jumpers, lunches, eskies and five cartons of beer? In a small vessel these items can be a significant proportion of the deadweight, aggravated by the fact that all vessels get heavier with time. As a result of calculating realistic deadweights, I was often on the receiving end from a vessel owner complaining that his mate's boat was certified for 12+2 but the best I could come up with was 10+2. Stability work eventually dried up, but I slept well at night.

Sheltered water stability is fairly simple, as the two greatest influences are passenger and wind heeling. Having underweight passengers standing some way inboard of the gunwale (again, an "average" condition used in Category T calculations) is not particularly good engineering practice.

Greg Cox

Dear Sir,

I recall the time when my interest in ship design was first sparked; it happened during the Singapore River Raft Race, which is held annually in February and which, over time, has become a real tourist attraction. The event is organised by Singapore Polytechnic with the main objective being to raise funds for needy and special schools. The race is open to the public, thus attracting many organisations to compete against each other. Each year, new ideas and competition categories are added to increase participation. Some of the categories now include the fastest raft (sail and rowing), the most decorative craft, the raft constructed at the lowest cost, and the list goes on.

A new category was added in 1999, that of the technological raft, in which rafts are judged on design, manoeuvrability, speed and weight. Each team is given four oil drums for their hull, and it is to be fitted with a propulsion system deemed suitable. The only restrictions on the propulsion system are that it must be electrically driven by one 12 V car battery, and parts must not be taken from any existing propulsion system design. The program requires the rafts to race over a distance of 100 m up the Singapore River.

For that race, I observed that there are two commonly-used hull shapes, typically monohulls and catamarans. What amazed me was the use of various household appliances to propel the rafts. One team used a fan blade as their propeller and drove it by a belt through a series of pulleys to ensure that there was sufficient torque to propel the raft. Another team used a filter pump from a backyard pond as their propulsion design, similar to the idea of jet propulsion. Many modifications were done after initial trials to ensure that the rafts performed at their best.

The event has spurred the interest of many participants, and encouraged some to take up further studies in the maritime sector or to further their knowledge of ship design The event has also brought together many other skills not officially taught in the polytechnic, like teamwork, event organisation, time and logistics management, setting up of a communications network, media coverage, and the unions have to organise and execute the events under supervision from the lecturers. So the whole polytechnic, with the various disciplines, gets to join hands and work together, allowing the students to observe how the societies function interdependently of each other and, finally, getting to enjoy the event together.

I would like to recommend that such an activity be organised in Australia, to promote knowledge of ship design and to get young people interested in maritime activities, thus drawing new energy and ideas from the youth of the country. It could be made into an event that every naval architecture student would look forward to, where their knowledge and skills could be displayed. They could enjoy the process of producing something small, which they could then call their maiden vessel design.

Ethan Seah
UNSW Student

Dear Sir,

In the May 2004 issue of *The ANA*, I reported on our use of rectangular propeller tunnels. We have recently launched another vessel with a rectangular tunnel in a single-screw configuration. A previous vessel of the same design fitted with semi-circular tunnels struggled to meet speed predictions, but the latest vessel with a rectangular tunnel slightly exceeded the predicted speed of 16 knots (Fn = 1.0). Anyone looking at a simple tunnel design for a vessel speed of less than 25 knots should consider the rectangular option.

Greg Cox

Dear Sir,

It's been about a year now since I decided that I wanted to be a naval architect. It's a decision that came as a surprise to me, because I had always wanted to be an aerospace engineer but I did like boats and water, and I had enjoyed sailing in one form or another my whole life. I think the clincher, though, was when my mate said "Pete, you should do naval architecture with me … It'll be bloody good." So I said 'OK".

All in all, I'm happy with that decision so far. I find myself liking boats more and more; I appreciate the diversity from high-performance ocean-acing yachts to supertankers to trawlers.

I have one minor qualm with this profession though. It seems that the community in general is misinformed on the definition of 'naval'. I'm sure that this has happened to us all, such as when you meet a new person and make small talk, inevitably the conversation gets to the subject of occupation. So I tell them I'm studying naval architecture. It is almost guaranteed that their reply will follow: "So you're going to join the navy?" It seems a very common misconception that all things naval are in the navy.

What should we do about this? Something needs to be done, because it's annoying and I'm already tired of having to correct everyone and explain to them that I probably won't be joining the Navy any time soon. I think that calling ourselves 'boat architects' would solve almost all of the problems, but I am open to suggestions.

I also have an issue with the use of the word 'architect' in preference to 'engineer', but that's best saved for another day — one problem at a time!

Peter Hatton
UNSW Student

[*This has been discussed from time to time within the profession, especially with the advent of the offshore industry. However, every possible term has its pros and cons. The term "naval architect" is well understood within the marine industry and, for the present, that suffices. We will all be able to continue honing our art of conversation in breaking the ice at parties* — Ed.]

PREFERRED DESIGNER FOR AWD CONTRACT

The Federal Government has chosen Gibbs & Cox as the preferred designer for Navy's Air-warfare Destroyers (AWDs) — one of Australia's largest and most complex Defence projects worth up to $6 billion.

Announcing the decision on 16 August, Defence Minister Robert Hill said Gibbs & Cox now joins a team made up of ASC Shipbuilder Pty Ltd, who has been selected to build the AWDs, and Raytheon Australia, selected as the Combat System — System Engineer.

Senator Hill said Gibbs & Cox, a United States-based company, was chosen through a competitive tender evaluation process that also included German company Blohm + Voss and Spanish company Navantia.

"The selection of Gibbs and Cox as platform designer now completes the team whose responsibility it is to deliver the project," Senator Hill said.

"The Government made the decision after accepting the recommendation of the Source Selection Board on the basis that Gibbs & Cox offered a superior bid in terms of value for money.

"All three companies presented competitive bids and showed themselves to be very competent naval ship designers. Bids were evaluated against a wide range of criteria.

"The Gibbs & Cox evolved design will now compete with an Australianised version of Spain's existing F100 ship design, and will be further considered by the Government as part of the next phase of the project.

"The construction of the Air-warfare Destroyers will be one of the most significant shipbuilding projects undertaken in Australia to date, and will provide enormous opportunities for Australian industry," Senator Hill said.

The Government has provided $455 million towards the current phase of the project, which includes further design work, workforce skilling, initial infrastructure investment and facilities construction.

Senator Hill said the Defence program office would now advise on a location to establish a state-of-the-art AWD System Centre which will house up to 200 personnel working on the development and through-life support of the vessels.

The conduct of the evaluation and selection of Gibbs & Cox was reviewed by AWD program probity advisers KMPG and independently by Sir Laurence Street, both of whom have confirmed that the process was fair and equitable.

"The AWDs represent a quantum leap in the air-warfare capabilities of the Navy," Senator Hill said.

"The vessels, which are to be introduced into service from 2013, will be equipped with the world-class AEGIS combat system which is capable of detecting hostile aircraft and missiles at ranges in excess of 150 km."

They will provide significantly-increased protection from air attack for troops being transported and deployed on ADF operations overseas and can provide long-range air-warfare defence for a naval task group.

The AWDs will also have an anti-submarine and anti-surface warfare capability, as well as the ability to embark a helicopter at sea. The ship will also be interoperable with the United States and other coalition partners.

NEWS FROM THE SECTIONS

ACT

Rob Gehling gave a presentation on *Research into Parametric Rolling of Ships in Head Seas* on the evening of 21 July to the ACT Section.

While it is known that ships operating in following and quartering seas may experience synchronous rolling when the wave encounter period approximates the ship's natural roll period, less recognised is the fact that large roll motions can also develop when the wave encounter period is half the ship's natural roll period. This parametric rolling can even be experienced in head seas. Rob noted that a number of ships have experienced such rolling when hove-to in heavy seas, resulting in significant damage to and/or loss of cargoes.

These incidents, which have mainly involved containerships and car carriers, are of concern in terms of the safe carriage of cargo, the stresses imposed on the crew and the navigational safety and environmental concerns associated with the loss of containers. In the case of one large post-panamax containership, parametric rolling to 35–40 degrees amplitude led to the loss of 406 containers and damage to over 1000 more. Other incidents of large roll motions have been reported for car carriers and containerships including an occurrence off the Victorian coast.

Commencing last year, the Australian Maritime Safety Authority instigated research at the Australian Maritime College (AMC) to examine the occurrence of parametric rolling. This led to the preparation of a paper for IMO proposing guidance to masters to enable them to recognise the onset of such rolling and to assist in their decision-making on how to respond.

Rob's presentation included photographs of damage resulting from such incidents, both in Australian waters and overseas. He outlined the work undertaken at AMC and showed some video footage of the onset of parametric rolling during these tests. The AMC tests were performed on a representative modern containership and a more traditional

THE WALTER ATKINSON AWARD 2004

The Award was established in 1971 to commemorate the life, work and service of a founder member of the Australian Branch (later Division) of RINA with the objective of stimulating increased interest in the preparation of, and the raising of the standard of technical papers presented to the naval architecture community in Australia.

A nomination for the Award may be for a presentation which includes a written technical paper. or for a technical published paper, and it must be more than a promotional presentation. The paper must be first presented at a maritime conference or RINA meeting within Australia, or first published in a maritime journal within Australia during the current year. All authors are eligible.

The following are considered in the assessment for the Award:

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

The Award will comprise a monetary award of $250 for an individual author or, where there are two or more authors, each author will receive $125. In addition, each author will receive, where practicable, a framed certificate.

Call for Nominations

Nominations for the Walter Atkinson Award for papers presented in **2004** are now called and should be made by members in writing to the Secretary of the local Section (or, for NT and SA residents, the Secretary of the Division). Nominations must include a hard copy of the paper for assessment, except for papers published in *The ANA*. It is the responsibility of the nominator to obtain the consent of the author/s of the paper to the nomination.

No member of a Section Committee or the Council of the Australian Division who is an author or contributor to a paper may be involved in the nomination or decision process at any stage.

Nominations close with the Secretary of your local Section (or, for NT and SA residents, the Secretary of the Australian Division) on Friday 23 September 2005.

Keith M Adams
Secretary
RINA Australian Division
PO Box 976
EPPING NSW 1710

cruiser-stern containership hullform represented by an S-175 model. Both models were self-propelled for tests in the AMC seakeeping basin, while some towed seakeeping tests were also performed in the towing tank. The tests indicated that modern containership hull forms, with more pronounced bow and stern overhangs, are more susceptible to parametric rolling. While it was more difficult to induce parametric rolling on the S-175 model, this was still demonstrated to be possible. Of interest was that parametric rolling could be induced on a towed model in head seas after a slight initial roll disturbance.

Initial tests were performed with GMs corresponding to about one metre at full scale. There is a possibility that further tests will be undertaken with higher GMs which are representative of the load conditions of some of the ships which have encountered parametric rolling in service.

Martin Grimm

New South Wales

The NSW Section Committee met on 20 June and, other than routine matters, discussed:

- SMIX 2005: Other possible venues were discussed at some length; focus narrowing and one further to be investigated.
- TM Program for 2005: A further technical meeting, with a presentation by Greg Seil of Rolls Royce/KaMeWa, added to the program, and the issue of cost-sharing by the Australian Society of Defence Engineering discussed further.
- TM Venue for 2006: Engineers Australia have sold Eagle House and will be moving to new (yet undecided) premises in mid-2006. We have the option of moving to their new venue or changing. Various other options canvassed, and several to be investigated.
- Clunies Ross Award 2006: The Australian Division Council of RINA has circulated a call for nominations for this award; conditions to be obtained.
- Finance: The NSW Section finances at 31 March 2005 stand at $72 in the black, having received reimbursement for several venue hires.
- Refreshments at Technical Meetings: The IMarEST Committee has agreed to an upgrade of refreshments at technical meetings to party pies/sausage rolls/quiche and orange juice, in addition to the usual tea and coffee.
- Presentation to Presenters: IMarEST has also agreed to the presentation to each speaker of a bottle of wine in appreciation for their efforts in presenting to us. The inaugural presentation was made to Gregor Macfarlane at the July technical meeting.
- Engineers Australia Advertising of Joint Meetings: Engineers Australia advised that advertising of meetings is done from their database, and attributes the meeting to whoever pays the bill. Joint meetings are attributed at the bottom of the advertisement.

Design and Construction of the Army Watercraft

Adam Williams of ADI Limited gave a presentation on *Design and Construction of the Army Watercraft* to a joint meeting with the IMarEST and the ASDE attended by forty-six on 10 May in the Harricks Auditorium at Engineers Australia, North Sydney.

Introduction

Adam began his presentation with some background on the acquisition of the army watercraft. HMAS *Manoora* and *Kanimbla* currently carry two LCM8s to unload vehicles over their stern ramp from the vehicle deck.

In 2001 a tender was released by the army for the acquisition of a replacement watercraft system which could decrease the loading time by at least 30%. In 2002 ADI Limited was awarded a contract to build six watercraft and provide logistics training and in-service support.

ADI's Approach

A system analysis demonstrated that the maximum reduction in loading/unloading time would be achieved by

- increasing the volumetric payload of the craft; and
- decreasing the time spent in loading/unloading operations.

The total loading/unloading time was not highly sensitive to vessel speed through the water. It was therefore decided that the selected solution should emphasise vessel cargo capacity and loading/unloading efficiency over speed.

The system analysis determined the maximum size that could fit on the LPA's foredeck (two were required, side-by-side), the maximum size of the well deck, that drive-through capability would be beneficial in minimising loading/unloading times, and that high manoeuvrability was essential.

The contract spelled out that compliance with DNV class was required, a weight limit on the craft to meet a crane limit on the LPAs, that there should be accommodation on board for four crew (bunks, shower, etc.), and the specification of military requirements (ballistic protection, armament, and military standards).

Principal Particulars

The principal particulars of the resultingvessels are as follows:

Length	25 m
Beam	7.8 m
Lightship	59 t
Range	720 n miles
Cargo	65 t
Construction	Aluminium
Propulsion	2 × diesels/waterjets
Speed	11.5 kn light
	9.5 kn laden

Note that the payload of these craft is more than the lightship!

Method of Deployment

The watercraft are stowed side-by-side on the LPA's foredeck. They are craned off, using the LPA's crane, into the water. The stern ramp of the watercraft marries to the stern ramp of the LPA, and vehicles drive forward off the LPA onto the watercraft. The watercraft then transits to the beach, lowers the bow ramp, and the vehicles drive forward

off the watercraft onto the beach. There is a big reduction in time and improvement in safety with the vehicles always driving forwards, as opposed to reversing operations on the current single-ramp LCM8 landing craft. The decks are sufficiently strong the no dunnage is required.

Cargo Capacity

The cargo-carrying capacity of the watercraft is 65 t, and the well-deck area is 137 m^2. The large well-deck area means that the vessel is not normally volume limited. Adam showed a slide of a bulldozer with a grouser blade embarked, and with fifty concrete blocks embarked to achieve the 65 t payload for trials; both were easily accommodated. The well-deck has both centreline and side tie-down points for securing the cargo, whatever it may be, and the vessel has a DNV-approved cargo-securing manual.

Vessel Mass

This was an unexciting, but critically-important, aspect. The contract specified a 62.4 t crane-off mass as a go/no-go indicator for delivery; i.e., if the vessel mass for crane-off exceeded 62.4 t, then delivery could be refused. This was based on the LPA crane capacity, together with some through-life margin.

Mass control was therefore exercised during the design and construction, as it was recognised as a high-risk component early on. A detailed database was therefore constructed for keeping track of each item. Original entries were based on estimates. These were fully updated to calculated values as drawings were produced (every item was drawn; there were no "typical" details), and to measured values as completed. At the end of the build, the database was 1200 line-items long, where a line item could be "accommodation module", including even the handling ropes. The database is an integral part of ADI Limited's configuration management database, *Oasis*. The database always uses the latest revision, and the previous versions are retained for reference so that estimates and calculated values can be checked for accuracy.

This is a complex structure on which to minimise construction mass. Aluminium was the only practical material, and the hull was built corrugated. Multiple plate thicknesses were used to match the plate thickness to the loads and to minimise structure mass where possible. The deck extrusion is a derivative of Incat's ICT701 extrusion, and Adam showed a sample of the new section, and a slide of the hull being turned over which clearly showed the hull corrugations.

On completion, each vessel had to be physically weighed to prove the crane-off mass. This was achieved using a floating crane, and a load cell provided by navy. The vessels are lifted by four attachment points, two each at Bulkheads 5 and 11, and the single load cell is placed in the line above where the four attachment wires meet.

All vessels are currently very close to the estimated mass, and below the contract requirement of 62.4 t.

Building to Class

The watercraft were fully built to class. The selected classification society was Det Norske Veritas A/S, and the class notation is ✠1A1 LC Crew R1 (aus) EO.

This was ADI Limited's first experience of designing to classification society requirements, and some important lessons were learned: there is a need to know the rules thoroughly; the class society should be involved from the beginning (especially where the solution is outside the norm; DNV were very helpful); and the timescale of the approval process needs to be allowed for (you cannot expect same-day service).

Significant issues turned out to include the interaction between the classification society rules and the military requirements (this accounts for the "aus" part of the notation), the vehicle tyre footprints, fatigue requirements, stability (this was unusual in that navy, rather than commercial, requirements were used); and the customer was also the flag state for the vessels!

Vehicle Tyre Footprints

DNV's rules for ro-ro vessels are based on commercial vehicle tyres, which generally have a mild tread pattern, leading to large contact patch and low contact pressure. Military vehicles tend to have a very aggressive four-wheel-drive-type tread pattern, leading to comparatively smaller contact patch and high contact pressure. The worst of these vehicles is the Unimog, which the army uses.

Fatigue Design

This was a multi-stage process. Initially, the design was done to DNV's requirements. However, then the customer requested more severe requirements based on the vessel's intended role.

Extensive variations were required, involving an internal finite-element modelling of the structure, and complete fatigue assessment. This was approved by DNV, and then independently verified by a specialist third party selected by the customer. The outcome was that the deck extrusion was modified to increase its strength, and a mass penalty of 300 kg per vessel had to be absorbed.

Stability

The watercraft were required to meet the RAN stability standard 8015866 (similar in principle to DDS079-1) which, however, had been developed for conventionally-shaped vessels.

The watercraft is essentially box-shaped, and many details of interpretation had to be sorted out with the customer, e.g. location of the collision bulkhead, the definition of the margin line (this continues horizontally forward, rather than following the downward line of the bow ramp) and the subdivision spacing (for one-compartment flooding). The frames are not evenly spaced, to allow for the precise location of the collision bulkhead and bulkheads for subdivision. Compliance with the criteria was checked by DNV.

Typical $G_F M_O$ of the vessel is 9 m light and 7 m loaded. There are criteria for wind heeling, passenger heeling, towing, turning, loading vehicles, and beaching. The limiting criterion is the area ratio for wind heeling. Reserve buoyancy is not a problem.

Build Philosophy

A modular build philosophy was adopted. This allowed outside companies to build separate modules, and

ADI Limited assembled the modules and conducted all outfitting. There was a number of reasons for this approach, including a lack of experience in some yards in working in aluminium, and the need to have flexibility in build location due to other potential projects. The overall outcome has been very successful, with work distributed to those best able to do it.

Major modules were the hull (three full-width modules), the bulwarks (six modules, including the superstructure), and the ramps (bow and stern).

Modules were constructed by:

- Varleys, who had extensive prior experience in aluminium, plus experience in ship repair and defence contracting, and they built all hull and bulwark modules except those for Ship 03;
- North West Bay Ships, an experienced aluminium shipbuilder, and they built Ship 03 structure to ensure that the build schedule was maintained; and
- Forgacs, which had extensive prior shipbuilding and aluminium experience, and they built the superstructure modules and ramps.

Aluminium Welding

Aluminium welding quality turned out to be a significant issue, and there was initially a lack of suitably-qualified welders locally. However, they recruited key personnel from interstate, and upskilled local welders where necessary. Even so, they had to import additional welders from interstate to cope with peak demands.

Maintaining standards also presented its share of issues. Aluminium is not a "set and forget" material, and good staff needed to be retained. Material certification was certainly a problem, and segregation of DNV-certified material from non-DNV-certified material caused headaches! Automatic welding was adopted where practical, and thirty DNV-qualified procedures were developed.

Module Alignment

Alignment of the hull modules was seen as a critical issue. The supplier of the corrugated plates was required to deliver the plates to tight tolerances. The critical dimensions of all modules were checked prior to despatch from the subcontractor's yard and when being lined up for joining. A high-stiffness assembly jig was used to ensure accuracy of the line-up.

Adam then showed several slides of hull modules A, B and C on the assembly jig.

Trials

All six watercraft were subjected to normal installation, set-to-work and sea trials programs.

The trials program was extensive. The Commonwealth requires all contract requirements to be verified, and the verification to be traceable. DNV requires all class requirements to be verified. The two programs overlap, but they each have a different focus.

Ship 01 was also subjected to extensive operational trials with HMAS *Manoora*, being lifted on and off the vessel, and Adam showed slides of the embarkation process. When two watercraft are stowed on the LPA foredeck, there is a walkway between the craft. Further slides illustrated a Unimog transferring from the LPA to the watercraft, and a Mack truck with seven concrete blocks on board driving onto the watercraft, both over the bow and over the stern from a marine railway to simulate beach operations. Real beach operations were trialled at Horseshoe Beach at Newcastle.

Adam then showed a video of a Larc (army duck) driving from being water-borne, up onto the deck of the watercraft.

Status

The status of the design-and-build component of the contract is as follows:

Ship 01	Delivered in Townsvillle
Ship 02–03	En route to Townsville for delivery in 2–3 weeks
Ship 04	Commencing final set-to-work
Ship 05–06	In later stages of build, for delivery later this year

Questions

Question time lasted for more than half an hour and elicited some further interesting points.

The Abrams tank was purchased after the contract for the watercraft was let. The watercraft can embark an Abrams tank, but not over the stern ramp; only over the bow.

There are mountings for 50-calibre machine guns port and starboard, but the contract did stipulate that landings were to be on non-opposed beaches. However, the bow ramp is bulletproof, and the gun mountings have bisalloy protection. The stern ramp is close to the same bulletproof protection. The wheelhouse has full ballistic protection by way of bisalloy and bulletproof glass.

The bow ramp is raised and lowered by winches either side, each of which is separately capable of doing the job, and there are simple turnbuckle locks.

The waterjets have grilles over the intakes to prevent ingestion of foreign matter. The waterjets are of large diameter and can cope with small debris and sand, etc. The same units are used in river deltas in Asia, and have been proven in practice to cope with sand and mud.

The corrugations in the hull prevent the occurrence of suction in water or on mud bottoms, and have been beneficial from that aspect.

The contract price for the design-and-build component was $32 million, or $5.3 million each.

The watercraft provide accommodation for four, but work in their main role as a ferry for vehicles from the LPAs with a crew of five: master, engineer (the engine room is unmanned), and three vehicle handlers.

The deck extrusions were developed in concert with G. James and Co. who approached Incat for permission to use their extrusion ICT701. However, following the fatigue analysis, the extrusion was modified to become ADI002, which was supplied in 8 m lengths.

The vote of thanks was proposed by Geoff Pearce of ASDE, and carried with acclamation.

Replenishment at Sea

David Miers of David Miers and Associates and John Dransfield of H.I. Fraser gave a presentation on *Replenishment at Sea and Equipment Fit in the RAN* to a joint meeting with the IMarEST and the ASDE attended by thirty-seven on 13 June in the Harricks Auditorium at Engineers Australia, North Sydney.

Introduction

David began the presentation with a slide showing HMAS *Success* simultaneously replenishing two FFGs at sea, and an outline of the presentation: he would be presenting general information on replenishment at sea (RAS), and John would be giving details of the conversion and equipment fit to HMAS *Sirius* ex *Delos*.

David Miers

David is now the Principal of David Miers and Associates, but joined the RAN as a youngster and, in his first job at sea, was posted to HMAS *Supply* as the Cargo Officer, in charge of fuel. This was daunting, and he had his share of accidents, but it was a good learning experience. For example, while anchored in the Swan River and refuelling, he had cemented up the scuppers in accordance with Standard Operating Procedure. The OOW went to sleep and, as a result, the cargo tanks overflowed and filled up the tank deck with FFO! Thanks to an SOP and having followed it, no heads rolled. His final posting was as Chief Engineer on HMAS *Success*.

Since leaving the RAN, his company has undertaken a worldwide study of RAS in the major replenishment navies, including the USA, Canada, the Netherlands and the UK, reporting to the RAN in 2002. As a result of that report, the RAN has now developed many materiel requirement documents for RAS equipment to be supplied, and these were promulgated in 2004.

What is RAS?

There are various interpretations of what constitutes replenishment at sea, but most definitions are along the lines of "a unique and inherently dangerous naval operation, carried out between vessels at speeds exceeding 12 kn, separated by about 50 m, connected by wire, with the prime objective of transferring fuel and cargo (stores)."

The whole operation demands precise shiphandling and skilled seamanship to transfer cargo at any time of day or night, on wet decks, in heavy seas, etc. Most RAS operations are performed in up to sea state 6 (although the equipment manufacturers claim their equipment is good for sea state 7), and generally only in daylight.

It is interesting that this is a specialised field which requires the integration of seamanship and engineering on board; the Captain and the Engineer must work closely together. All deck officers have their stories of how they ran aground somewhere, but all engineering officers have their stories of how a RAS operation went wrong!

How RAS Works

The key to RAS is the tensioning of the spanwire (also called the highwire) which keeps the wire high and tight despite the relative rolling movement of the two vessels. This is usually accomplished by a pneumatic ram-tensioning device which takes a constant load of about 9 tonnes-force (90 kN), with other cables to handle inhaul and outhaul. A typical payload transfer is about 2 t, with separation distances of the ships being 30–60 m (up to 90 m unloaded), and a typical crossing time of 30 s. Operations may continue up to the top of sea state 6, but not higher. Typical transfer rates are of the order of 35 t/h for cargo (compared to 30 t/h for cargo transfer by helicopter), and 600 t/h for fuel.

The problem for any commanding officer with RAS is that it confines the ship to a particular heading and speed for

HMAS *Success* refuelling USS *Kitty Hawk* during the recent exercise Talisman Sabre 2005 off North Queensland. USS *Cowpens* is approaching for RAS to starboard of *Success*
(US Navy photograph)

the operation, thereby reducing manoeuvrability and is operationally uncomfortable. Most COs would prefer to move people and stores by helo, which does not reduce their manoeuvrability, and use spanwire transfer for fuel only.

An aircraft carrier, for example, may take up to 4000 t of fuel which, at 600 t/h, is going to take almost 7 h to transfer! An FFG, taking 250 or 300 t, is still going to take half an hour for the transfer. However, the RAS operation extends the operations of the vessels.

The USA has developed a "seabasing" operation, where they place their supply vessels close to the scene of operations, thereby making the time off-task as short as possible. They are also doing a lot of work in improving the RAS operations. USS *Cimarron*, for example, has her bridge structure aft, a store forward, and a flush deck. The result is that a forklift can remove cargo from the forward store and drive anywhere along the length of the ship, including past the bridge structure to the helo deck at the aft end.

History of RAS Development

The first RAS was done prior to World War I, and the records show that a transfer rate of 83 t/h was achieved with coal in bags, compared to the 35 t/h which we can achieve today! The first recognised system was the Nimitz Jury Rig, developed for cargo transfer by Chester Nimitz who was Commanding Officer (later Admiral) on the vessel USS *Mau Mee*. Admiral Spruance subsequently developed the Burton Rig for transferring armaments and fuel. Then, during the Korean War, the US Congress approved the construction of purpose-built RAS ships. In 1957 Admiral Arleigh Burke committed the US Navy to the development of RAS, and made some far-reaching policy decisions: the replenishment ships had to be as fast as the fleet, and liquid transfers had to be on a tank-to-tank basis (with no intermediate handling). These principles have now been almost universally adopted.

Trends

Current RAS systems were developed in the 1960s, 1970s and 1980s. However, war has changed, firepower has changed and crewing has changed. These days it is no longer acceptable to tie ships together for 4 h for a transfer. An aircraft carrier needs 80 crew on deck for a stores transfer, and a further 400 for the strike-down and, with current crewing levels, there are not the people available. There is not enough money in RAS operations to keep people busy all the time, and the USA is busy looking at the RAS operation and how it can be improved.

John Dransfield

John then continued the presentation, and introduced himself as the General Manager of H.I. Fraser, the Australian agents for Rexroth Hydraudyne, suppliers of RAS equipment based in the Netherlands, and who have won the contract for supply of RAS equipment to the RAN for fitting to HMAS *Sirius*.

The RAN currently has two supply ships:

- HMAS *Westralia*, homeported in Perth and due for replacement in 2006; and
- HMAS *Success*, homeported in Sydney and due for replacement in 2015.

John illustrated these vessels with slides of HMAS *Westralia*

With the ships connected by highwires, two cargo fuel hoses from *Success* approach *Kitty Hawk*. A probe on the end of each hose connects with a fitting on the receiving ship allowing fuel to pass
(RAN Photograph)

In *Success* all replenishment operations are controlled from a Cargo Control Room amidships. In this photograph *Success* is receiving fuel from HMAS *Westralia*
(RAN Photograph)

refuelling HMAS *Sydney*, and HMAS *Success* refuelling a US aircraft carrier during a RimPac exercise.

Current RAN Contracts

The RAN has three major contracts currently on the go:

SEA1054 for Replacement of Afloat Support Capability.

Phase 2A	Replace HMAS *Westralia* with a commercial auxiliary tanker (*Delos*, to be renamed HMAS *Sirius*)
Phase 2B	Replace HMAS *Success* with a purpose-built double-hull support ship in 2015
Phase 3	Replace HMAS *Sirius* in 2018/2020

SEA2048 for replacement of two LPAs.

SEA4000 for acquisition of three air-warfare destroyers.

Here John showed a slide of *Delos*, which is to be refitted to the RAN requirements and renamed HMAS *Sirius*.

Why *Delos*?

Why was a commercial tanker chosen over a purpose-built vessel? Principally because the launch time was two years vs four or five, and the cost was $150 million vs $300 million.

The RAN had over 300 criteria in their search for a vessel, including:

- sufficient tankage and pumping;
- large enough working platform for RAS and a helo pad;

- sufficient hydraulic power capacity to drive the RAS equipment;
- sufficient hull speed;
- built to Lloyd's Register classification;
- the right price; and
- available immediately.

Some comparisons between HMAS *Westralia* and HMAS *Sirius*:

	HMAS *Westralia*	**HMAS *Sirius***
Type	Leaf-class auxiliary tanker	Chemical/oil tanker
Hull	Single	Double
Class	LR	LR
Built	UK	South Korea
Launched	1979	2004
Length OA	172 m	176 m
Beam	26 m	31 m
Draft	11.9 m	10.5 m
Deadweight	37 000 t	33 600 t
Speed	16.5 kn	15.9 kn

Method of Tendering

The tendering was done in two stages:

1. Prime Contractor for Ship Conversion
- ADI/Forgacs who nominated Brisbane or Newcastle shipyards; and
- Tenix who nominated a Fremantle shipyard.

2. Supplier of RAS Equipment (to be supplied to the prime contractor as Government-Furnished Equipment (GFE)
- Rolls Royce (UK)
- Hepburn (Canada)
- IMECO (USA)
- Rexroth Hydraudyne (the Netherlands)

The tendering schedule was extremely tight (some would say ambitious!) but, so far, is still on track:

End Sept 2004	Request-for-tender issued
End Oct 2004	Tenders submitted
Mid Dec 2004	Rexroth Hydraudyne awarded RAS contract
End Feb 2005	Tenix awarded prime contract etc.

RAS Deliverables

The RAS deliverables included:
- design of the RAS masts;
- supply of the RAS equipment, including the spanwires, winches and ram tensioners, three saddle winches, five hose assemblies, the HP air system, etc.;
- initial 90 days of on-board spares; and
- ILS (integrated logistic support) documentation package.

The liquid cargo configuration included delivery and receiving stations for NATO1 (178 mm diameter) couplings for F76, NATO3 (65 mm diameter) couplings for FF44 and NATO5 (65 mm diameter) couplings for FW.

Prime Contract Deliverables

The prime contract deliverables included:
- fabrication of the two RAS masts;
- installation of the RAS masts and all RAS equipment;
- upgrade of the accommodation, including living quarters for the additional crew, heating, ventilation, air conditioning, fresh water supply and vacuum sewage equipment fit;
- helo landing pad;
- RIB and related crane; and
- provision for the RAN of lifesaving and damage-control systems and equipment.

John then showed slides of typical versions of the main equipment which will be supplied to the RAN. These included:

Typical derrick mast arrangement for RAS operations, with a crossbeam at the top. Rexroth Hydraudyne have proposed single masts either side with no connecting crossbeam, which significantly improves the vision from the bridge. However, the challenge will be in mounting the masts to the deck without penetration, as the stiffening is above the deck.

The saddle winches, which control the three hose-support points on the spanwire. These are linked to prevent the hoses dragging in the water.

The ram tensioners are mounted vertically alongside the masts, have eight falls and are driven by high-pressure air to automatically maintain the same tension on the spanwire while the ships are rolling.

Other equipment illustrated included probe and NATO fuelling connections, a cargo drop reel, an hydraulically-driven RAS capstan, and the RAS control desk with good visibility of the operation and the HP air control panel.

The RAS Masts

Delos currently has large transverse above-deck beams on the cargo deck, and it will be necessary to connect the RAS mast structures to these without penetrating the deck to leave the deck clean skinned underneath. However, there is also a need to drive a forklift truck over the top to the helo deck, and to provide protection for the cargo and saddle winches (often provided by enclosures). It is likely that an upper deck will be provided to kill both birds with one stone.

Slides and Video

John then showed slides of a number of supply vessels from around the world, including *Berlin* from Germany and HMS *Amsterdam* from the Netherlands.

This was followed by a video of RAS operations from HMS *Amsterdam* to a frigate of the Royal Netherlands Navy. The more-common alongside refuelling was shown first, where a messenger line is first fired across by gun, and then the spanwire is hauled across, tensioned, and the fuel hose hauled across. This was followed by astern refuelling, where the supply vessel trails the fuel hose astern with a messenger line to a marker buoy, and the supplied ship comes up astern, retrieves the messenger line with a grapple and hauls the fuel hose aboard, generally at the aft end of the foredeck near the bridge structure.

Questions

Question time elicited some further points of interest:

Astern refuelling had not been chosen as the principal method of supply from HMAS *Sirius* because it is not popular and is regarded as more dangerous. It cannot be used in rougher seas than alongside refuelling, due to the danger to crew from green seas sweeping the foredeck. HMAS *Sirius*

is being fitted for, but not with, astern refuelling capability. Astern refuelling was used extensively by the UK in the Falklands conflict.

HMAS *Sirius* will be fitted with two refuelling masts, one port and one starboard, and will use helo for transfer of solid cargo. There are safety issues with the transfer of personnel by spanwire, and most commanding officers now prefer to transfer personnel and cargo by helo, as this does not tie the ship to one course and speed.

In an emergency or under fire, refuelling ships can disconnect in less than 30 s. Ideally, they would disconnect the fuel line, reduce tension in the spanwire and disconnect.

Rexroth Australia is involved in the supply of equipment to the mining industry, and has not been involved in the tender for supply of the RAS equipment by Rexroth Hydraudyne. The Rexroth RAS equipment is mostly off-the-shelf, and believed to be more so than from other tenderers.

Following ten years in service on HMS *Amsterdam*, the RAS gear was removed to the supplier's workshop, tested, and simply repainted; it did not require stripping or servicing.

The vote of thanks was proposed by Frank Simpson, and carried with acclamation.

Phil Helmore

The AMC Towing Tank Upgrade and Low-wash Hullforms

Gregor Macfarlane of the Australian Maritime College gave a presentation to a joint meeting with the IMarEST attended by thirty-three on 12 July in the Harricks Auditorium at Engineers Australia, North Sydney. His presentation was in three parts. The first, entitled *A Tool for the Reduction of Wave Wake,* was a summary of the research by Alex Robbins at the College for his master's degree.

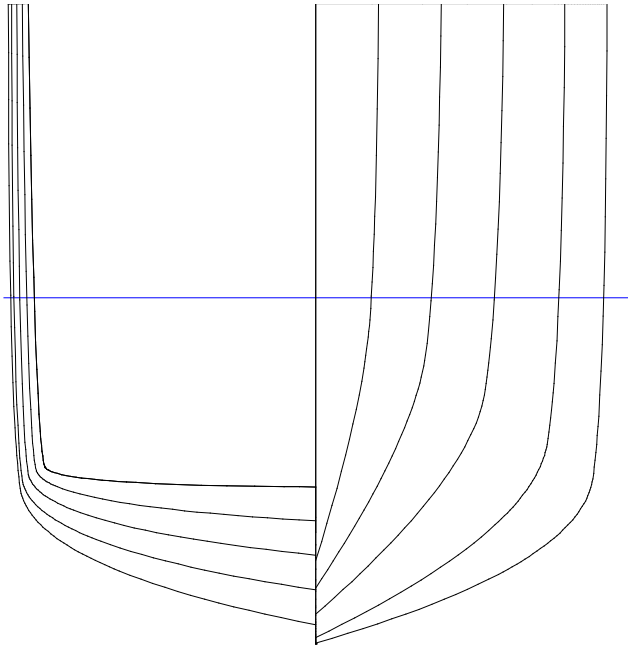
The two main aims of Alex's research were to determine which variables have a significant effect on vessel wave wake and to create a practical method for calculating and predicting wave wake within a given variable range. A series of model tests was undertaken in the AMC tank with a parent hull form (PHF) — a catamaran intended to have perceived low wash characteristics, be commercially viable, scaleable within set parameters and which could be used for future work. The parameters of the PHF were:

Parameter	Value
B/T	1.764
L/B	19.861
CP	0.625
$L/\nabla^{1/3}$	11.135

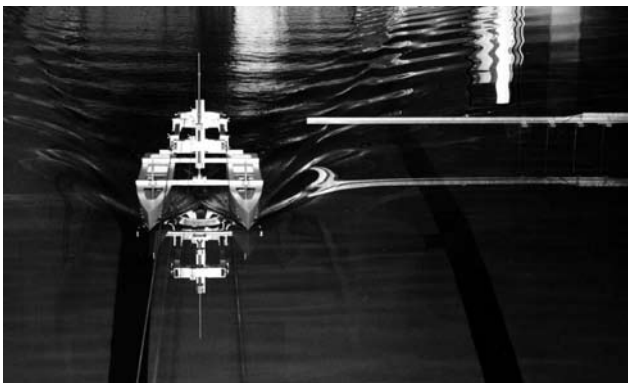
Six hull form variants were tested and the final list of variables selected was:

Froude number, Fn
Length-Displacement Volume ratio, $L/\nabla^{1/3}$
Demi-hull separation, S/L
Prismatic coefficient, C_P
Length-beam ratio, L/B
Beam-draught ratio, B/T
Trim

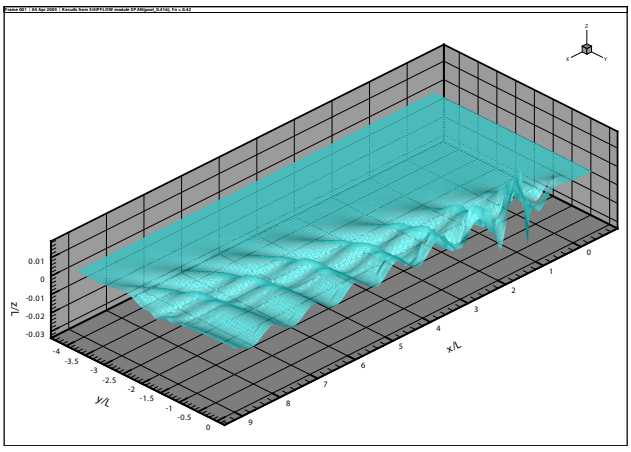
It was found that the effects and relative importance of each parameter varies with the Froude number, but $L/\nabla^{1/3}$ ratio ap-



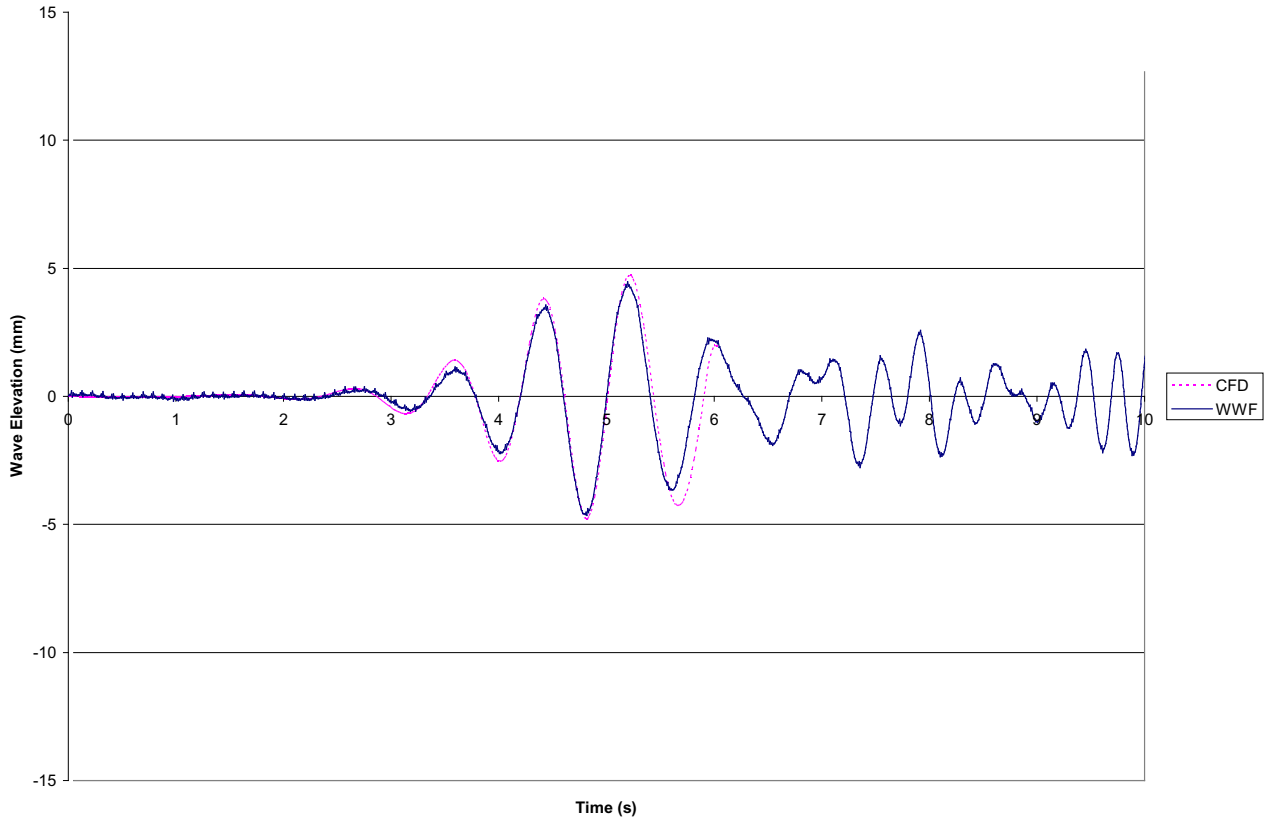
Body plan of Parent Hull Form
(Image courtesy AMC)



The PHF model under test
(Photo courtesy AMC)



CFD output at Fn 0.45
(Image courtesy AMC)



Model test data compared with CFD at Fn 0.45
(Chart courtesy AMC)

pears to be the dominant parameter at higher speeds, with L/B more significant at lower speeds.

The wave patterns for the parent hull form and variant hull forms were obtained using CFD (the Shipflow package) over a range of speeds in deep water. Longitudinal wave cuts were then taken from the calculated free surfaces and analysed using the decay method. The tank test data were used to correlate the actual physical data with the predictions obtained from CFD. Over the speed range of Fn 0.4 to 0.6 there was good agreement between the predictions and experimental values for the maximum wave height (HW) and the associated wave period for the three outboard wave cuts. Closer to the vessel, the accuracy declines for HW but it was concluded that CFD is a valid wave-wake prediction tool within the given Froude number range.

The second aim of Alex's research was to create a simple method for calculating/predicting a vessel's wave wake within a given variable range. Each variable was ranked on its decay function (γ). The final form of the regression equations are:

$\gamma'\ 0.4 = [\ 0.08 \times (L/B)^{0.24} \times (L/\nabla^{1/3})^{-0.16}\ ] + [\ 0.09 \times (B/T)^{0.11} \times (CP)^{-0.13}\ ] - 0.21$

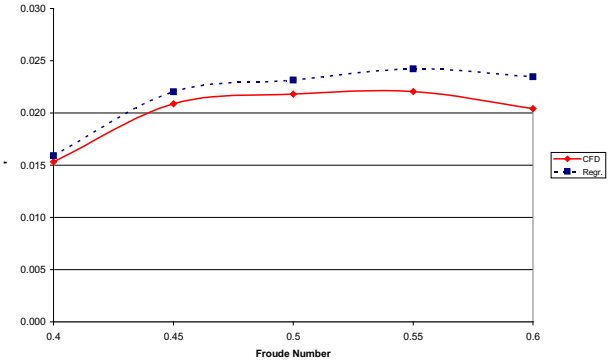
$\gamma'\ 0.45 = [\ -0.26 \times (L/B)^{0.59} \times (L/\nabla^{1/3})^{-1.25}\ ] + [\ 0.09 \times (B/T)^{-0.27} \times (CP)^{0.17}\ ] + 0.01$

$\gamma'\ 0.5 = [\ -0.32 \times (L/B)^{0.86} \times (L/\nabla^{1/3})^{-1.87}\ ] + [\ 0.07 \times (B/T)^{-0.41} \times (CP)^{0.20}\ ] + 0.01$

$\gamma'\ 0.55 = [\ -0.36 \times (L/B)^{0.92} \times (L/\nabla^{1/3})^{-2.01}\ ] + [\ 0.07 \times (B/T)^{-0.43} \times (CP)^{0.20}\ ] + 0.02$

$\gamma'\ 0.6 = [\ -0.40 \times (L/B)^{0.95} \times (L/\nabla^{1/3})^{-0.82}\ ] + [\ 0.06 \times (B/T)^{-0.44} \times (CP)^{0.25}\ ] + 0.02$

To validate the regression equations, the wave pattern for an independent test hullform was obtained using CFD. The resulting values of γ were then compared with the predicted values using the regression equations. The results are shown in the figure below.



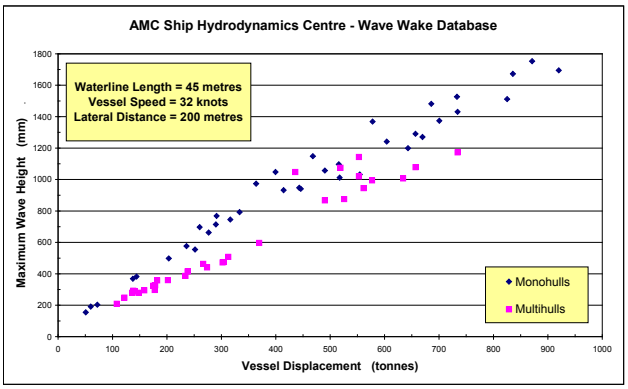
Regression vs. CFD
(Chart courtesy AMC)

Alex concluded that current CFD techniques predict wave wake sufficiently accurately for initial design purposes and the regression equations developed during the research provide a sufficiently accurate method of predicting a vessel's wave wake within specified variable ranges.

A paper describing the work in detail, *A Tool for the Prediction of Wave Wake*, by Alex Robbins and Martin Renilson has been submitted for publication in RINA's *International Journal of Maritime Engineering*.

In the second part of his presentation, Gregor outlined other work being undertaken at AMC, particularly the wave-wake database created from a wide variety of hullforms using data from model experiments with over 90 models. The database

provides a useful range of comparative data to compare vessel performance.



Some results from the AMC Wave Wake Database
(Chart courtesy AMC)

Finally, Gregor described the recent upgrade of the AMC towing tank facilities at Launceston which was partly funded by the Federal Government's Major National Research Facilities Scheme. The tank first started operations in 1984, and the possibility of extending the tank had been canvassed on several occasions. The project was finally approved in October 2002, and construction started on 29 November 2004. The tank was closed just before Christmas and, with work on the tank completed on 10 June 2005, the first project was begun with the improved facilities on 16 June.

The extension of the tank from 60 m to 100 m was linked to the extension of the Swanson Building. In addition to the substantial increase in the steady-state test section this provided, the opportunity was taken to improve the carriage ride quality and upgrade associated equipment with a new layout of support workshops and offices.

The equipment upgrade included a new wet dock for model set-up purposes, a new wavemaker control system, a viewing port in the side of the tank, improvements to all wave damping devices, a new data acquisition and analysis system, new offices for staff and redevelopment of the carriage.

The carriage redevelopment included an improved layout with an increase in the maximum attainable test speed. New test equipment was installed with the capability of fitting the AMC horizontal planar-motion mechanism. A major task during the upgrade was the alignment of the rails. The calm-water surface was used as the datum to take into account the curvature of the earth and the top face of both rails was set flat and level to within ± 0.1 mm over their length.

Work is continuing at AMC on the completion of the

Early construction work showing the tank extension
(Photo courtesy AMC)

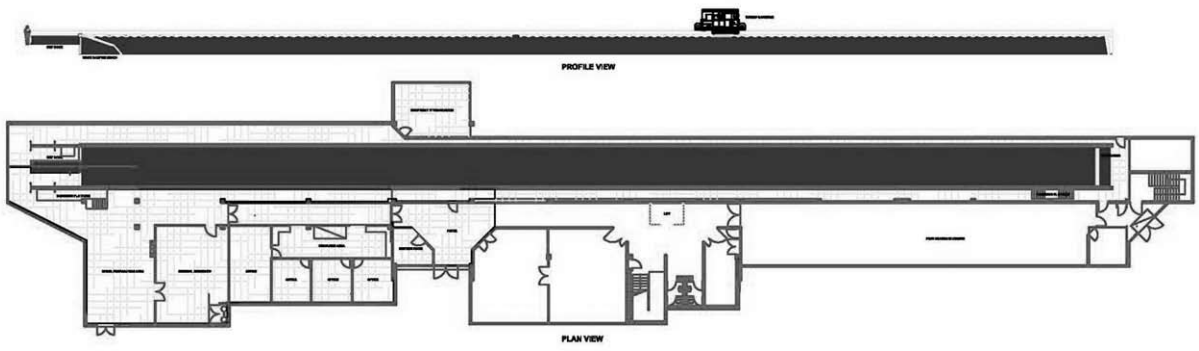
Swanson Building extension and the relocation and expansion of the cavitation tunnel. The tunnel will have new and improved features, including low freestream turbulence intensity, a highly uniform freestream velocity profile, low minimum cavitation number, low background noise, boundary-layer control on the ceiling of the test section, rapid degas equipment, nuclei injection system and continuous separation of nuclei, residual gasses and injectable (non-condensable) gasses.

The test facilities at AMC continue to be busy with the test tank fully booked out well into September.

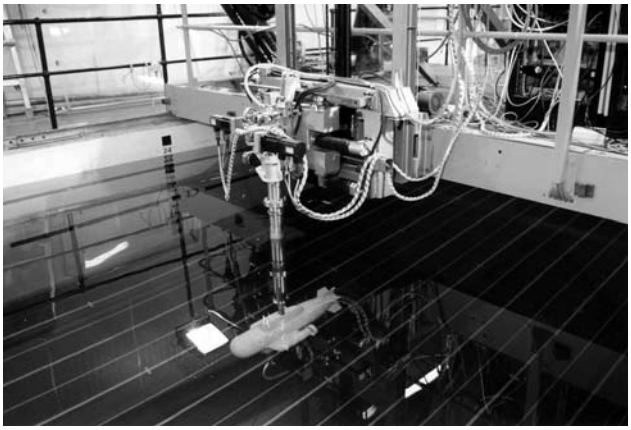
John Jeremy

The vertical offset of the rails relative to the calm-water surface with the old tank data shown for comparison

The model preparation area showing the upgraded tank carriage in the background
(Photo courtesy AMC)

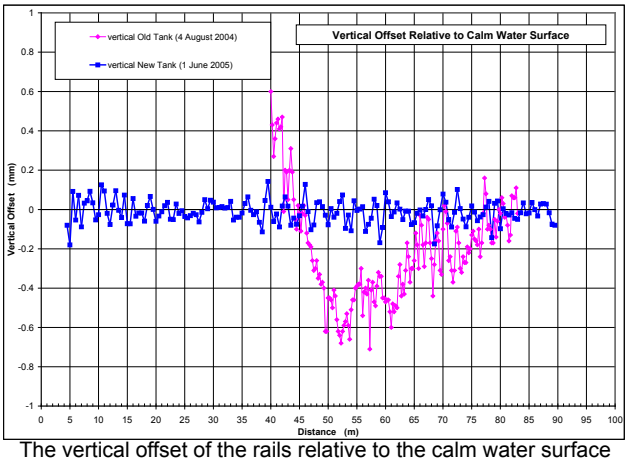


The arrangement of the AMC towing tank
(Image courtesy AMC)



AMC's horizontal planar motion mechanism fitted to the carriage
(Photo courtesy AMC)

Aligning the carriage rails
(Photo courtesy AMC)



The vertical offset of the rails relative to the calm water surface with the old tank data shown for compasison
(Chart courtesy AMC)

Queensland

The Queensland Section held its most recent technical meeting on 7 June at the Toowong premises of Brisbane Ship Construction Pty Ltd. The technical meeting consisted of a presentation by Michael Hollis, Tommy Ericson and Chris Ramsay on *An Overview of the Brisbane Ship Construction Design and Production Activities*.

Michael Hollis introduced the topic, providing an insight into the core business of Brisbane Ship Construction Pty Ltd, particularly risk management. Michael outlined the complex and significant risks involved in predicting all aspects of vessel performance, whilst keeping abreast of many different classification society and local authority rules and government regulations.

Chris Ramsay discussed the history of BSC's design-and-build contracts, starting with BSC's first in-house design. This was a 25 m low-wash passenger catamaran built to Lloyds' class G2 and launched in 1999. It is now operating out of Lisbon in Portugal. Chris then described one of BSC's more recent designs, a 20 m monohull fisheries patrol vessel built to Lloyds' class G3 for the Queensland Department of Primary Industries. This vessel was launched in 2002 and is currently patrolling the south-east coast of Queensland from the Gold Coast to Bundaberg.

Tommy Ericson completed the presentation with the most recent BSC projects, from the three 32 m catamaran crew boats built to Lloyd's G3 restricted/G2 unrestricted for Chevron, Nigeria, which were launched in 2004, to the current project, a 27 m passenger catamaran being built to Lloyds' class G3 for South Sea Cruises in Fiji. Tommy also described two smaller prototype vessels, a 9 m monohull pursuit craft and an 8 m catamaran patrol vessel suitable for police duties, both nearing completion and ready for trials.

The three speakers responded to a range of questions including aspects of design, construction, operation and strategic and operational management.

The Queensland Section Committee nominated Mr Marc Richards of NQEA as a member of the Queensland Section Committee for 2005 and thanks Marc for his acceptance of the nomination.

Brian Robson

COMING EVENTS

NSW Technical Meetings

Technical meetings are generally combined with the Sydney Branch of IMarEST and held on the second Tuesday of each month in the Harricks Auditorium at Engineers Australia, 118 Alfred St, North Sydney, starting at 5:30 pm for 6:00 pm and finishing by 8:00 pm. The program of meetings remaining for 2005 (with exceptions noted) is as follows:

13 Sept.*	Clive King, AWD Project *Design of the RAN's New Air Warfare Destroyer*
11 Oct.	IMarEST AGM Rob Madders, Rolls Royce Australia *Zebra Batteries for Submarines*
1 Dec.	SMIX Bash 2005

* Denotes joint meeting with the Australian Society of Defence Engineers

Queensland

A technical meeting will be held on Tuesday 13 September at 6.30 pm at the Boat and Shipbuilding Section of the Gateway Campus of the Brisbane North Institute of TAFE, 76 Kingsford Smith Drive, Hamilton, Brisbane. A presentation will be given on *Marine Surveying* by Toby Blundell of Marine Matters Pty Ltd. Interstate members and guests are most welcome to attend.

Tasmania

Upcoming AMC/RINA seminars, held on Thursdays in the AMC Auditorium at noon (unless otherwise noted), include:

25 August	Dr Christopher Chin (AMC Mathematics Lecturer) *A Model of an Aircraft Towing a Cable-body System*
29 Aug.	Dr Tracie Barber (Lecturer, UNSW) — at 5pm *CFD in Ship Design*
5 Sept.	Bill Wright (Norman R. Wright & Sons) — at 5pm *Pilot Boat Design and Construction*
8 Sept.	Fourth Year BE Naval Architects *Ocean Vehicle Design Project Presentations*
15 Sept.	Shinsuke Matsubara (AMC PhD student) *Application of the Desingularised Method to Bodies Oscillating near a Free Surface and the Viscous Roll-damping effect of Advancing Ship*
22 Sept.	John Wakeford (Manager, Circulating Water Channel) *Circulating Water Channel Overview including Past and Potential Projects*
29 Sept.	Dr Giles Thomas (Lecturer, AMC) *Development of a 112 m High-Speed Catamaran*
6 Oct.	Dr Dev Ranmuthugala (Senior Lecturer, AMC) Topic to be confirmed
13 Oct.	Dr Irene Penesis (Lecturer, AMC) Topic to be confirmed

AMC Maritime Engineering Conference and Reunion Dinner

AMC is hosting a conference and reunion dinner to celebrate a number of significant milestones, including:

- AMC's 25th Anniversary (1980 - 2005);
- 15 years of producing Bachelor of Engineering graduates (first in 1990) in the fields of:
  - Maritime Engineering (1990 – 1999)
  - Naval Architecture (1992 – present)
  - Ocean Engineering (2000 – present)
  - Marine and Offshore Systems (2003 – present)
- The Official Opening of the Major Extension to the Swanson Building;
- The Official Re-opening of the AMC Towing Tank following a major upgrade; and
- The 21st Anniversary of Operation of the AMC Towing Tank.

Details of the events are given below:

Thursday 20 October 2005

Current Bachelor of Engineering Final Year Student Research Project Presentations — AMC Auditorium 8 am to 5pm (approximately) *Open invitation*

Friday 21 October 2005

Department of Maritime Engineering one-day Conference

Details of the Conference Programme are outlined below (Open invitation).

Official Opening of the Swanson Building Extension and Re-opening of the Towing Tank Swanson Building 11:35 am to 12:30 pm, followed by Official Luncheon (Open to Conference delegates and by invitation).

Tour of facilities (including the Towing Tank, Cavitation Tunnel, Ship Handling Simulator and Model Test Basin) (Open invitation).

Reunion Dinner — Hotel Grand Chancellor, Launceston, 7:00pm till late (Open to all AMC Bachelor of Engineering Graduates, past and present AMC Maritime Engineering staff, industry personnel with affiliation to AMC, and conference delegates).

Conference Programme

Keynote Address: Dr Martin Renilson, Technical Manager for Maritime Platforms and Equipment, QinetiQ, UK, (AMC senior staff member 1983 – 2001) *International Developments in Hydrodynamics*

Tony Vine, Fleet Marine Engineering Officer, RAN, NSW, (AMC Bachelor of Engineering in Maritime Engineering, 1991) *The Naval Technical Regulatory Framework — A Shift from Proscriptive Regulation to a Risk Management-based Regulatory System*

Derek Gill, Design Manager, Austal Ships, WA (AMC Bachelor of Engineering in Naval Architecture, 1993) *The Design Process at Austal Ships*

THE INTERNATIONAL MARITIME EXPOSITION & CONGRESS

PACIFIC 2006

PACIFIC 2006

31 JANUARY - 3 FEBRUARY 2006 SYDNEY AUSTRALIA

INTERNATIONAL MARITIME CONFERENCE

31 January - 2 February 2006

INNOVATIONS IN MARITIME TECHNOLOGY - VISIONS AND PROGRESS

Organised by:

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For further information visit:
www.pacific2006imc.com

ROYAL AUSTRALIAN NAVY

SEA POWER CONFERENCE 2006

Organised by:

SEA POWER CENTRE AUSTRALIA

31 January - 2 February 2006

For further information visit:
www.seapower2006.com

For further information on the above conferences contact:
Tour Hosts Conference & Exhibition Organisers
GPO Box 128, Sydney NSW 2001 AUSTRALIA
Tel: + 61 2 9265 0700 Fax: + 61 2 9267 5443

Email:
Pacific 2006 International Maritime Conference:
pacific2006imc@tourhosts.com.au
Royal Australian Navy Sea Power Conference 2006:
seapower2006@tourhosts.com.au

Dr Andrew Tuite, Technical Director, Crowther Design, NSW (AMC Bachelor of Engineering in Naval Architecture, 1993) *Crowther Design: A Naval Architecture Consultancy group*

Simon Debnam, Senior Engineer, American Bureau of Shipping, Houston, USA (AMC Bachelor of Engineering in Naval Architecture, 1994) *Real Life Experiences (and Expectancy) Working for a Classification Society*

Teresa Hatch, Director – Maritime Operations, Australian Shipbuilders Association, Vic (AMC Bachelor of Engineering in Naval Architecture, 1996) *Topic to be confirmed*

Suzanne Hayne, Project Engineer, AMOG Consulting, Vic (AMC Bachelor of Engineering in Ocean Engineering, 2004) *Hydrodynamics of FPSO design*

Attendance at the conference is free, but places are limited so reserve your place now! The cost for the conference has been heavily subsidised by AMC as part of its 25th Anniversary events.

Reunion Dinner

The conference will be followed by a Reunion Dinner. To be held at Launceston's Hotel Grand Chancellor, the dinner promises some of the finest Tasmanian fare and the opportunity to network with graduates, industry representatives and past and present AMC engineering staff. Partners are welcome. The cost will be $50 per head (not including drinks).

Further details of the above events can be obtained from the Department Head, Maritime Engineering, Norman Lawrence by phone (03) 6335 4779 or email n.lawrence@amc.edu.au.

SMIX Bash 2005

The sixth SMIX (Sydney Marine Industry Christmas) Bash will be held on Thursday 1 December aboard the beautifully-restored James Craig alongside Wharf 7, Darling Harbour, from 1730 to 2230. This party for the whole marine industry is organised jointly by RINA (NSW Section) and IMarEST (Sydney Branch).

"Early bird" pricing, and credit-card payments are available for tickets bought before COB on Monday 31 October, but not after. Tickets are available now.

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

Pacific 2006 International Maritime Conference

The Pacific 2006 International Maritime Exposition and Congress will be held at the Sydney Convention and Exhibition Centre, Darling Harbour, Sydney, from 31 January to 2 February 2006. It will include:

The Pacific 2006 International Maritime Exposition, organised by Maritime Australia Ltd.

The Royal Australian Navy Sea Power Conference 2006, organized by the Royal Australian Navy and the Sea Power Centre Australia. Further information on the conference can be obtained from the conference website www.seapower2006.com or by contacting the conference organizers, Tour Hosts Conference & Exhibition Organisers, GPO Box 128, Sydney NSW 2001, phone (02) 9265 0700, fax 9267 5443 or email seapower2006@tourhosts.com.au.

The International Maritime Conference is being organised by the Royal Institution of Naval Architects, the Institute of Marine Engineering, Science and Technology and Engineers Australia on the theme *Innovations in Maritime Technology — Visions and Progress*. Further information on the conference can be obtained from the conference website www.pacific2006imc.com or by contacting the conference organizers, Tour Hosts Conference & Exhibition Organisers, GPO Box 128, Sydney NSW 2001, phone (02) 9265 0700, fax 9267 5443 or email pacific2006imc@tourhosts.com.au.

The call for papers has concluded, and the schedule of dates for authors is as follows:

- Final submission of papers 31 October 2005
- Author registration December 2005

Further details of the conference are available on the website www.pacific2006imc.com.

Second High-performance Yacht Design Conference

Timed to coincide with the arrival of the Volvo Ocean Race fleet in New Zealand, the second international conference on high-performance yacht design will be held in Auckland in February 2006 and will showcase the latest developments in yacht research from around the globe. This conference will be a venue where naval architects, engineers, designers and researchers can present and hear papers on the current state of high performance yacht and power craft technology.

Advances in high performance yacht design are being driven by a range of factors, including development of new racing classes and demand for increased size and performance of racing and cruising craft. Radical design concepts such as innovative hullforms, moving keels and masts and new approaches to sails and propulsions systems require innovative approaches to analysis, design and experimental verification.

Papers are expected on all aspects relating to the design and performance of high performance power and sailing yachts, including:

- performance prediction and measurement;
- wind-tunnel and towing-tank technology;
- regulations and rating rules;
- computational methods;
- materials and construction; and
- hull and appendage design.

The conference will be held on 14–16 February 2006 and is being organised by The University of Auckland, The Royal Institution of Naval Architects, and Massey University.
For further information visit the website www.hpyd.org.nz.

HIPER 06 at AMC

The fifth International Conference on High Performance Marine Vehicles (HIPER) will be held between 8 and 10 November 2006 at the Australian Maritime College in Launceston. HIPER Conferences are held once every two years. Dr Prasanta Sahoo is the Convenor of the fifth HIPER conference which will be held in late 2006. Watch this space for forthcoming details. In the meantime, for further information contact Dr Sahoo on (03) 6335 4822 or email p.sahoo@mte.amc.edu.au.

GENERAL NEWS

ASC to Build Air-warfare Destroyers

The Federal Government has chosen ASC Shipbuilder Pty Ltd as the preferred shipbuilder for Navy's Air Warfare Destroyers — one of Australia's largest and most complex Defence projects worth up to $6 billion.

Announcing the decision on 31 May, Defence Minister Senator Hill said the Government made the decision after accepting the unanimous recommendation of the Source Selection Board on the basis that ASC Shipbuilder offered a superior bid in terms of value for money.

In addition, the Government has granted first-pass approval and provided $455 million towards the next phase of activities including further design work, workforce skilling, initial infrastructure investment and facilities construction.

Senator Hill said the construction of the Air-warfare Destroyers will be one of the most significant shipbuilding projects undertaken in Australia to date, and will provide enormous opportunities for Australian industry.

"More than 1000 direct jobs will be created in South Australia as part of the build contract," Senator Hill said.

"However, up to 70% of the module construction will be sub-contracted to other shipyards around Australia, creating around 1000 additional jobs throughout the country.

"This presents an excellent opportunity for the whole of the Australian shipbuilding industry to become involved in the project, and opens up important flow on benefits for key sub-contractors throughout Australia."

ASC Shipbuilder was chosen through a competitive tender evaluation process that also included Northrop Grumman Ship Systems and Tenix Defence.

The conduct of the evaluation and selection of ASC Shipbuilder was reviewed by the Air-warfare Destroyers Program probity advisers KPMG, and independently by Sir Laurence Street, both of whom have confirmed that the process was fair and equitable.

"I would like to thank the State Governments of both South Australia and Victoria for providing offers of support to the bidding companies. Both offers were highly competitive and produced excellent infrastructure investment packages," Senator Hill said.

"I also commend Navy, the Defence Materiel Organisation (DMO) and the highly-capable project team which included the independent financial adviser Carnegie Wylie and Company and Mr David Mortimer who acted as an Independent Chairman to the Selection Board."

The commitment of $455 million towards the second phase of the project will fund the project until mid 2007 and will further reduce risks to the project in accordance with the recommendations of the Defence Procurement (Kinnaird) Review. In 2007, the Government will consider second-pass approval for the project.

Defence is currently evaluating three ship designer proposals from Blohm +Voss, Gibbs &Cox and Navantia (formerly Izar). ASC Shipbuilder is now in a position to assist the Commonwealth to select one of those designers in mid 2005, whose evolved design will be further considered in conjunction with an Australianised version of Spain's existing F100 ship design.

Raytheon Australia has previously been selected as the preferred bidder for Combat System–System Engineer contract in support of the combat system design and maintenance for the air-warfare destroyer.

"The air-warfare destroyers represent a quantum leap in the air-warfare capabilities of the Navy," Senator Hill said.

"The vessels, which are to be introduced into service from 2013, will be equipped with the world-class AEGIS combat system which is capable of detecting and defeating multiple hostile aircraft and missiles at ranges in excess of 150 kilometres.

"The ships will also have an anti-submarine and anti-surface warfare capability, as well as the ability to embark a helicopter at sea.

"They will provide significantly-increased protection from air attack for troops being transported and deployed on ADF operations overseas, and can provide long-range air-warfare defence for a Naval task group. The ship will also be interoperable with the United States and other coalition partners."

Senator Hill said the construction of the vessels will be a major project for Defence Industry. Accordingly, companies bidding for the destroyers were required to include Australian skills and training programs in their tenders, in line with the Government's Skilling Australia's Defence Industry program.

Project Protector Underway in Whangarei

Tenix Defence restated its commitment to New Zealand industry on 24 June, marking another milestone in the Royal New Zealand Navy's Project Protector shipbuilding program — cutting the first steel for four inshore patrol vessels.

NZ Defence Minister Mark Burton was the guest of honour at the ceremony, held at Donovan Industries in Whangarei, where the vessels will be built and launched from Tenix Shipbuilding New Zealand's facility.

The $NZ500 million Project Protector involves a total of seven ships to be delivered to the RNZN in the next 30 months — a 131m multi-role vessel, two 85 m offshore patrol vessels, and four 55 m inshore patrol vessels. All are on schedule.

Tenix Defence Marine Division's Business Development Manager, Paul Davies, announced at the ceremony that more than 160 New Zealand companies have so far tendered for 388 work packages.

Some 15 companies from Auckland, Blenheim, Christchurch, Palmerston North, Wellington and Whangarei have won more than $28 million in contracts.

Contracts for work worth a further $52 million are scheduled to be awarded in the next month, with another $30 million to be awarded in the next 30 months.

"Tenix Shipbuilding New Zealand is very proud to mark

the continuation of our shipbuilding record at Whangarei and our commitment to New Zealand industry with this ceremony," Mr Davies said.

"We had outstanding support from New Zealand industry and labour during the Anzac-ship Project, and we are looking forward to continuing at the same high level for Project Protector.

"The construction, launching, sea trialling, commissioning and delivery of the four inshore patrol vessels at Whangarei will see the development of this facility and its regional infrastructure from a module fabrication site to a modern, capable shipyard," Mr Davies said.

Direct employment at Whangarei by Tenix Shipbuilding New Zealand will peak at about 200.

Tasmanian Industry News

Sabre Marine & General Engineering

Sabre Marine are working with the latest in adhesive technology. An aluminium deck house is under construction to convert a fishing boat to a yacht. Structural elements have been welded in the usual way but the skin stiffeners have been glued wherever possible in order to minimise unsightly weld distortion. Materials and technology have been supplied by Huntsman Advanced Materials in Melbourne.

Australian Wooden Boat Festival — Hobart

Festival Director, Andy Gamlin, has proposed a design-and-construct project, observing: "A type of boat rarely built or seen, and yet often wanted, is one for recreational rowing. Plans and kits are available overseas but local availability is uncommon for this type of boat. This type of recreation is popular interstate and overseas and, with Tasmania having a large number of sporting rowers and excellent waterways, a locally designed and built boat should be popular for this pleasurable exercise activity."

The first half of the project will call for Expressions of Interest in a design competition for a boat that

- is functional for recreational rowing for (predominantly) one person;
- is possible for a 'home handyman' to build in wood with basic tools;
- is not expensive;
- can be rowed in estuary conditions;
- has reasonable performance characteristics;
- is light enough for car top carrying; and
- is unique, attractive and has a distinctly Australian ingredient.

The second part will be to call for interest from a young Australian boat builder to build a prototype of the winning design to a high standard of finish on a commission basis. The boat will be owned by the Festival, displayed at the 2007 Festival, and subsequently sold and then to build a second boat during the AWBF 2007 to demonstrate the method of construction and that the boat can be successfully built by an amateur employing average (or better) wood-working skills.

North West Bay Ships

Due for launch mid-August is the 28 m catamaran dive-charter boat destined for the Great Barrier Reef and the tourism industry. A review and pictures are planned for the next issue of *The Australian Naval Architect*.

Georges Bay Marine Pty Ltd (St Helens)

Lyndcraft Boats (their marketing banner) are well into the construction of a 9 m jet boat, the third of this design by Michael Hunn. With seating for 25 and designed for thrill rides, these boats provide for the 'Sit down, Strap in, Hold on!' tourist experience in spectacular surroundings. The first boat is the well known 'Oz-jet', based in Sydney Harbour. Hull number 2 was exported to the US Virgin Islands and this third boat is also an export order. She will be fitted with a pair of Cummins QSC engines rated at 257 kW and directly-coupled Ultra-Jet 305 waterjets. She is expected to cruise at 40 kn fully loaded.

Cape Cat Australia

The lines of this 7.5 m catamaran were drawn by Henry Hobson some 25 years ago. The catamarans, known as Cape Cats, earned a good reputation among Tasmanian abalone divers in the 1980s for their solid build and good performance. It is thought they were initially powered by 130 kW two-stroke outboards.

Abalone diver Scott Palmer recalled the good performance and wondered how the design would perform if running the latest four-stroke outboards and built with modern materials. Scott went in search of the moulds and in 2002 discovered them at a chicken hatchery near Wynyard. The hull mould was still usable but the deck mould needed improvements. Negotiations to purchase the building rights proceeded satisfactorily and Steve French from Smithton was commissioned to carry out the reconstruction.

The first Cape Cat Australia hull *Bugger Work* was delivered in June this year and is immaculately finished in every detail. Powered by a pair of Yamaha F225 four-stroke outboards, she recorded a maximum speed of just over 48 kn with three people aboard and fuel tanks three-quarters full.

The ride was comfortable and, running against the swell there was no slamming. Running with the swell, turns could be made safely, with no tendency to nose dive or trip. In a turn the Cape Cat heels mildly outward like most catamarans but she also adopts a gentle slide which gave a very secure feeling when turning in the swell. The spray rails kept what little spray there was below gunwale height and well aft. Idling in the seaway, the catamaran hullform has the additional benefit of providing a good stable working platform — a particularly useful feature in a dive tender.

Badenach Enterprises Pty Ltd

George Badenach has now assembled a production team to produce the GRP Badenach 40. Headquarters is a hangar-like shed in the old zinc works at Electrona, 25 km south of Hobart. In winter the team includes George, taking a break from crayfishing off the west coast of Tasmania.

The GRP team of Mark Large, Alan Vincent, Nick Burke and Cory Robinson have a steady stream of work on the hull lay-up, deck and minor parts construction. Specialist subcontractors are brought in during outfit — Ken Cawthorne for engine installation and his speciality, stainless steel fabrication with yacht-quality finish, "Boots" Jaeger

for the electrical installation and Trevor Burden of On-Site Hydraulics completes the team.

Drawings for Badenach's next project arrived in June from Mark Ellis Marine Designs. Designed as a fast GRP crayboat, she is similar in appearance to the Badenach 40. Three wheelhouse styles will be offered — a forward wheelhouse with either forward- or aft-raked screens, and an aft-wheelhouse version.

The hull mould will be constructed so that the boat can be offered in different lengths. The smallest boat will have a measured length below 12 m with the largest having a maximum length overall of 13.5 m. The design draft is just under 1 m and the hull will be configured for single- or twin-engine installations. George reported that he has the first order for the new boat and shipwright Chris Burke joined the team in July to begin construction of the moulds. The first will be a crayboat and will work the west coast of Tasmania powered by a single Caterpillar C9 373 kW engine.

Guy Anderson

Two Firsts at Incat Tasmania

Pushing the boundaries of high-speed ship building has always been the aim of Tasmanian aluminium-ship specialist Incat, as clearly seen when one looks back at the list of vehicle-passenger vessels completed by the company since 1990. It should come as no surprise, therefore, to learn that a new 112 m wave-piercing catamaran is not only pushing the boundaries of vessel size for Incat, but also extending the boundaries of the shipbuilder's undercover construction facilities.

Incat's Wilson building hall is designed to accommodate the new 112 m catamarans and even larger vessels of 120 m and beyond. Named after the renowned Tasmanian shipbuilding family, the deeper and wider drydock is parallel to the Coverdale's building hall and takes the total undercover facility at Incat to over 50 000 m².

Although the new Wilson shed was actually partially commissioned in August 2001, when Incat 050 was positioned in the completed drydock for conversion to HSV-X1 *Joint Venture* for the US Military, it was not until May that the first keel was laid in the cavernous building.

Incat Chairman, Mr Robert Clifford, admits that the building of the Wilson complex has been a slow process but the well-documented reasons behind those delays are now past.

"With the laying of the keel of the first of our 112 m ships, Hull 064, Wilson is now considered complete. The jigs, cranes and other equipment required to build large craft, even larger than the 112 m vessel, are being progressively installed in what will be the largest and most modern aluminium shipbuilding facility in the world," Robert Clifford said.

Prefabrication work on the 112 m catamaran has been in progress for some months, and the laying of the first section of hull in the new building hall signals the countdown towards vessel completion in late-2006.

The 112 m catamaran complements Incat's highly successful 98 m vessel by offering customers a choice of solutions to meet their needs.

"It had become apparent to Incat and others in the ferry industry that, despite the impressive capacity and versatility of the 98 m ship, particularly on the vehicle deck, it was still not large enough for some high-volume ferry services, particularly those in Europe. As far back as 1998 Incat conceived that a larger vessel was required to fill this market niche for even larger high-speed ferries," Robert Clifford said.

At the time, the design brief specified the following criteria:

• A 40 kn service speed.
• A deadweight capacity of 1000-1500 t.
• Cost minimisation in terms of both capital and operating costs.
• The paramount importance of in service reliability.
• The avoidance of "exotic" technology and the minimisation of technical risk.

After two years research, the 112 m wave-piercing catamaran design, with a waterline length of 106 m, emerged as a ship capable of meeting or exceeding all design brief goals. Today, six years after commencing its research, Incat is in a position to contract and deliver the 112 m catamaran. "As the keel of the first 112 m vessel is laid, it is done against a background of eleven 96/98 m wave-piercing catamarans in commercial and military service around the world, making the 96/98 m design one of the most popular high-speed ship types in modern times" Robert Clifford said.

"The Incat 112 m draws on the principles, technology and in-service experience of the Incat 98 m, yet it is also enhanced to provide significant competitive advantages to operators who need greater capacity, particularly in achieving much higher levels of profitability," he says.

The Incat 112 m vessel offers:

• Dual-speed operation (either 23 knots or 40 knots service speed).
• Up to a 53.9% reduction in fuel costs per deadweight tonne per mile.
• A fuel cost of US$41.58 per nautical mile @ 1000 t deadweight burning MGO.
• 22-49% increase in transport efficiency.
• 33% increase in the number of available passenger seats.
• 55% increase in the available heavy truck lane metres (can include coaches).
• 33% increase in normal operating deadweight to 1000 t.
• 100% increase in available "operational" deadweight to 1500 t.
• 20% greater operations window plus R0 certification.
• 20% greater station keeping and manoeuvring ability.
• 25% reduction in motions and motion sickness index.
• 30% increase in deck area.
• 50% increase in axle loads on vehicle deck.
• Extensive retailing/catering/entertainment opportunities which will boost revenue.

"The 20 or more years of experience we have amassed allows us to incorporate all the lessons learnt in the most efficient and cost effective manner. There is no doubt this will be reflected in the bottom line of contracted vessels," Robert Clifford said.

Principal Particulars

Length OA	112.60 m
Length WL	105.60 m
Beam OA	30.30 m
Draught (max)	3.30 m
Hull beam	5.80 m
Deadweight (operational)	1000 t (1500 t 'cargo only' at 23 kn service speed)
Speeds (100% mcr)	Approx. 40 kn at 1000 t dwt Approx. 45 kn at 500 t dwt
Total Persons	up to 1400
Vehicle Deck Capacity	589.9 truck-lane metres plus 50 cars, or a total of 412 cars
Main Engines	4 × MAN B&W 20RK280 each 9 000 kW
Gearboxes	4 × ZF NRH 60000
Water Jets	4 × Lips 150E

First Stage of LHD Project Approved

The Federal Government has approved the first stage of the $2 billion Amphibious Ships project which will provide Navy with a world-class capability to deploy land forces on operations.

Announcing the decision on 11 August, Defence Minister Robert Hill said the project will provide Navy with two new amphibious ships to be used in operations such as combat operations, regional disaster relief, humanitarian aid, peacekeeping and peace monitoring, and assistance to policing or military operations.

Australian shipbuilders will be invited to tender for either or both of two designs:

- the Spanish Navantia ship at approximately 27 000 t; and/or
- the French Armaris Mistral ship with additional troop carrying capability at approximately 22 000 t.

"Each ship will preferably have the ability to transport up to 1000 personnel, have six helicopter landing spots and provision for a mix of troop-lift and armed-reconnaissance helicopters. It will also be able to transport up to 150 vehicles, including the new M1A1 Abrams tanks and armoured vehicles," Senator Hill said.

"Each ship will also be equipped with medical facilities, including two operating theatres and a hospital ward."

A Request for Tender will be released to the Australian shipbuilding industry in the second quarter of 2006. Senator Hill said the shipbuilder would be determined once a thorough financial and technical comparison was made between Australian bids and overseas build options.

"The Government's preference is to see the ships built in Australia; however, Australian industry will need to demonstrate that it can deliver the project at a competitive price," Senator Hill said.

The Government has given first-pass approval to the project and committed $29.8 million towards the Design Development Phase of the project.

This will now enable Navantia and Armaris to work on defining the requirements for the ships incorporating necessary Australian environmental, safety and technical requirements.

The tender documentation for the potential Australian shipbuilders will allow bidders to:

- form teaming arrangements;
- submit fixed price bids;
- provide innovative solutions to improve price and schedule; and
- bid on through-life support solutions.

"A lot of work has been done in assessing the two ships and the capability of ship builders. Both ships are very capable and will be a quantum leap over our current capability," Senator Hill said.

"The Spanish ship would have a greater carrying capacity, but construction of the first Spanish ship has only just started. In comparison, the French ship has slightly less carrying capacity but has been constructed and is undertaking its final tests with the French Navy."

For an Australian build, the contract would be awarded in early 2007 with the in-service date for the first ship being 2012.

An impression of the Spanish LHD
(Navantia image courtesy Department of Defence)

Navantia began construction of the first LHD for the Spanish Navy at the Ferrol-Fene shipyard on 20 May. The 230.82 m long ship will be the biggest ship in the Spanish Navy and is expected to be launched in November 2007 and completed in December 2008. For Spanish service the ship will be equipped for limited operations by fixed-wing aircraft
(Navantia photograph)

Another Austal Ferry for Greece

Greek ferry passengers this summer are now even more likely to travel on an Austal-built ferry, following the delivery of *Highspeed 5* for Hellenic Seaways (formerly Hellas Flying Dolphins), handed over on 13 July 2005 by the West Australian shipyard.

Hellenic Seaways is Greece's largest domestic-ferry operator, transporting approximately 6 million passengers, 200 000 trucks and 800 000 cars every year. *Highspeed 5* will bring the total number of vessels in the Hellenic Seaways fleet to 34.

In keeping with the stern-to mooring style commonly used in Greece, the vessel has been customised to provide separate passenger and vehicle loading ramps. The bi-fold ramps enable loading and unloading onto a low landing stage and the ferry will be equipped with high-speed anchor winches and mooring winches to allow for efficient berthing.

Austal Sales and Product Development Manager, Mr Glenn Williams, said the contract was confirmation of Austal's commitment to providing specialised solutions for ferry operators.

"The Greek market has unique needs which need unique solutions. It is this approach that sets us apart from our competitors, and provides the ability to develop long term relationships with our customer base," he said.

Hellenic Seaways General Manager, Gerassimos Strintzis, said "Our reputation is based on providing a superior service as exemplified by our current Highspeed fleet. Austal's ability to deliver a competitive solution tailored to our needs helped to secure this order and we look forward to this vessel providing an improved service to our customers."

Following on from Austal's experience with the 92 m *Highspeed 4*, the new catamaran, capable of travelling in excess of 40 kn, has three classes of seating (VIP, business and economy), each with its own bar and facilities. With capacity for 154 cars (or four coaches and 131 cars) and 809 passengers, the vessel will display a sophisticated level of fitout, disabled-persons access (including a lift) in compliance with European Union regulations, and crew accommodation for 26.

The boarding area will lead to a baggage room on the mezzanine deck and, for the comfort of passengers when boarding, dry exhaust funnels have been designed to direct main engine exhaust fumes away from the ramps and other passenger areas.

Interestingly, eight specially-designed dog kennels have been provided based on a special Presidential Decree allowing their transport on a high-speed ferry. Built in differing sizes for optimum comfort, each kennel has a vacuum sanitary connection plumbed to the vessel's black water system. [*But will the dogs know how to press the button?* — Ed.]

Principal Particulars

Length OA	85.0 m
Length WL	76.4 m
Beam moulded	21.2 m
Hull depth moulded	6.7 m
Hull draft (maximum)	3.09 m
Deadweight (maximum)	470 t
Crew	26
Passengers	
VIP	120
Business	416
Tourist	273
Total	809
Vehicles	154 cars or 4 coaches and 131 cars
Axle loads	
Centre lanes	9 t (single axle) 12 t (dual axle)
Outer lanes	1 t
Vehicle deck clear height	4.3 m
Fuel (approx)	111 000 L
Propulsion	
Main engines	4 × Caterpillar 3618, 7 200 kW each
Propulsion	4 × KaMeWa 112 SII
Service speed	38 kn at 400 t dw
Maximum speed	41 kn at 400 t dw
Survey	
Classification	Germanischer Lloyd

Highspeed 5
(Photo courtesy Austal Ships)

Port quarter view of *Highspeed 5*
(Photo courtesy Austal Ships)

A general view of the interior of *Highspeed 5*
(Photo courtesy Austal Ships)

Austal Delivers Private Research Vessel

Following the recent delivery and entry into service of the 50 m luxury tourism vessel, *True North*, the Austal-Image yard continues the theme, with the successful delivery of *Electra* in July to a private owner for operation in the Bahamas.

With the initial design brief heavily based on carrying and deploying a 9 m, twin-engine RIB, *Electra* is customised as a base for serious diving adventures.

Complete with all the necessary equipment to support underwater research and film making, *Electra* provides both comfort and practicality.

Exterior decks and interior joinery are detailed in teak with the owner deploying his own Italian tradesmen to work with the Austal-Image team to produce a modern, highly-functional interior, capable of accommodating six guests and four crew.

Externally, and from an engineering perspective, the owner was inspired by previous rig tender and offshore supply boats produced by the yard which could be combined with luxury features to produce a robust, easy-to-operate, reliable, low-maintenance all-purpose vessel.

Constructed in aluminium and equipped with a 4 t deck crane and heavy-duty stern anchor, *Electra* is capable of more than 18 kn, courtesy of twin Caterpillar 3508B 820 kW engines two driving propellers.

Following on from the *True North* and *Electra* deliveries is the announcement of a new contract for a 37 m private vessel. Destined for Sydney Harbour, the vessel is primarily designed for private use but will also be certified for charter work along Australia's East Coast and the Whitsunday and Lord Howe Island regions.

The interior layout features a large open-plan lounging and outdoor-cockpit area that can be opened by way of bi-folding main-saloon doors.

Accommodation will be provided for eight guests in three double staterooms and one master supported by four crew members.

The upper deck will feature a generous-size wheelhouse with a dedicated BBQ and spa area aft of the wheelhouse.

Principal Particulars

Length	37.1 m
Beam	8 m
Draft	2 m
Cruising Speed	14 knots

Electra on trials
(Photo courtesy Austal Ships)

The bridge in *Electra*
(Photo courtesy Austal Ships)

Austal and Defence in Skills Training

It was announced in June that a Letter of Intent had been signed between the Australian Government, Department of Defence and Austal regarding the Skilling Australia's Defence Industry Program (SADI).

Subject to confirmation of a formal agreement, Austal will conduct the following general activities in order to receive payments of up to $1.1 million over the 2005-06 financial year:

- Recruitment programs, including attraction activities, additional apprentices, dual apprentices and mature-age apprenticeships.

- Training/upskilling programs including on-the-job training, additional TAFE courses and leadership-development and team building courses.
- Retention programs, involving a broad range of initiatives including coordinator and supervisor development, new starter familiarisation and enhanced HR capacity.

Skilling Australia's Defence Industry Program is a policy initiative announced by the Government in 2004 to address a significant shortfall in the quantity and quality of skills available to defence industry to ensure that the Australian Defence Force has the capabilities it needs to defend Australia and its national interests.

Austal Chairman, Mr John Rothwell commented, "Austal has always had a strong policy with regard to apprenticeships, recruitment and training. With a strong relationship now forged between Austal and the Department of Defence we are pleased to be able to cooperate and provide even more employment opportunities to the community."

Queensland Industry News

On the Gold Coast the annual Sanctuary Cove Boat Show has come and gone for another year, with all involved reporting good sales and the generation of a lot of positive leads. Over 50 000 people passed through the gates during the four-day event with most of the activity focused around the on-water display of vessels of all sizes, types and budgets.

Local Gold Coast custom boat builder, Azzura Yachts, has secured a contract to build a 21.3 m luxury sport fisherman designed by Warwick Yachts of New Zealand for an Australian owner. It will be surveyed by Oceanic Yacht Design to USL Code Class 2B. The vessel is to be powered by two C30 Caterpillar engines of 1119 kW each and will reach a maximum speed of 32 kn, with a cruising speed of 25 kn.

Local manufacturer Lightwave Yachts recently held its second annual sailing regatta, organised specifically for Lightwave owners. The four-day event attracted a total of 12 boats from all around Australia. Apart from providing an enjoyable event it also provided a unique opportunity to view the different layout options of the various models, including the Lightwave 35 m and 38 m sailing cats and the 40 m power cat. The fourth model, the new 45m sailing cat, was officially launched at the Sydney Boat Show.

Cockle Bay awash with boats during the Sydney Boat Show
(Photo John Jeremy)

Sea Transport Solutions have a number of interesting consulting jobs in hand. These include the design of an amphibious vehicle, the preliminary design for a 30 000 dwt cement carrier, the concept design of a 140 m LNG vessel, and the preliminary design of a 65 m freight-feeder vessel to assist with the PNG gas pipeline project.

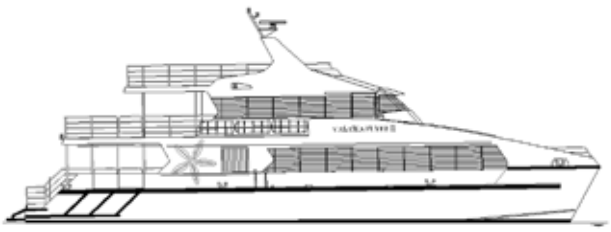
In the Brisbane region, Aluminium Marine have delivered *Five*, a 34m catamaran passenger ferry designed by Crowther Design for Fantasea Cruises operating in the Whitsundays. The vessel has seating for 350 passengers and has a top speed of 29 kn. The shipyard has also started on the construction of a 24 m diveboat/passenger ferry.

The new passenger ferry for Fantasea Cruises
(Photo courtesy Aluminium Marine)

BSC Marine Group's current project is a 27 m passenger catamaran, *Yasawa Flyer II*, to Lloyd's class G3 for South Sea Cruises. This vessel will serve as a vital link for tourists, locals and supplies to the Fiji islands that make up the Yasawa Group. The principal particulars of this vessel are:

Length OA	27.5m
Beam OA	9.1m
Draft (max)	2.0m
Passengers	276
Luggage	5 t
Construction	Aluminium
Main engines	MTU 10V 2000 M72
Gearboxes	ZF 3000A

The vessel is a larger version of *Yasawa Flyer I* which she will replace. *Yasawa Flyer I* was also designed and built by BSC Marine Group in 2000.



Profile of Yasawa Flyer II
(Drawing courtesy BSC Marine)

Tenix Delivers Ninth Anzac-class Frigate

The ninth Anzac-class frigate to be completed by Tenix Defence was delivered to the Royal Australian Navy on 22 July 2005 at Tenix's Williamstown shipyard in Melbourne.

Tenix Defence CEO Robert Salteri officially handed over *Toowoomba* to Director General, Major Surface Ships, Commodore Drew McKinnie and Acting Commanding Officer, Lieutenant Commander David McDonald, in front of the ship's company.

Mr Salteri said that the ship had received the thumbs-up from the Navy and exceeded expectations in its sea trials in February and March this year.

"*Toowoomba* features state-of-the-art weaponry and a range of enhancements unique to Australian vessels," Mr Salteri said.

"Developing the Anzac ships' technology, electronics and defence systems has been fundamental to ensuring Australia's defence capabilities are maintained in line with international standards.

"*Toowoomba* is a flexible, capable, cost-effective general-purpose vessel which has drawn on the skills and expertise of thousands of local suppliers, sub-contractors and Tenix employees," Mr Salteri said.

The vessel is named *Toowoomba* in honour of the original Bathurst-class minesweeper that served with distinction in World War II.

The keel of the new *Toowoomba* was laid on 26 July 2002 and she was launched on 16 May 2003. The ship is scheduled for commissioning into the RAN in Brisbane in October, and will be based in Perth.

Swedish Submarine HMS *Gotland* Arrives for US Duty

The Swedish attack submarine HMS *Gotland* arrived at Naval Air Station North Island, California, on 27 June to begin a one-year bilateral training effort with the US Navy's anti-submarine warfare (ASW) forces.

Gotland will play a major role in the Navy's ASW training by being an opposing force (OPFOR) during exercises against carrier and expeditionary strike groups, air patrols and other forces.

"We have been waiting for this day," said LCDR Jan Westas, commanding officer of *Gotland*, which was shipped on a container ship from Sweden while the crew travelled separately. "We have all missed *Gotland*. Everyone is motivated, ready and eager to go to sea and get back to work."

Gotland was selected to be the OPFOR because of its unique propulsion system. *Gotland* is the first submarine in the world to operate with an air-independent propulsion (AIP) system.

"The Stirling AIP system allows us to stay submerged at sea for weeks without having to come up to recharge our batteries or snorkel for air," said LCDR Rickard Boberg, *Gotland's* chief engineer. "No other Navy in the world except for Japan uses this system, and they bought it from us. With our low signatures and smaller sonar cross section, it will be a little more challenging for the [other] ships and submarines."

Gotland's trip from Sweden to San Diego took about a month. During that time, the crew prepared for its arrival by making logistical arrangements with local contractors for services which the submarine requires.

Sweden is not a member of NATO. Instead, it is part of the Alliances Partnership for Peace program, which is aimed at improving defence cooperation. Through various programs, exchanges and exercises, including *Gotland's* year-long training effort in the US, the Partnership for Peace program will help partner countries like Sweden prepare to operate jointly with NATO forces.

Before beginning the year-long training in the US, *Gotland's* crew has to complete a lot of work to make the boat ready for sea.

"This is the first time *Gotland* has been in the Pacific, which is very different from the Baltic Ocean," Westas said. *Gotland* was built for operating in the waters around Scandinavia, which has less salt content. "Now that we are in the Pacific, we will have to re-ballast *Gotland* for the Pacific."

The 30-person male and female crew comprises 19 officers and 11 conscripts.

HMS *Gotland* shortly after arriving in San Deigo
(US Navy photograph)

World's Biggest Shipyard in Shanghai

Construction has begun on what China says will eventually be the world's biggest shipyard, part of the country's plan for taking a dominant role in the industry. China's biggest shipbuilding company started building the five-mile-long facility on an island in the Yangtze river, north of Shanghai. The $US3.6 billion new shipyard is meant to quadruple Shanghai's current shipbuilding capacity to 12 million t by 2015.

China now shares about 10% of the world shipbuilding market; South Korea and Japan combined now make three-quarters of the world's ships. The 130-year-old Jiangnan Shipyard, which once operated along the Huangpu River in the centre of Shanghai, will move to the new facility once it is built. Shanghai handles almost half of all China's shipbuilding orders, with an annual capacity of more than 3 million t, accounting for 4.6% of the world total.

Marine Digital Maritime Newsletter, 13 June 2005

Integrated Naval Architecture & Ship Construction Software

Maxsurf for Windows is a completely integrated suite of design, analysis and construction software suitable for all types of vessels. All modules feature a consistent, graphical interface compatible with Windows and data exchange with AutoCAD and Microsoft Office.

Contact us for a free demonstration kit or download the latest demo from our web site:

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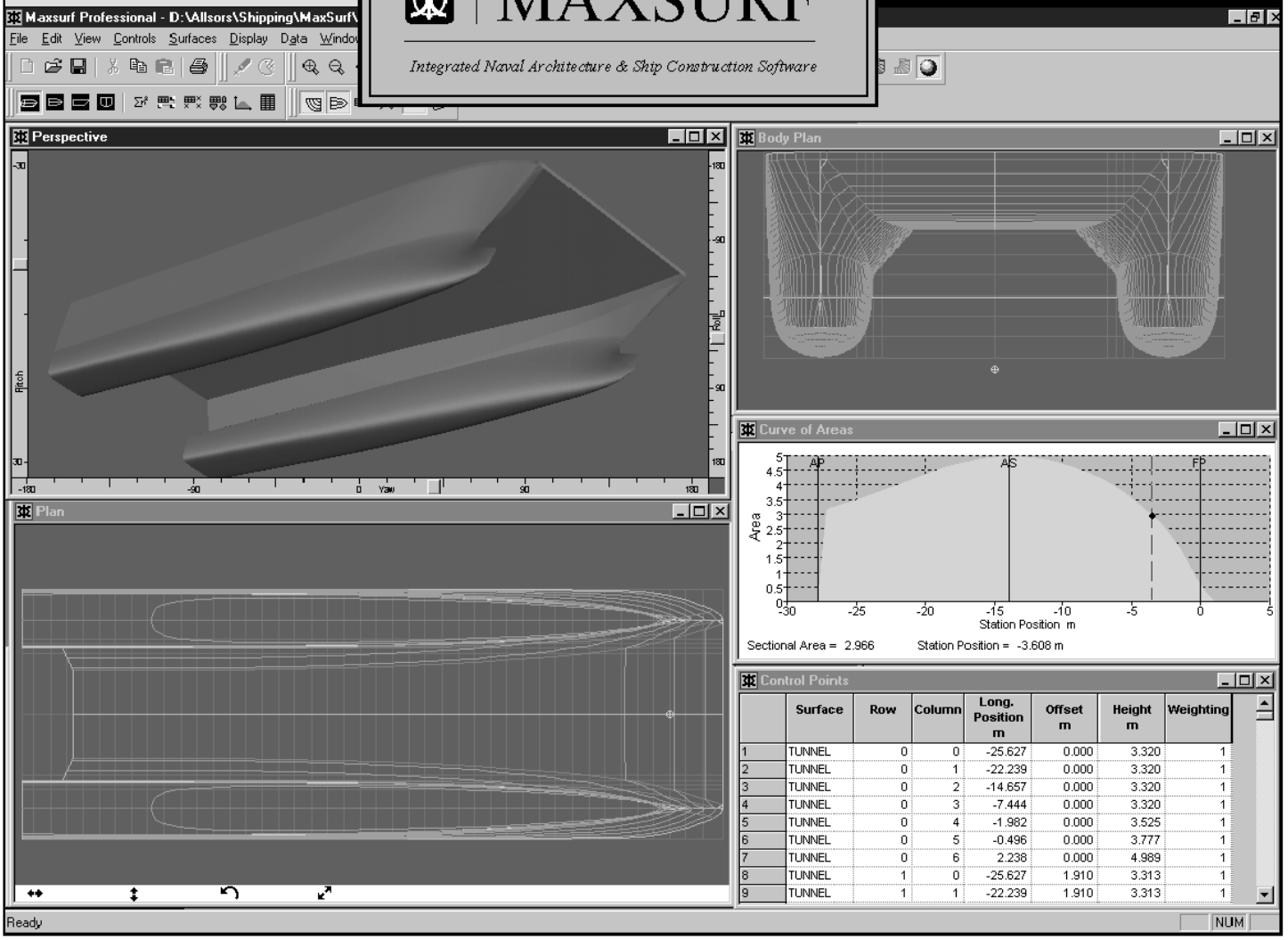


25 m Passenger Transit Cat from Crowther Design

A 25 m passenger transit catamaran to a design by Crowther Design is currently under construction by Sea Crest 1993 Co Ltd in Samutprakam, Thailand. This vessel is the start of a new era for Crowther Design. It is the first vessel to be delivered as a complete kit for the operators of Lamprayah High Speed Ferries in Thailand. A similar platform to the previous vessel, the new boat will offer an increase of 30% internal capacity to cope with the increased tourism demands in the area.

Principal particulars of the vessel are as follows:

Length OA	25.0 m
Length WL	23.0 m
Beam OA	8.50 m
Draft (propeller)	1.86 m
Draft (hull)	1.30 m
Passenger Seating	
Internal	176 (main deck)
	49 (upper deck)
External	30
Fuel	6000 L
Fresh water	2000 L
Sullage	1000 L
Deadweight	33.44 t
Engines	2 × CAT 3412E
	each 820 kW @ 2300 rpm
Gearboxes	2 × ZF 2150
Gensets	1 × 45 kVA and 1 × 16 kVA
Construction	Aluminium
Speed	26 kn

52 m Crowther Catamaran

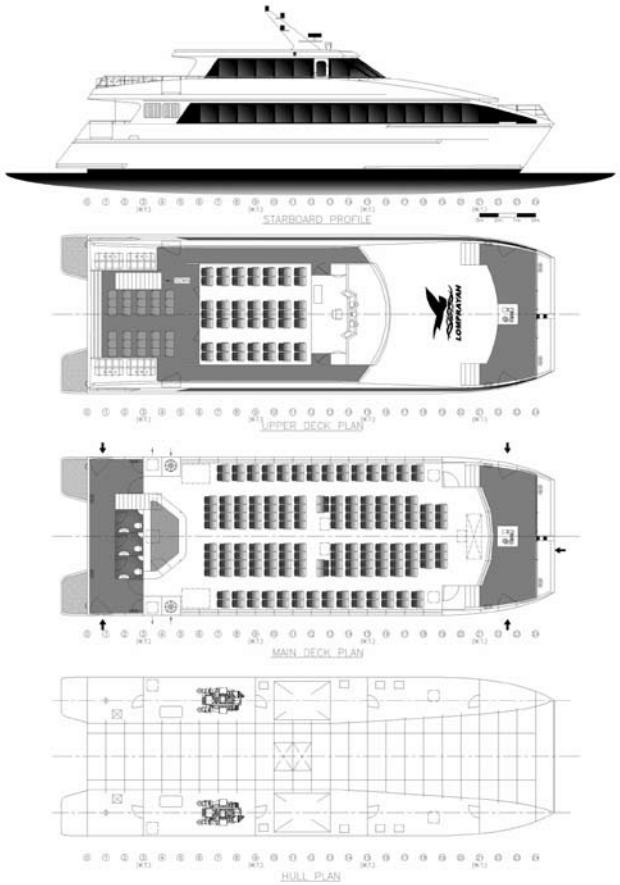
A 52 m passenger transit ferry to a design by Crowther Design is currently being built at the yard of Gulf Craft Inc. in Patterson, Louisiana, USA. The vessel is due to be delivered in mid December to operator Key West Shuttle who will operate a commuter service from Ft Myers to Key West, Florida, USA. This is the second Crowther vessel designed for the operators at Key West Shuttle and the third Crowther vessel operating on this demanding run.

The vessel is fitted with four MTU16V400 M71 diesel engines, each producing a maximum of 2468 kW. Four Hamilton HM811 waterjets are driven through four 2 × ZF7550 NRH/LH gear boxes.

The vessel has seating for a full passenger complement of 441 seated in a mixture of lounges, aircraft-style and bar-stool seating. Exterior seating accomodates a further 72 passengers seated on both the mid and upper decks. The speed of this vessel will reduce the current transit time from 3.5 h to 2.75 h.

Principal particulars of the vessel are as follows:

Length OA	52.27 m
Length WL	44.16 m
Beam OA	11.58 m
Draft (hull)	1.64 m



General Arrangement of Crowther Design's
25 m Passenger Transit Catamaran For Thailand
(Drawing courtesy Crowther Design)

Passenger Seating	
Internal	269 (main deck)
	147 (mid deck)
External	80
Fuel	4 × 11 356 L
Fresh water	2 × 2763 L
Sullage	1892 L
Deadweight	70.9 t
Engines	4 × MTU 16V 4000 M71
	each 2468 kW @ 2000 rpm
Gearboxes	4 × ZF7550 NRH/LH
Gensets	2 × Detroit 95 kVA
	120/208 V 3 ϕ 60 Hz
Survey	USCG Subchapter K
Construction	Aluminium
Speed	45 kn

46 m Crowther Catamaran

A 46 m passenger transit ferry to a design by Crowther Design is also currently being built at the yard of Gulf Craft Inc. in Patterson, Louisiana, USA, for Safe Way Maritime Transportation to operate in the waters around Hondurus. The vessel is fitted with four CAT 3512B diesel engines, each producing a maximum of 1230 kW. Four Hamilton HM651 waterjets are driven through four Twin Disc/Nico RGN122H gear boxes.

The vessel has seating for a full passenger complement of 297 seated internally, and 150 passengers seated on the aft mid deck.

Rendering of Crowther Design's
52 m Passenger Transit Ferry for Key West Shuttle
(Image courtesy Crowther Design)

Principal particulars of the vessel are as follows:

Length OA	46.33 m
Length WL	38.61 m
Beam OA	10.36 m
Draft (hull)	1.14 m
Passenger Seating	
Internal	237 (main deck)
	60 (mid deck)
External	150 (mid deck)
Fuel	4 × 11 356 L
Fresh water	2 × 2082 L
Sullage	2 × 833 L
Deadweight	61 t
Engines	4 × Caterpillar 3152B
	each 1230 kW @ 1800 rpm
Gearboxes	4 × Twin Disc/Nico RGN122H
Propulsion	Hamilton HM 651 waterjets
Gensets	2 × Caterpillar C4.4TA 79 kVA
	120/208 V 3 ϕ 60 Hz
Survey	USCG Subchapter K
Construction	Aluminium
Speed	34 kn

Rendering of Crowther Design's
46 m Passenger Transit Ferry for Safe Way Marine
(Image courtesy Crowther Design)

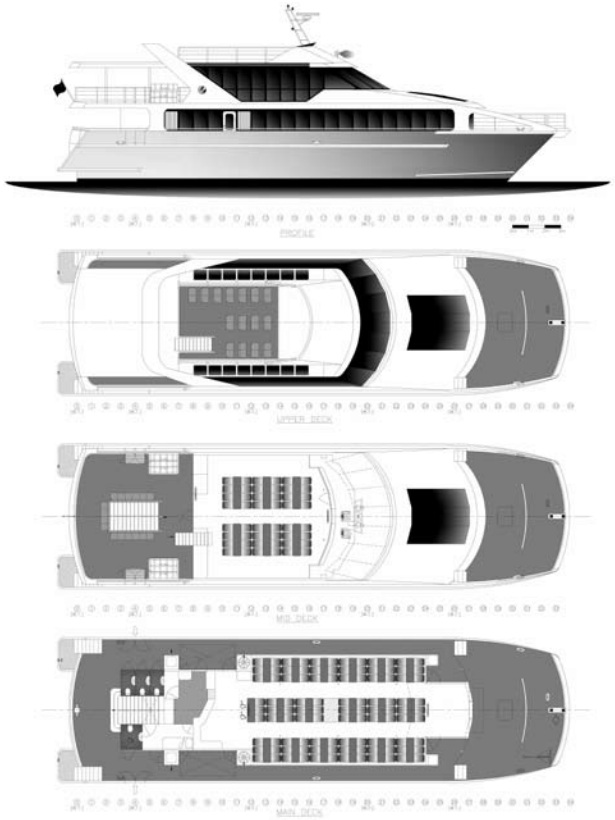
30 m Crowther Sight-seeing Catamaran

A 30 m sight-seeing catamaran to a design by Crowther Design is currently being built at Richardson Devine Marine in Hobart. This will be the first Crowther vessel for the New Zealand operators, Real Journeys. The vessel is intended to operate on the World Heritage waters of Doubtful Sound as a day-cruise vessel. The unique feature of this vessel is the complete walk-around main deck, offering the passengers an unobstructed view of the pristine surroundings.

Spear Green Design, Sydney, were contracted by Crowther Design to provide assistance with interior design as part of their total design package.

Principal particulars of the vessel are as follows:

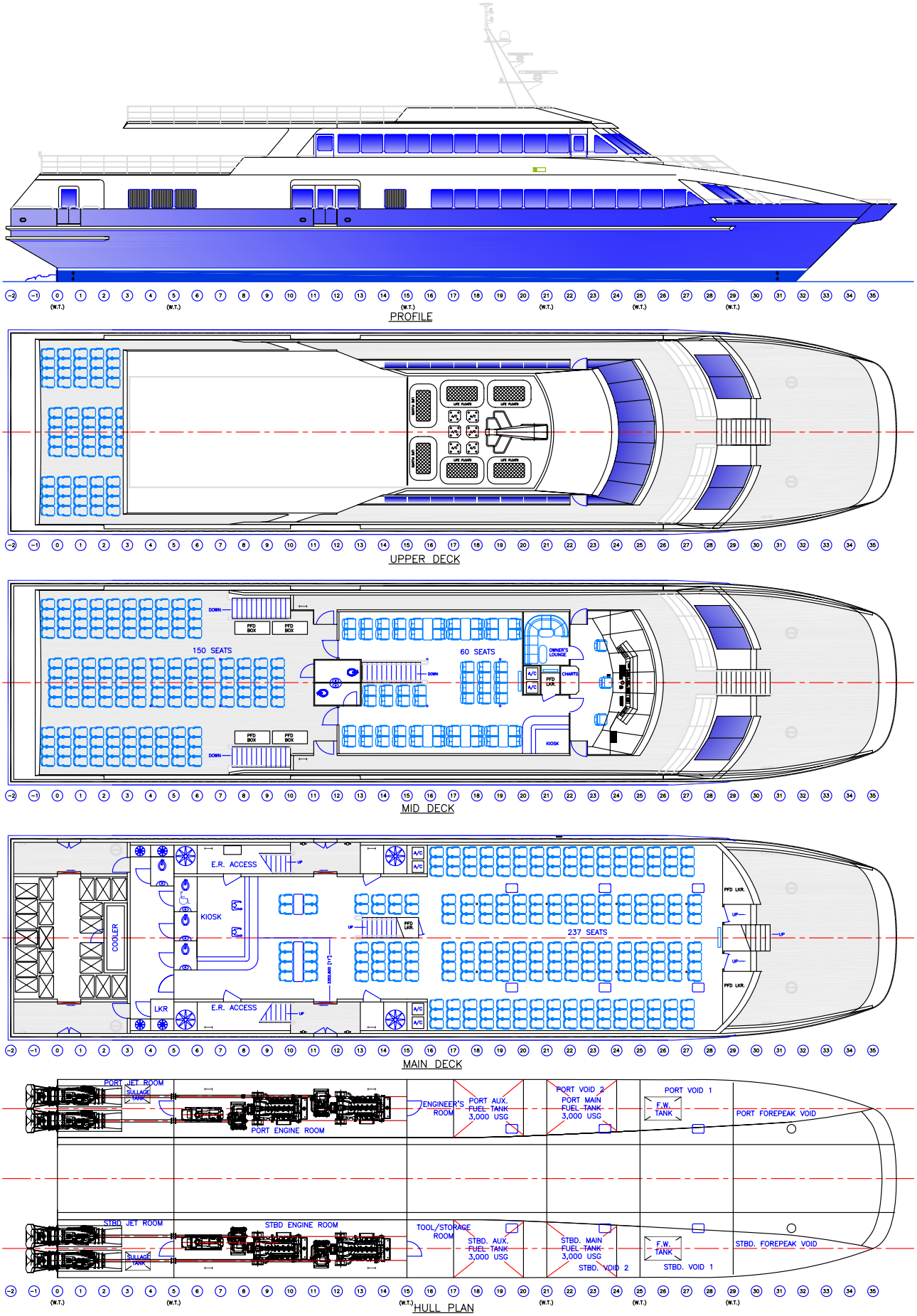
Length OA	30.00 m
Length WL	26.65 m
Beam OA	9.00 m
Draft (skeg)	2.13 m
Draft (hull)	1.33 m
Passengers	
Internal	105 (main deck)
	48 (upper deck)
External	16 (upper deck)
	30 (roof deck)
Crew	6
Fuel	2 × 4000 L day tank
	2 × 5500 L long-range tank
Fresh water	2 × 1500 L
Deadweight	25.12 t (excl. long-range tanks)
Engines	2 × CAT C32
	each 1045 kW @ 2300 rpm
Gearboxes	2 × Twin Disc MG6619SC
Survey	New Zealand MSA
Construction	Aluminium
Speed	28.5 kn



General Arrangement of Crowther Design's
30 m Sight-seeing Catamaran for Real Journeys
(Drawing courtesy Crowther Design)

Currently there are nine significant vessels under construction to designs by Crowther Design, in yards located in Australia, North America, South America and Asia.

Steve Coates



General Arrangement of Crowther Design's
46 m Passenger Transit Ferry for Safe Way Marine
(Drawing courtesy Crowther Design)

Bow Rendering of Crowther Design's
30 m Sight-seeing Catamaran for Real Journeys
(Image courtesy Crowther Design)

Stern Rendering of Crowther Design's
30 m Sight-seeing Catamaran for Real Journeys
(Image courtesy Crowther Design)

John Oxley Restoration

On a sad note, the Chair of the *John Oxley* restoration project, Anthony Morgan, passed away unexpectedly during 2004. Anthony was a keen marine steam enthusiast and would often relate stories from his youth about daily travel on fast British paddle steamers. His place as Chair has been taken by Andy Munns, a long-term member and volunteer with experience on the restorations of *Waratah*, *Lady Hopetoun*, *Ena*, *Kookaburra* and, for a short time, *James Craig*.

Much progress has been made on the restoration of the hull, with many plates removed from the main and forward hold areas. These plates have been sent to the workshop for replication and are currently being fitted back up to the ship for riveting in place.

Work has also commenced on the last area of structural weakness, the stokehold and the boiler space. While the frames here are in good condition, the floors are all badly wasted due to the effect of water, ash, coal and heat, and must be replaced. The complicating factor is that they must be replaced without removing the boilers from the vessel, and this places limits on how the job can be done.

John Hayes, a naval architecture student at The University of New South Wales, has just completed his undergraduate thesis on the project management of the *John Oxley* restoration. While the overall project management has been addressed, much of the focus has been on how to replace the floors under the boilers. John has spent much time on site with the restoration team, and there is a recent photo on their website (www.australianheritagefleet.com.au/jorest/jolatest.html) showing John helping to remove the first of the floors from the stokehold and boiler space. John's investigation included a finite-element analysis of the stokehold and boiler space, with hull plates and frames removed, to ensure that allowable stresses were not exceeded at any stage of the proposed operation.

Phil Helmore

John Oxley restoration May 2005
(Photo courtesy George Wortham)

NSW Police Order for Patrol Boats

Following a detailed review and tender process, in June Austal was awarded a contract for the design, construction and supply of six 16 m aluminium monohull boats for the Water Police in New South Wales.

This order will add to the previous Austal delivery of two 22 m and seven 16 m patrol boats delivered in 2000. As with the previous vessels, this order will be completed over a period of approximately 10 months.

Austal Chairman, Mr John Rothwell commented: "We look forward to the opportunity of working once again with the New South Wales Water Police. With Austal vessels also forming significant parts of the Australian Customs Service and Royal Australian Navy fleets, we take pride in knowing our patrol boats are performing such an important role in Australia's marine security network".

The boats have been ordered as part of a four-year upgrade of the Water Police fleet.

CLASSIFICATION SOCIETY NEWS

Joint Tanker Project

The Joint Tanker Project's Common Structural Rules for Double Hull Oil Tankers is a joint project between American Bureau of Shipping, Det Norske Veritas and Lloyd's Register.

The aim of the Joint Tanker Project is to develop a set of unified rules and procedures for the determination of the structural requirements for oil tankers. By employing the combined experience and resources of ABS, DNV and LR to develop a single common standard, competition between class societies with regard to structural requirements will be eliminated. This will benefit the industry by affording greater transparency to the technical background of the rules, and reducing costs with only one set of rules to apply. To ensure that the new rules and procedures will be recognised by the industry, they fully embrace the anticipated IMO requirements for goal-based new-construction standards.

The draft Common Structural Rules for Double Hull Oil Tankers has now been made available on the web for consideration and comment by the shipping industry. The copyright for the draft Rules is owned jointly by American Bureau of Shipping, Det Norske Veritas and Lloyd's Register. Visit www.jtprules.com to access and download the March 2005 draft Common Structural Rules for Double Hull Oil Tankers, supporting tools and documentation:

- Draft Rules and summary of significant changes
- Background to the Rules and supporting presentations
- Consequences of applying the Rules
- Organisation and ongoing project work
- Spreadsheets (supporting tools)
- FAQ's and JTP Knowledge Centre
- Feedback form

If you would like to comment on the March 2005 Draft Rules or any of the supporting documents then please use the feedback form available on the website.

For further details, visit the website.

Phil Helmore

ABS Publishes Guides

American Bureau of Shipping has recently published two guides:

Guidance Notes on the Investigation of Marine Incidents

These Guidance Notes provide a structured approach to the investigation of incidents and near-miss events. The information contained can also assist with identifying and documenting root causes as required by the ISM Code. These Guidance Notes provide instructions for the performance of incident investigation activities, including incident investigation initiation; data gathering; data analysis; root cause determination; generating recommendations; and reporting and trending of incident investigation results. The methodology is expressly developed for the maritime industry, and reflects those elements of operations and incident causation particular to the marine industry. This publication became available on 20 July 2005.

Guidance Notes on Fire-Fighting Systems

These Guidance Notes address the requirements for the design, installation and operation of a vessel's fire-fighting systems to comply with ABS standards. This publication is *only* available for download from the web.

ABS Rules and Guides may be downloaded for free at www.eagle.org/absdownloads/index.cfm.

New Divisional VP for ABS Pacific

ABS Pacific Division now has a new Divisional Vice-President, Adam Moilanen, based in Singapore. Adam recently toured all ABS offices in the region and visited Australia in May this year. He also visited selected ABS clients and shipyards in Australia to promote the ABS commitment to service from the very top. His face-to-face meetings with the captains of the local maritime community went down very well.

Adam was previously the Divisional Vice-President of the North American region and impressed with his fresh and open approach and personality. His maritime background includes some twelve years sea-going experience.

ABS Classes *Oceanic Princess*

NQEA Australia delivered the ABS-classed passenger vessel, *Oceanic Princess*, in April this year to her owners, Coral Princess Cruises of Cairns (see *The ANA*, May 2005).

The steel 63 m long vessel can carry 80 passengers and 20 crew. This comfortable and well-appointed twin-screw vessel has a service speed of 14 kn delivered by two Caterpillar 3512B V12 engines, each delivering 1118 kW through reduction gearboxes. She is an Australian-flagged SOLAS vessel and is intended for cruising mainly in Australian waters with occasional trips to New Zealand. Her displacement is 1346 t and gross tonnage is 1779.

Geoffrey Fawcett

Oceanic Princess alongside in Cairns
(Photo courtesy Geoffrey Fawcett)

GL Emergency Response Service: Damage Control for Accidents at Sea

Damage control for accidents at sea is always a race against the clock. The Emergency Response Service (ERS) of Germanischer Lloyd offers shipping companies and owners

immediate help in the event of an accident. Thanks to the rapid availability of an expert assessment for the damage stability and the residual strength of the stricken ship, the salvage risks can be evaluated with great precision. The team of ERS experts at Germanischer Lloyd is on call via emergency numbers right around the clock, 365 days a year.

This valuable service is available to *all* shipowners, *even if their ships are not classified by Germanischer Lloyd*. ERS-registered ships bear the class notation ERS and receive the corresponding confirmatory certificate. ERS registration of the ships includes the production of a ship-specific data model, the entry of the necessary customer and ship data into the ERS database, and the generation of special emergency datasheets for shipboard use.

Following an incident, a detailed simulation model is used to calculate, within the space of a few hours, the current status regarding damage stability, strength, and relative position of the casualty vessel. From this, recommendations as to which salvage measures are most advisable are then derived. Calculation of the towing force required to free a grounded vessel is performed, as is — in the event of tank leakage — a plausible appraisal of the potential oil outflow in relation to various salvage options. For stranded ships, lightening plans can be worked out to float the ship free as quickly, and with as low a risk, as possible.

The Emergency Response Service is a pro-active environmental protection measure for ships sailing in ecologically sensitive regions such as the Baltic Sea. Through the shore-based calculation and advice afforded by Germanischer Lloyd, it is possible to prevent an accident from becoming an environmental catastrophe.

For further details, contact the Head of the ERS Core Team, Henning Schier, on phone: +49-40-3614 9269, email henning.schier@gl-group.com or website www.gl-group.com.

New IMO Regulations at a Glance: GL Publishes New Edition of the IMO Pilot

The new *IMO Pilot 2005* with an overview on the current legislation of the International Maritime Organization (IMO) is now available as the 5th edition for all customers of Germanischer Lloyd. All amendments to the regulatory framework of the IMO, as decided at the 79th session of the Maritime Safety Committee (MSC 79) and the 52nd session of the Marine Environment Protection Committee (MEPC 52), have been considered in this issue.

New additions include, e.g. regulations on the safety of bulk carrier in the revised Chapter XII of SOLAS (International Convention for the Safety of Life at Sea) as well as the requirement to install simplified voyage data recorders (S-VDR) on cargo ships of more than 3 000 GT.

The new provisions of Annex VI to the MARPOL Convention (International Convention for the Prevention of Pollution from Ships), which come into force on 19 May and involve strict exhaust-gas regulations in internationally defined "sulphur emission control areas", are also included.

The 90-page *IMO Pilot* offers a ship-type specific overview of all the major changes in technical and operational IMO legislation (SOLAS, MARPOL, STCW, Load Line Convention, et al.) since the year 2000. This presentation form provides easy orientation and a handy reference for yards, owners, shipping companies and flag state administrations alike.

Available in English, *IMO Pilot 2005* can be requested free of charge from Germanischer Lloyd, or is available for download via the Internet as a PDF file(2.2 MB) from www.gl-group.com>Client support>Flag States>IMO Pilot

For further details, contact Dr Olaf Mager on phone +49-40-3614 9634, email pr@gl-group.com or website www.gl-group.com.

Georgios Spiliotis

THE INTERNET

Marine Terminology

Having trouble with definitions of marine terms? Visit the San Diego Naval Historical Association's website for a list of terms taught to recruits at the Recruit Training Command, San Diego, USA. Some of the definitions could be argued, but generally a good site, found at www.quarterdeck.org/Terminology/naval_terminology_a.htm#A.

Kjetil Utrimark
UNSW Student

High Holding-power Anchors

Looking for a high holding-power anchor? Australian Commercial Marine in Fremantle may have the answer for you. Their SupeRay anchors are "drag embedment" anchors, with extremely high holding powers in sand and muddy bottom conditions, and are the result of ten years' development. The required anchor weight is claimed to be reduced by fifty percent or more when compared to traditional anchors and, with weights ranging from 75 to 2000 kg, there should be one to suit most needs. These anchors may also be packed flat for transportation or stowage in confined spaces, and then assembled in minutes. Further information may be obtained by phone on (08) 9431 6000, email info @ acmarine.com.au, or checking their website www.acmarine.com.au.

Ship Motion Control

Ship Dynamics recently announced the opening of its new office in Fremantle where it will service and provide solutions for ship motion control. Tony Elms, Managing Director of Ship Dynamics, says that they provide clients with a complete seakeeping package, from the design stage through to customised applications. In commissioning a seakeeping analysis, customers can determine not only the benefit of a motion-control system on their vessel, but also the appropriateness of their vessel for a given operating route. Whilst Ship Dynamics would always like to sell a motion control system, that is not their prime focus; the first priority is to help the customer to decide if they have the right vessel for their proposed route.

For further details on what Ship Dynamics can provide, visit www.shipdynamics.com/news/default.aspx.

Atlas Online

At the computer, and can't be bothered to go and find the atlas to find out where Liberia is (coastal western Africa), or what it's capital is (Monrovia)? What about Burkina Faso (land-locked in western Africa), or its capital (Ouagadougou)? Help is just a few keystrokes away. The Atlapedia Online website provides full color physical and political maps for regions of the world, together with facts, figures and statistical data on geography, climate, people, religion, language, history, economy, etc. Visit www.atlapedia.com.

Nautical Links

The less-than-modest Mother of All Nautical Links website does, in fact, have an enormous number of useful links. No matter whether your interest lies in design software, ocean liners, pirates, or tug/towboats, this website has many pages of links to sites on the subject of your choice.

Visit www.boat-links.com/boatlink.html#top and check out the impressive lists.

Marine Notices

Marine Notices issued by the Australian Maritime Safety Authority may all be accessed on line at www.amsa.gov.au/shipping_safety/marine_notices. Select the year, then the notice number, and whether you want HTML or PDF format.

Phil Helmore

Foil-borne Kayak

The Flyak, or foil-borne kayak, is the brainchild of Einar Rasmussen and Peter Ribe and is a new concept in the quest for human-powered speed on the water. On 27 May 2005, Peter Ribe set a new solo 1000 m record of 2 min 57 s at Duisberg, Germany, totally eclipsing the previous year's International Canoe Federation (conventional kayak) record of 3 min 25 s. Check the details, photos and video clips at www.foilkayak.com/component/option,com_frontpage/Itemid,1/.

Tony Armstrong

The Register of ANZ Ships and Boats

The register of Australian and New Zealand ships and boats at www.boatregister.net is a private project being undertaken as a hobby. It arose through the research work undertaken for the restoration of the tug *Waratah* and barque *James Craig* in the 1970s and 1980s. Information was being uncovered on other vessels for which there was no central repository. Lists and card records were drawn up in those earlier years, including a card-based register of the historic vessels administered by the (then) Sydney Maritime Museum. The lists and card records were transferred to an electronic register in 2000, and there are currently more than 29,000 vessels recorded. Each record on the register contains 42 fields of information, and there is provision for a photograph on the register. At present, the register is not available directly on the web (there is a sample page), but it is hoped that a simplified version will be on line in the near future. It is hoped one day to publish the register on CD.

So, are you looking for information on a particular vessel? Do you know anything of the history of a particular vessel? Interested persons are very welcome to contact me directly if looking for or to contribute information; all contributions of information, photos, etc. will be gratefully received and acknowledged.

Mori Flapan

MARITIME AUSTRALIA AWARD

The Australian Naval Institute, in conjunction with the Centre for Maritime Policy at the University of Wollongong, has announced the opening of the first selection process for the *Maritime Australia Award*, sponsored by Booz Allen Hamilton Australia.

The Award is in the form of a two-year grant for research or development in a maritime activity. $12 000 each year will be made available to the winning project. The grant will be awarded to the most promising research or development proposal which will be judged by a committee of experts from the various fields of maritime endeavour, including science, maritime law and policy, defence, commerce, shipbuilding and maritime industry. The intent of the award is that it be available to the widest range of potential researchers and innovators, rather than just one sphere of maritime endeavour.

Applications open immediately and will close on 31 October this year. The first award will be announced at the Pacific 2006 Maritime Exposition in February 2006, with subsequent awards being announced at future Pacific Maritime Expositions.

The institution of this award demonstrates the commitment of the Australian Naval Institute and the Centre for Maritime Policy to the encouragement and promotion of the advancement of knowledge related to the Navy and the maritime profession. The Australian Naval Institute and the Centre for Maritime Policy are extremely grateful to Booz Allen Hamilton Australia for making this award possible, demonstrating its own strong commitment to the advancement of Australia's maritime activities.

The Award is open to all individuals, companies and institutions, with the exception of Government departments and agencies and sponsoring organisations. Applications are not restricted to Australian citizens or residents, but the recipient of the Award must develop a research project that is of direct benefit to Australia and its maritime activities.

The Award is an inclusive one, open to applicants from all fields of endeavour relevant to the maritime sector including, but not restricted to, science and technology, law, policy, defence, marine industries, engineering, information technology and history. No reasonable application will be excluded from consideration for the Award.

Applications will be considered by an Australian Naval Institute Maritime Australia Award Selection Committee, consisting of the President of the ANI (Chair) or their representative and another ANI member nominated by the Council of the ANI,

together with a member nominated by the Centre for Maritime Policy and a member nominated by Booz Allen Hamilton (Australia). In the event of a tied vote, the Chair will have the casting vote. The Selection Committee may invite representatives of other maritime organisations to advise on the applications, but these representatives will not have voting rights.

Terms and Conditions

1. The winner of the Maritime Australia Award will receive $12 000 per year for a maximum of two years to fund the successful research project.
2. The project must produce a tangible output within the two-year timeframe. The type of output is not prescriptive, however, and, as possible examples, may take the form of an invention or design, some other type of product, a publication, software or educational material.
3. The money will be disbursed to the winner in two separate payments of $12 000 in March of each year of the Award. The second payment will only be disbursed on receipt by the Selection Committee by the beginning of the previous month of a satisfactory report on the progress achieved during the first year of the project.
4. The recipient should produce a final report on the project for the Selection Committee, which would also be published in the *Journal of the Australian Naval Institute*.
5. The recipient of the Award must agree to attend, if requested by the Committee, the public announcement of the winner at the Pacific 2006 Maritime Exposition and present the findings/output of the research at the Pacific 2008 Maritime Exposition.
6. The research must be new and original and should be a stand-alone project that advances maritime-related knowledge in Australia.
7. The Award cannot be used to fund research relating to the award of a degree or other qualification. Current and prior research undertaken as part of a degree or other qualification is ineligible for consideration for the Award.
8. Applicants may submit more than one project for consideration, but these must be made as separate applications, posted in separate envelopes.
9. All applications must be received by 31 October 2005 to be eligible. Late or incomplete applications will not be considered. Applications will be acknowledged in writing by the Australian Naval Institute.
10. Applicants will be informed of the outcome of their application(s) by 31 December 2005. All applications and supporting material will be retained by the Australian Naval Institute.
11. The decision of the Selection Committee is final and no correspondence will be entered into with unsuccessful applicants. The Selection Committee will have sole and complete discretion over the acceptance of applications and over the identification of a winning application.
12. The Selection Committee will not enter into any correspondence with potential applicants prior to their application.
13. The Selection Committee reserves the right not to confer the Award if they decide that none of the entries meets the desired standard.
14. The disbursement of the Award does not infer any commercial or other endorsement of the research output by the Australian Naval Institute or the sponsors of the Award.
15. The Australian Naval Institute reserves the right to cancel payment of the Award if, at any time, the terms and conditions of the Award are found to have been breached.

Application Procedure

Applicants must submit three copies of their application(s) (to contain personal/institutional details, etc.) together with three copies of the research proposal(s) and any supporting material.

All applications must be submitted in hard copy and the declaration on each copy of the application form must be signed.

The research proposal should consist of no more than one to three pages and must convey sufficient information for the Selection Committee to be able to understand the aim of the project, the process to be undertaken, its originality, merits and national benefit.

Supporting material may be submitted, but final decisions will be based primarily on the research proposal.

The application must be received by the Australian Naval Institute at the following address by 31 October 2005:

Maritime Australia Award Competition
Australian Naval Institute
PO Box 29
Red Hill, ACT 2603

Further details are available from the points of contact of the Australian Naval Institute and the Centre for Maritime Policy listed below:

Commodore James Goldrick, RAN
Councillor
The Australian Naval Institute
PO Box 29
Red Hill, ACT 2603
(02) 6268 8600
James.Goldrick@defence.gov.au

Professor Martin Tsamenyi
Director
Centre for Maritime Policy
University of Wollongong
NSW 2522
(02) 4221 4883
tsamenyi@uow.edu.au

EDUCATION NEWS

The University of New South Wales

Undergraduate News

Inclining Experiment on *Boomerang*

Sydney Heritage Fleet provided access to their yacht *Boomerang* for the Year 3 students to conduct an inclining experiment at Rozelle Bay on 11 May. The students conducted the experiment with the guidance of lecturer Mr Phil Helmore. The day was perfect for an inclining, sunny, flat calm and with almost no breeze. 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.

Year 3 UNSW Students at Inclining of *Boomerang*
(Photo courtesy George Wortham)

Thesis Projects

Some of the undergraduate thesis topics in progress include:

Hydrofoil Surfboards

Foil assistance has been applied to many types of craft; to hydrofoils, catamarans, and even kayaks (see *The Internet* column elsewhere in this issue of *The ANA*). It has recently been applied to chairs for parasailing behind towing vessels and, even more recently, to surfboards for riding non-breaking waves in the open ocean with only the foil in the water. Aaron Carle has designed and built his own surfboard, and has adapted a foil from a chair to fit the board. He is currently testing the foil in the wind tunnel and will compare the results with those from computational fluid dynamics (CFD) and then use CFD to optimise the shape of the foil to provide the maximum lift and minimum resistance.

Rating System for Displacement/Non-displacement Craft

Many vessels in the South Australian seine fishery have a length of 6–7 m with planing-type hulls and powerful engines but, because of the weight of the net, its location, and the possible load of fish they are likely to carry, these vessels are never going to plane. They would be burn less fuel and create less greenhouse emissions if designed as displacement vessels in the first place. In order to give guidance to owners and masters, Joon Chee Yew is investigating the resistance characteristics of these vessels of various lengths and at various displacements, to come up with a means of giving them a "star" rating based on the non-dimensional ratio of weight*speed to installed power, *Wv/P*.

Operational Measures of Performance and Effectiveness

The success (or otherwise) of a marine operation is not easy to define. How can the performance of a patrol boat be optimised, for example? If we have a target (such as illegal fishing) and we want to investigate, at what speed and heading angle do we drive the vessel to intercept the target? The sea state affects fuel usage, MII and MSI loadings, and time to target is important. It is pointless arriving too early with a large fuel bill and sick sailors. Can we provide a measure of this performance, and can we do better? Ethan Seah is modelling the performance of a patrol vessel to predict MII and MSI, a fuel usage model, and time taken to target via various course options before the target can escape over a given boundary. This will provide useful information on which a master or coordinator can base decisions about the best course and speed to be used.

Canting Keel vs Water Ballast Systems

Canting keels and water-ballast systems are now commonly used by high-performance racing yachts to improve speed. However, the choice of which system is best for a particular vessel or a particular rating rule is not always clear. Dan Wupperman is investigating the choice of canting keels and water-ballast systems for high performance yachts by starting with a particular length of vessel and sail area, using a known rating rule, and designing vessels with varying beam to suit either a canting keel or water ballast. The performance of these vessels will be checked using a velocity-prediction program, and the results will give guidance on the best movable-ballast option for a given set of conditions.

CFD Analysis of Dingbat *Foil Shape*

The high-speed sailing vessel, *Dingbat*, brainchild of Sydney inventor Bill Rayner, is working up for an attempt at the world speed-sailing record (see the *Internet* column in *The ANA*, February 2004 and the website www.dingbat.com.au). This vessel is a combination of hang glider and hull, with the prototype version based on a catamaran hullform, but the latest uses a single long slim monohull with a centreboard. One of the unknowns is whether the centerboard foil shape will cavitate at the high speeds expected (more than 50 kn). Peter Hatton is conducting a computational fluid dynamics investigation to check the cavitation propensity of the foil, and to propose remedies via improvements to the shape.

The Influence of Propeller Pitch on Off-design Performance

A propeller which will not allow a marine engine to reach its MCR RPM or, conversely, allows the engine to over-rev, needs to have its pitch reduced or increased to suit. Conventional analysis of the slip ratio would indicate that that the change of pitch required is proportional to the change of RPM required. Robert Skerman is analysing the off-design performance of a database of more than one hundred propellers to check how this works in practice. Initial results show that the conventional analysis works well for propellers which overload an engine, but not at all well for propellers which underload an engine, and a better estimator has been derived for this case.

Variation of Wind Heeling Lever with Angle of Heel

Various regulatory authorities allow different variations of the heeling lever due to wind with angle of heel: the IMO Severe Wind and Rolling Criterion and the Australian Maritime Safety Authority both take the heeling lever to be constant, while the state regulatory authorities generally allow a lever which reduces as the cosine of the angle of heel. Robert McConachie is conducting wind tunnel tests on a model of a 24 m motor cruiser to see how the heeling lever varies with angle of heel, between angles of 45° to windward and 45° to leeward.

Plan Reviews

The degree plans in the Faculty of Engineering are all under review, as a result of a number of drivers:

- new requirements of the Academic Board for elective material;
- new requirements of the Dean of Engineering that all courses be 6 units of credit and that there be a flexible entry to Year 1 (i.e. an almost-common Year 1 for all of the Faculty of Engineering) [*just like there was forty years ago!* — Ed.]; and
- the establishment of a UNSW campus in Singapore, and the requirement by the Academic Board that transfer between campuses be without penalty.

As a result of the review, the new plan structures and courses will be introduced for Year 1 in 2006, and roll in progressively for those Year 1 students.

Multiple-criteria Entry

The Faculty of Engineering has introduced a new entry scheme that looks beyond just HSC exam results. Multiple-criteria entry involves potential students attending an interview to assess their suitability to the profession.

"Engineering is a professional discipline and, while academic performance is important, success in the field also depends on motivation, attitudes and commitment," said A/Prof. Tim Hesketh, Associate Dean in the Faculty of Engineering. "Through the multiple criteria entry program's interview process, we can assess a student's attitude and their ability in certain areas not measured in high-school examination assessment."

Students who believe that their UAI may fall in the range of 75–85 are encouraged to apply for an interview or to phone the Faculty of Engineering to talk it over. The inaugural round of interviews for entry to UNSW in 2006 will be held during the week commencing Monday 26 September 2005 at The University of New South Wales in Sydney, and in Canberra, Coffs Harbour and Dubbo.

Post-graduate and Other News

School Advisory Committee

The School Advisory Committee, which liaises with industry, has been reconvened after a lapse of a few years. Members include:

	Industry
Mr Phil Hercus	International Catamaran Designs
Mr Ron Beckett	Consultant
Mr David Cox	Qantas Airways
Mr Simon Ho	Trane Australia
Mr Lester Partridge	Bassett Applied Research
Mr Per Mellin	Electrolux Home Products Australia
Mr Klaus Roeske	Bishop Innovation
Dr John Wager	Consultant/Engineering Education Australia
	UNSW
Prof. H. Kaebernick	Head of School
A/Prof. P. Mathew	Executive Assistant to Head of School
Prof. E. Leonardi	Director of Research and Computing
Mr. P. Helmore	Director of Undergraduate Teaching
Dr. B. Kayis	Director of Postgraduate Teaching
Prof. G. Morrison	Director of Laboratories
A/Prof. N. Ahmed	Director of External Affairs
Prof. R. Randall	Director of research Training

The new committee met on 2 August and discussed a number of issues, including the new flexible first-year entry program, student attributes and their attractiveness to industry, and external income through research. The visit concluded with a tour of inspection of the laboratory building.

AGM Michell Award to Prof. Churches

On Friday March 18, Adjunct Associate Professor Alex Churches was presented with The AGM Michell Award 2005 for outstanding services to the profession of engineering. This is the highest award that the Mechanical College Board of Engineers Australia can bestow. Highlighted in the presentation was his work in creating, developing and promoting the annual Warman Design-and-Build Competition, which he began in the School of Mechanical and Manufacturing Engineering in 1987 and which is now a successful and highly-regarded national event, currently attracting entries from up to 20 universities (including two from New Zealand). The competition has focussed attention on the importance of good design in engineering and fosters innovation and creativity by all participants.

Phil Helmore

FAST'05

The Eighth International Conference on Fast Sea Transportation (FAST'05) was held in Saint Petersburg, Russia, from 27 to 29 June. As on previous occasions, the size of the Australian contingent at FAST'05 was most respectable with respect to our population.

Readers of *The ANA* will be pleased to learn that there is a large variety of high-speed vessels operating on the River Neva which winds through picturesque Saint Petersburg. The majority of these high-speed vessels are hydrofoils, which can be observed operating continuously during the daylight hours to nearby destinations. It is a remarkable achievement that these vessels now number approximately 800 and have been used on the many rivers in Russia for almost 40 years. These vessels are of the surface-proximity-foil type, which gain their vertical stability via the loss of lift suffered when the foil approaches the free surface of the water.

Meteor-class passenger hydrofoil on the River Neva, St Petersburg
(Photo courtesy Lawry Doctors)

A total of 134 papers was presented, of which nine were from Australia — a most commendable result. These papers were:

- *Developing High Speed Aluminium Ships to Meet Emerging Commercial and Defence Needs*, by John Rothwell (keynote paper).
- *On the Added Resistance of Catamarans in Waves*, by Tony Armstrong and Anton Schmieman.
- *The Waves Generated by a Trimaran*, by Prasanta Sahoo and Lawrence Doctors.
- *Transom-Stern Flow for High-Speed Craft*, by Kevin Maki, Lawrence Doctors, Bob Beck and Armin Troesch.
- *The Integration of Lifting Foils into Ride Control Systems for Fast Ferries*, by Alan Haywood and Benton Schaub.
- *Optimization of a Split-Cushion Surface-Effect Ship*, by Lawrence Doctors, Vidar Tregde, Changben Jiang, and Chris McKesson.
- *Global and Slam Loads for a Large Wavepiercing Catamaran Design*, by G. Davidson, Timothy Roberts, and Giles Thomas.
- *The Influence of Slamming and Whipping on the Fatigue Life of a High-Speed Catamaran*, by Giles Thomas, Michael Davis, Damien Holloway, and Timothy Roberts.
- *Validation of Non-Linear Wave Loads Predicted by Time Domain Method in Sea Trials of an 86 m Catamaran*, by Michael Davis, Damien Holloway, and Nigel Watson.

All aspects of high-speed marine vessels were covered, principally resistance, motions, wave loads, propulsion, environmental wave generation, structures and materials, operations, economics, safety and training. Types of vessels were monohulls, catamarans, trimarans, pentamarans, planing craft, hydrofoils, hovercraft, surface-effect ships and wing-in-ground-effect craft.

FAST'07 is scheduled for Shanghai, China, in September 2007. The exact dates have not been finalized as we go to press. Further information as the planning progresses can be obtained from Professor Cui WeiCheng at WCCui@cssrc.com.cn or Professor Lawry Doctors at L.Doctors@unsw.edu.au.

IMDS'05

FAST'05 was accompanied by the Second International Maritime Defence Show (IMDS) on 29 June to 3 July. There was a very interesting variety of Russian craft on display. Of particular interest to this writer was the world's heaviest hovercraft, the air-cushion landing craft, *Zubr*, designed and built by the Central Marine Design Bureau, Almaz.

The following table compares this craft with the British SRN4 (no longer in service), and the American LCAC (landing craft air cushion):

Craft	**SRN4**	***Zubr***	**LCAC**
Disp. (t)	300	550	150
Power (HP)	15,200	39,500	15,400
Speed (kn)	70	70	70
Payload (t)	94	90	60
Payload/Power (HP/t)	0.00618	0.00228	0.00390

It can be seen that the SRN4 had an efficiency approaching three times that of *Zubr*; the superior performance of the SRN4 was no doubt due to, in part, the excellent aerodynamic streamlining of the craft (both external and internal). Clearly, the SRN4 also possessed a very light-weight structure relative to its payload. It is also accepted that the LCAC could have been designed with a higher efficiency, had it not been severely constrained, in terms of its length and beam, in order to fit into a well-deck vessel.

Lawry Doctors

Air-cushion landing craft *Zubr* alongside at IMDS, St Petersburg
(Photo courtesy Lawry Doctors)

View on deck of *Zubr* showing one (of four) lift fans and two (of three) propulsion fans
(Photo courtesy Lawry Doctors)

Australian Maritime College

Ocean Engineering Degree — Industry Liaison Committee

The Bachelor of Engineering (Ocean Engineering) degree course team held one of its regular Industry Liaison Committee (ILC) meetings on 6 May. The members met and spoke with students currently enrolled in the course. The industry representatives, all of whom provided excellent input throughout the meeting, included Chris Carra (AMOG Consulting), Greg Miller (Clough Engineering) and David Provis (Lawson & Trelour). Also providing input to the ILC, but unable to attend this meeting were Neil Lawson (Lawson & Trelour), Alan Hill (Independent Naval Architect) and David Cooper (DNV).

International Activities

The Vice President (Academic & Research), Professor Tom Hardy, recently attended the Fifth International Waves Symposium on *Ocean Wave Measurement and Analysis* (WAVES 2005) in Madrid, Spain. WAVES 2005 offers a special opportunity for professionals, researchers, managers, and those with interest in coastal and ocean wave measurement and analysis to exchange information, present views and share case studies which will promote communication and technology transfer, improve design, wave climate statistics, theoretical hydrodynamics and practical solutions to many coastal challenges.

Jinzhu Xia visited Europe, Singapore and Perth during the months of May and June. He attended the following meetings at which he made presentations:

- Loads Committee meeting of the International Ship and Offshore Structures Congress (ISSC) in Oslo, Norway.
- Presentation to 20th International Workshop on Water Waves and Floating Bodies, Spitsbergen, Norway
- Invited lecture at the Norwegian University of Science and Technology
- Presentation to 24th International Conference on Offshore Mechanics and Arctic Engineering (OMAE 2005), Halkidiki, Greece

FAST 2005 Conference

A healthy Australian continent including Giles Thomas from the Australian Maritime College and Michael Davis from the University of Tasmania made the long trip to St Petersburg to attend the 8th International Conference on Fast Sea Transportation. After protracted difficulties surrounding registration and visa applications, both were relieved to finally make it to Russia and find that there actually was a conference. Whilst the organisers had drawn together an interesting collection of papers, including a suitable number on the local favourite topic of ekranoplans, they forgot to provide lunch. In addition, a lack of printed proceedings made following papers, and selection of which presentation stream to attend, difficult. Delegates were however treated to some traditional Russian hospitality and were able to enjoy the delights of vodka, ballet, amazing architecture and white nights. The conference delegates were drawn from universities, research centres, classification societies and industry, with a large contingent from the US Office of Naval Research due to their strong interest in high-speed craft developments and their possible military applications. The presented papers focussed on the design, research and development of high-speed marine vehicles, including recent developments in experimental and analysis techniques. It should be noted that FAST'07 will be held in Shanghai, China.

Giles Thomas presented two papers on the fatigue life of large high-speed catamarans and load assessment for the new 112 m Incat catamaran design. Giles also paid a visit to the UK where he met up with Dr Martin Renilson at Qinetiq.

Attendance at the Simulation Industry Conference

SimTecT is an annual simulation conference and exhibition held under the auspices of the Simulation Industry Association of Australia. This year the event was held at the Sydney Convention and Exhibition Centre over the period 9–12 May. The conference attracted around 400 delegates from a wide range of simulation and training disciplines. Jonathan Duffy attended the conference and presented a paper titled *Prediction of Bank Induced Sway Force and Yaw Moment for Ship-Handling Simulation*. This paper summarises research conducted by Jonathan to enhance the mathematical model in the AMC Ship-handling Simulator. The paper was well accepted and generated interest amongst conference delegates.

Presentation to RINA (NSW Section) and IMarEST (Sydney Branch)

Gregor Macfarlane made two presentations to the RINA Australian Division (NSW Section) and the Institution of Marine Engineering, Science and Technology (Sydney Branch). One presentation was on *Low Wash Hullforms* which included some of Alex Robbins' MPhil work in this field (at Alex's request) and Gregor's own research in this field. The second presentation was on the *Major Upgrade to AMC's Towing Tank*, which is now back in full operation and has a heavy workload for the next 3 months. The content of these talks is covered in more detail in the NSW Section report. While in Sydney, Gregor also met with staff of Energetech Australia who have contracted the Ship Hydrodynamics Centre team to conduct a number of experiments for a wave-energy converter in the Model Test Basin over the past two years. A site visit was also made to the prototype wave energy converter in Port Kembla.

Final Year BE Research Theses 2005

A large variety of final-year projects is being undertaken by naval architecture and ocean engineering students at present. A selection of these projects is briefly described below.

An Investigation into the Slamming of High-speed Craft through Computational Fluid Dynamics is being carried out by James Clarkson under the supervision of Giles Thomas. This work, in collaboration with Revolution Design and the University of Tasmania, is using the CFD package Comet to predict the slamming pressures of wedges undergoing water impact. The analytical predictions will be compared with results from model drop tests conducted at the University of Tasmania.

Iain Larkins is investigating *The Controllability of Racing Yachts Sailing Downwind in Large Waves*. Under Giles Thomas' supervision, Iain is writing a prediction model to estimate the yawing moment experienced by a yacht

when sailing in following seas. Towing tank tests have been carried out to provide experimental validation of the theoretical predictions. Iain is being assisted in his experimental program by Aurélien Lefevre, an intern student from ENSIETA, France. Another ENSIETA intern student, Bertrand Minguet, is carrying out an investigation into the motions of catamarans in waves under the supervision of Prasanta Sahoo.

AMC has played a role over the past two or three years in the investigation of a few hydrodynamic issues related to the Energetech Australia prototype wave energy converter for Port Kembla. This association has continued with a final year research project by Adrian Parkins, under the supervision of Gregor Macfarlane and Dr Tim Finnegan of Energetech. Adrian is a final-year student in the Ocean Engineering degree and the primary aim of his study is to investigate the effect of the shape, width and length of the wave wall on the wave elevations in the critical regions around the oscillating water column. The study is also predicting the wave loads on the wave wall. A series of physical scale model experiments has been conducted in AMC's model test basin in order to validate some numerical predictions obtained from the Bureau Veritas software package, HydroStar.

Thor Schoenhoff, a naval architecture student, is investigating *The Effect of Initial Trim on Steady-state Vessel Squat* for his final year research project, under the supervision of Jonathan Duffy. Thor has the honour of being the first to conduct a series of model scale experiments in the 'new' upgraded AMC Towing Tank. The aim of his experiments is to quantify the effect of initial trim on squat for a series of water depth to draught ratios, vessel speeds, vessel displacements and two hull forms. One of the aims is to investigate whether the under-keel clearance of a vessel can be maximized by loading with an initial trim. As a vessel moves forward, the changes in pressure distribution over the hull cause it to sink and trim. The combined effect of the sinkage and trim is known as squat. This may cause a vessel to ground in extreme cases and is becoming an escalating problem as the demand for large vessels increases. Accurate prediction of vessel squat is very important to ship operators to enable maximum cargo carrying capacity, whilst avoiding the risk of grounding. Many empirical formulae exist for the prediction of steady-state squat, but very few account for the effect of initial trim.

AMC/RINA Seminar Series — Semesters 1 and 2 2005

The AMC/RINA Engineering Seminar Series provides a presentation every week during academic semesters. Presentations during the 2nd Semester will generally be held every Thursday at noon in the AMC Auditorium. The most recent presentations have included:

LCDR Glen Miles and LCDR Matt Butcher from HMAS *Collins* presented a seminar in May. Their talk covered a variety of aspects including the design and operation of the Collins-class submarines.

Gordon MacDonald, of BMT Australia, gave a presentation on systems engineering.

Frank Bethwaite, of Bethwaite Designs and Virtual Sailing, gave a presentation on recent developments in high-performance sailing.

Conrad Ermert, Paul Sincock, Hayden Marcollo, Colin Paton, Suzanne Hayne (AMC BE graduate), Jonathan Schulz (AMC BE graduate) and Will Shanasy, all staff of AMOG Consulting in Melbourne, made a visit to AMC to meet with 3rd and 4th year engineering students. They made a number of presentations to the students and staff, convened an ocean-engineering design workshop, met with AMC staff and had a tour of AMC facilities. A lunch for about eighty 3rd and 4th year engineering students and AMC staff was held in the AMC Seafarers Bar with all food and beer provided by AMC and AMOG.

Bruce Cartwright, an AMC PhD Student, gave a presentation on the evaluation of Smooth Particle Hydrodynamics (SPH) for ship studies.

Dr Tristan Perez, a post-Doctoral Fellow from NTNU, Norway, gave a presentation on marine control engineering, *An Overview of Marine Systems Simulator — Simulink® Toolbox for Marine Control Systems*.

Gregor Macfarlane gave a presentation on the *Major Upgrade to AMCs Towing Tank*.

Research into Asymmetric and Nonlinear Loads on High-speed Catamarans

Two PhD students have recently commenced work on the ARC linkage project *Asymmetric and Nonlinear Loads on High-speed Catamaran Vessels*. This project is a collaborative venture between Incat Tasmania, Revolution Design, the University of Tasmania and the Australian Maritime College. Shinsuke Matsubara has enrolled at the AMC and will focus on the determination of global loads experienced by large high-speed catamarans, whilst Jason Lavroff, at the University of Tasmania, will study the problem of slamming.

Engineers Australia Re-accreditation of AMC Engineering Degrees

The Bachelor of Engineering degree programmes provided by the Australian Maritime College recently underwent accreditation by Engineers Australia under the panel chairmanship of Professor Doug Hargreaves of Queensland University of Technology. The three courses (naval architecture, ocean engineering, and maritime and offshore systems) were formally accredited for a further five-year period.

Ship Hydrodynamics Centre (Towing Tank Upgrade)

It is pleasing to report that the major upgrade of the AMC Towing Tank has been successfully completed, on time and on budget. The official handover date was slightly delayed to 10 June 2005; however, this did not overly affect the re-commissioning and validation period, with the first official experiments commencing just six days later. It is now business-as-usual with a heavy list of bookings over the coming three or four months.

Building works on the ground and first floor of the extension to the Swanson Building are continuing, with an expected completion of the entire project on 12 September 2005.

The tank has been extended in length from 60 m to 100 m, doubling the effective test length. Major modifications have been made to the testing carriage, including structural stiffening and vibration reduction. Along with the structural changes there has been an upgrade to the data acquisition system, dynamometry equipment, new workshops and of-

fices. Photos showing various stages of the tank upgrade can be found at www.amc.edu.au/facilities/towing.tank/upgrade/.

Following the successful completion of this facility upgrade, the Manager of the Towing Tank (and Model Test Basin), Gregor Macfarlane, will commence an extended period of leave from this role as of the start of September 2005. Gregor plans to take some study leave to reacquaint himself with his research into vessel-generated waves and take a few months' long-service leave. He intends returning to his role as facility manager in March 2006.

From 1 September 2005 (and for a period of approximately six months), please contact either Jonathan Duffy (03 6335 4899 or j.duffy@amc.edu.au) or Richard Young (03 6335 4887 or r.young@amc.edu.au) for all Towing Tank or Model Test Basin enquiries.

Gregor Macfarlane
Giles Thomas
Jonathan Duffy

ALAN PAYNE FOR AMERICA'S CUP HALL OF FAME

The late Australian naval architect, Alan Payne (1921-1995), has been named as one of the 2005 inductees to the America's Cup Hall of Fame. The inductees will be honoured on the occasion of the Rolex America's Cup Hall of Fame 13th Annual Induction Ceremony to be held Friday 14 October 2005. This black-tie dinner, sponsored by long-time supporter, Rolex Watch USA, will be held at the St. Francis Yacht Club, San Francisco, USA

Halsey C. Herreshoff, President of the America's Cup Hall of Fame will preside over the Induction Ceremony.

Alan Payne designed *Gretel* and *Gretel II*, two of Australia's first America's Cup challengers. When Australians decided to venture into the America's Cup, there were few Australian naval architects capable of designing twelve metre yachts. No boat of this type had ever been designed and built in Australia. Alan Payne served an apprenticeship at Cockatoo Dockyard in Sydney studied naval architecture at Sydney Technical College. In 1945 he was the only Australian naval architect to devote all of his business to yacht design, both sail and power. His 16.8 m *Solo* won the Sydney Hobart yacht race in 1955.

Alan Payne, having created fast lines for numerous racing craft, was the logical person to elevate Australia to competitive America's Cup status. He set to work on a four-year project in which he analysed the lines of *Vim*, America's best trial horse, brought to Australia by Sir Frank Packer. He proceeded to test a total of 30 models while developing *Gretel's* design.

In the 1962 America's Cup, *Gretel* gave *Weatherly* a run for her money. *Gretel* was hugely admired for her superiority in fast downwind sailing. This quality won a race for Australia, and nearly a second race, in a tight series in which Bus Mosbacher and *Weatherly* defended the Cup for the New York Yacht Club. In 1970, Alan designed *Gretel II* for Packer and skipper Sir James Hardy. The new design proved to be an even more dangerous challenger. Racing against *Intrepid*, which had won the Cup three years earlier, *Gretel II* was in contention in the first race until a crewmember fell overboard. The Australian boat won the second race on the water, but lost it in the protest room. After *Intrepid* won the third race, *Gretel II* took the fourth before losing the series in the fifth. Alan maintained his involvement with the Cup after 1970, designing the 1983 challenger *Advance* and consulting for a defence syndicate in 1987. Alan Payne has been selected for membership in the America's Cup Hall of Fame for his tremendous dedication to America's Cup designs.

The America's Cup Hall of Fame was created to honour the challengers, defenders, and legendary personalities of the world's most distinguished sporting competition. The present prototype Hall of Fame is located in an historic building on the grounds of the former Herreshoff Manufacturing Company in Bristol, Rhode Island, where yachts were constructed for eight consecutive America's Cup defences between 1893 and 1934. The Herreshoff Marine Museum, situated on this historic site, operates the America's Cup Hall of Fame.

Commencing with the first induction ceremony in 1993, sixty-two legends of the Cup have been selected for membership in the Hall of Fame. Candidates eligible for consideration include skippers, afterguard, crew, designers, builders, organisers, syndicate leaders, managers, supporters, chroniclers, race managers, and other individuals of merit. Each nominee is judged on the basis of outstanding ability, international recognition, character, performance, and contributions to the sport. The twenty-one members of the Hall of Fame Selection Committee bring a wealth of knowledge to the selection process. This illustrious international group is made up of persons intimate with the America's Cup tradition of yacht racing and committed to the integrity of the Hall of Fame. The America's Cup Hall of Fame is honoured to conduct its yearly induction ceremonies in conjunction with Rolex Watch USA

The America's Cup Hall of Fame is dedicated to preserving and demonstrating the influence of America's Cup Competition, for the purpose of education and the inspiration of excellence in the world of yachting.

Dana Paxton

A CENTURY OF HYDROFOILS — ENRICO FORLANINI

Martin Grimm

This year marks the centenary of the operation of the first fully foilborne manned hydrofoil. The hydrofoil was one of a series of 'hydro-aeroplanes' designed and built by the Italian engineer, inventor and helicopter and airship pioneer, Enrico Forlanini.

To mark the occasion, this tribute to Enrico Forlanini has been compiled from various articles and website references, but primarily The Hydro-aeroplane Boats of Enrico Forlanini and *written by George Zangakis, and which appeared in the January 1963 issue of* Hovering Craft and Hydrofoil.

Enrico Forlanini was born on 13 December 1848 in Milan, Italy. In 1870 he graduated from the Scuola di Applicazione del Politecnico di Milano. He was a man of many interests.

On 15 April 1877, a steam-engine driven helicopter model built by Forlanini rose approximately 12 m from the ground after a vertical take-off from a park in Milan. This is believed to be the first helicopter with an engine to become airborne. The machine weighed 3.5 kg. The upper of its pair of two-bladed coaxial rotors was powered by a two-cylinder 0.15 kW steam engine. The lower rotor was rigidly attached to the fuselage so that the complete machine revolved. Just before takeoff, the spherical steam accumlator was charged with 10 atmospheres of pressure, enabling the craft to rise and remain aloft for 20 seconds. The model was exhibited at the Olympia International Aero Exhibition during 16–27 July 1929.

In 1885 he built an aeroplane model which took off, by means of a gunpowder tube, along two steel wires. It is recorded that the model reached a height of 183 m in twenty to twenty-five seconds. This model was also exhibited at Olympia in 1929.

Possibly as early as 1877, Forlanini started experiments with hydrofoils, which he referred to as hydro-aeroplane boats. Initially, the experiments were in the form of a series of model tests, from which he arrived at several simple mathematical relationships. Subsequently he built a full-scale hydrofoil, based on a ladder system of foils and fitted with a 44.7 kW engine driving two counter-rotating air props. During testing on Lake Maggiore in 1906, this craft reached a top speed of 36.9 knots.

During the period 1905–1914, Forlanini designed and built a number of semi-rigid airships. Notably, in 1909, *Leonardo da Vinci* and, in 1912, *Citta di Milano*, dedicated to his mother town. The latter showed exceptionally good stability and controllability which gained Forlanini international recognition. Three were ordered by the British Government, but due to the outbreak of the 1914–1918 war, they were never delivered.

In 1911, Forlanini found his first hydrofoil client. During Alexander Graham Bell's world tour, he and 'Casey' Baldwin met with Forlanini and were given the opportunity to ride in one of his hydro-aeroplanes on Lake Maggiore. Baldwin described the ride as smooth as flying. Bell was sufficiently impressed with the concept that, on returning to Canada, he purchased a licence to build and develop the Forlanini ladder-foil system in North America. Among Bell's other associates in this venture were Glenn Curtiss, Lieutenant Selfridge and John McCurdy. Bell and Baldwin developed a number of designs, called hydrodromes, culminating in the HD-4, which set a world water speed record of 61.57 knots in September 1918.

Enrico Forlanini died on 9 October 1930 in Milan at the age of 81 years, while still working on the design of a new flying machine with the same passion and ardor of the early years. The city of Milan has dedicated its city airport, Linate Airport, as "Airport Enrico Forlanini" in his honour.

The Hydro-aeroplane Boats of Enrico Forlanini

It is known that a model of the craft shown in Figure 1, weighing approximately eleven pounds, was built and tested experimentally. The main cylindrical body, formed from sheet material, was closed at both ends by conical caps. Laterally extending tubular arms screwed into threaded sockets on the main body, till locked in position by setscrews. The outer part of each arm was provided with sockets to house vertical rods supporting a number of slightly concave foils. The sockets permitted the rods to be moved through a small angle, and locked in the position desired by set screws. A rear extension carried a variable position rudder.

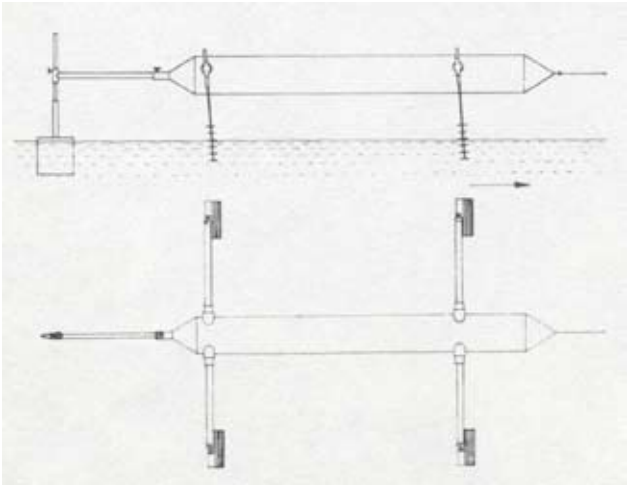


Figure 1 — Forlalini's first model

The model was towed at speeds varying between approximately 1.0 to 3.0 m/s, and the height of the main body rose above the surface of the water by between 75 and 150 mm depending on towing speed. Resistance of the model measured by the tension in the towing rope did not exceed approximately 1.5 pounds (6.7 N) which was one-seventh (14%) the total weight of the model.

Figure 2 illustrates the next experimental stage. Three tubes were connected together by cross bars which carried foil attachments in a similar manner to that shown in Figure 1.

Experiments made by towing this craft at speeds varying between 5 and 7 m/s enabled Forlanini to arrive at the following approximate formulae for constructing a practical and operative craft:

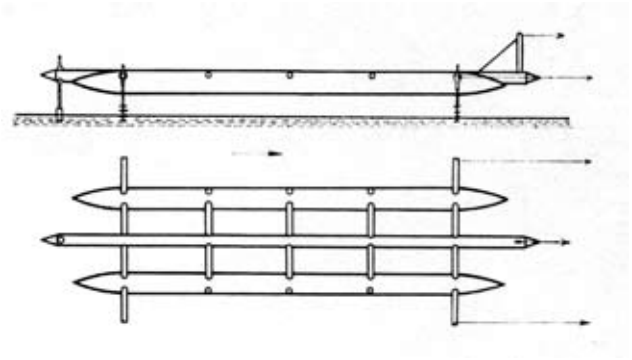


Figure 2 — Forlanini's second model

$P = (12 + 425X - 1250X^2)\ AV^2$, and
$S = (1.20 + 100X^2)\ AV^2$

where

P = All-up weight of the craft in kilograms
A = Total foil area in square metres
V = Speed of craft in metres per second
S = Tow force in kilograms

From these formulae, differentiating, it results that the maximal ratio P/S is obtained when X = 0.063, which Forlanini stated was confirmed very well in practice.

Using this value the formula gives:

$P = 34AV^2$
$S = 1.6AV^2$

so that P = 21S approximately.

The last equation shows that the horizontal force required to propel the craft is as low as 1/21 of the total weight of the craft.

A document prepared by Forlanini states:

"The weight, P, that can be supported by a certain blade having a certain inclination is substantially proportional to the square of its speed (V^2). The resistance, S, of the blade during the travel of the machine, which is to be overcome by the propeller, is also substantially proportional to the square of the speed (V^2). The resistance of a number of superimposed submerged blades is therefore proportional to the number. If my machine travels at an increasing speed (V) the number of the supporting blades travelling below the surface of the water will decrease proportionally to the square of the speed (V^2). There is, therefore, an increase of the resistance of the machine proportionally to V^2, on account of the increased resistance of the different blades and, at the same time, a decrease of the resistance of the machine also proportional to V^2, on account of the decreased number of submerged blades. It follows, therefore, that the resistance of the machine is independent of its speed, and that, furthermore, the energy [actually power] required for propelling my machine is proportional to its speed. This conclusion is also applicable theoretically to other machines sustained more or less, but never totally, by the dynamic reaction of the water but, for such other machines, the reality does not respond to the theory, because the surface emerging from the water with the increasing of V remains always very near to the water and, therefore, always more or less exposed to its resistance, this fact annulling the principal characteristic of such kind of apparatus that is to be exposed to a resistance, S, constant and independent from V. My apparatus on the contrary is provided with water-blades which are disposed at different levels in such a way that when, by the increasing of V, some or all of them become superfluous as supports of the apparatus and withdraw from the water, they get far away from the same and are entirely and continually out of contact therewith. My apparatus realises therefore, and for the first time, practically and effectually the above mentioned law, on the constancy of the resistance independently of V.

It will be readily understood that the values P and S vary according to the depth to which the blade is submerged, and they have their smallest measure when the blade just glides with its front edge over the surface of the water. The values are increased by 60% if the blade is what may be termed a deep blade, that is, if it is submerged to a depth about equal to its length, the length of the blade being, in this case, its dimension in the line of travel."

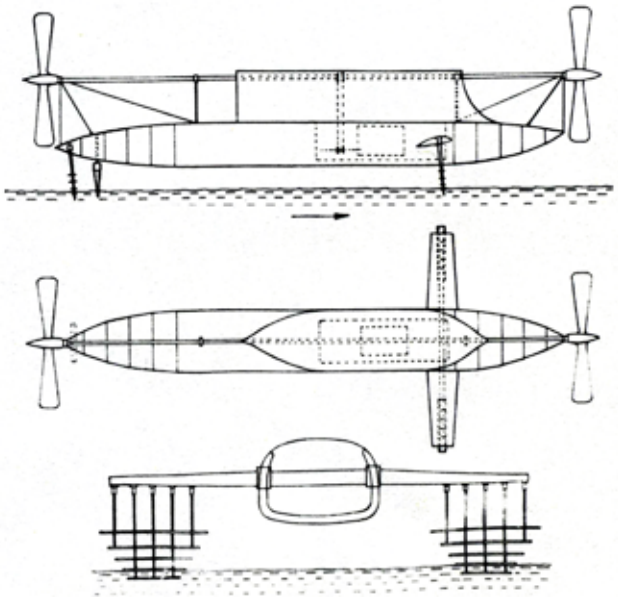


Figure 3 — Forlanini's craft No. 3

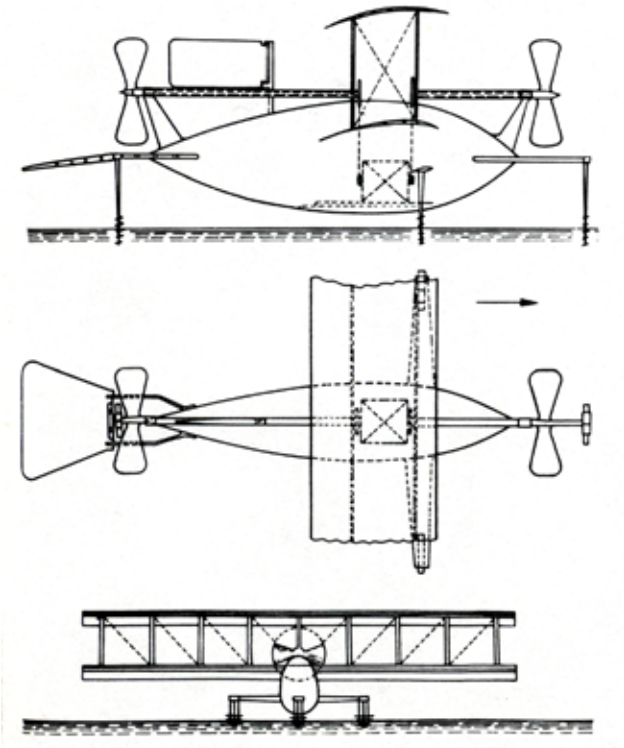


Figure 4 — Proposals for incorporating foils with aircraft

Figure 3 illustrates a craft weighing approximately 1.2 t, having a 44.7 kW engine and designed to operate at a speed of 48.7 knots. The craft was driven by contra-rotating, coaxial airscrews, one at each end of the craft. It is understood that this craft was tested on Lake Maggiore between 1905 and 1911 and was reported to have attained a speed of 36.9 knots.

It appears from photographs that, at a later stage in the development of these craft, the air propellers were replaced by a water propeller mounted from a strut near midships.

The ladder foils of varying length and width were supported by rotatable beams and located at a considerable sideways distance from the main body of the craft to ensure the best possible transverse stability.

Forlanini obtained a number of British and American patents on his ideas and designs, most of which were aimed at seaplane applications. Figure 4 shows diagrammatically Forlanini's proposals for incorporating foils on aircraft. Many variations of the basic design were suggested by Forlanini and some of them can be seen in the illustrations forming part of his British Patent 7603/1905 and U.S.A. Patent 1,112,405.

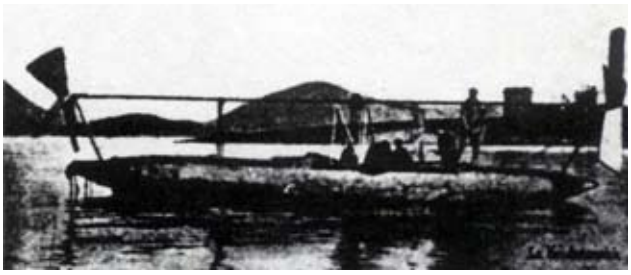


Figure 5 — Photograph of hydrofoil driven by counter rotating air propellers

Figure 6 — Photograph of hydrofoil driven by water propeller running foilborne

FROM THE CROW'S NEST

Hydrometer Supply and Calibration

How long is it since you had to buy a new hydrometer? As a result of the recent accidental demise of a faithful hydrometer and its necessary replacement, some current sources of supply and calibration service have poked their topmasts above the horizon.

Metal loadline hydrometers are available from G.H. Zeal in the UK, made to order with a four-week delivery, and are priced at £180 plus freight of £45, total £225 ≈ $540. Contact Vaughan Rivett on phone +44-20-8542 2283, fax 8543 7840 or email vaughan.rivett@zeal.co.uk.

Relative density hydrometers (like loadline hydrometers) measure the density of a liquid relative to pure fresh water and are available from several scientific-supply sources. The term relative density is preferred; "specific gravity" has been deprecated for many years due to the common scientific usage of the term "specific" to mean "per unit mass" making the term "specific gravity" meaningless. Relative density is converted to an actual density by multiplying by the density of pure fresh water at the temperature of the measurement.

Two known sources of relative density hydrometers are Carlton Glass Company Pty Ltd, 35 Commercial Rd, Maroochydore, Qld 4558, phone (07) 5443 4544; and Extech Equipment Pty Ltd, 2 Langworth Ave, Boronia, Vic 3155, phone (03) 9761 3300, email extech@extech.com.au or website www.extech.com.au (which shows a range of hydrometers, some with inbuilt thermometers).

Draft survey hydrometers measure apparent weight (i.e. weight in air, in kgf/L), but the result can be converted to a measurement of relative density (see *The ANA*, April 1998). Draft survey hydrometers are available from G.H. Zeal in the UK (see their website www.zeal.co.uk, which shows a draft survey hydrometer) for £45 plus freight. The same hydrometers are available directly from Zeal's Australian agent, Arthur Bailey Surgico Pty Ltd, 55 Lilyfield Rd, Rozelle, NSW 2039, phone (02) 9555 1588, fax (02) 9555 9130 for $180 including GST.

How much accuracy do you need? The temperature corrections tend to be small for the usual range of water temperatures in Australia. If you deal only with small vessels, say less than 100 t displacement, then a $10 or $20 hydrometer may suffice. At the other end of the scale, if you are inclining or draft surveying large vessels, then you need all the accuracy that you can get and, with care, you can get five significant figures from a good-quality hydrometer.

How long is it since your hydrometer was last calibrated? One known source for calibration is H.K. Calibration Services, 4/20 Loyalty Rd, North Rocks, NSW 2151, phone (02) 9630 2544, fax (02) 9630 2823, email hkcalib@hotmail.com, website www.hkcalibration.citysearch.com.au. Calibration comes at a cost of $165 per temperature point, or $325 at two points (say, the upper and lower temperature limits required).

Australian Government Analytical Laboratories last year merged with the National Measurement Laboratory and the National Standards Commission to become the National Measurement Institute, but they no longer calibrate hydrometers (and have not done so for some years).

It therefore looks like it is still cheaper to buy a new hydrometer than to re-calibrate the old one! Regular calibration of hydrometers is still required; within the year prior to the date of the inclining experiment by the USL Code, and within two years for a metal hydrometer or five years for a glass hydrometer by Marine Orders, although it is not known how rigorously this is checked by survey authorities at inclining experiments.

With the new stability section of the National Standard for Commercial Vessels due out for public comment in early September, the required calibration interval for hydrometers and the rigour with which calibration is checked could be areas for your comment.

Phil Helmore
John McKillop

Australian Coasting Trade Permits

At present, the Australian Department of Transport and Regional Services (DOTARS) can allow foreign-flag vessels to trade between ports in Australia carrying local produce. A Single Voyage Permit (SVP) is required to ply this "coastal trade".

In a bid to improve the standard of vessels which qualify for a SVP, changes in the requirements have recently been introduced. Ships issued with permits are expected to meet the standards of safety and working conditions of the international conventions to which Australia is a party. In addition, ships issued with permits are liable for Port State Control inspections by the Australian Maritime Safety Authority (AMSA).

DOTARS advises that it will not be in the public interest to issue permits to vessels with poor safety or environmental protection records. It is a condition of issue of coasting trade permits that further permits will not be issued for any ship:

- if detained by AMSA, during a period of 6 months after the end of the detention period (and if twice detained by AMSA, no further permits will be issued);
- alleged to be responsible for a pollution incident for which a prosecution action is pending or under way; or
- responsible for a pollution incident proven at law.

Further details can be obtained from the DOTARS web site at www.dotars.gov.au

Nautical Knowledge

Here is a test of your nautical knowledge. A friend recently called, wanting to know the answer to a crossword-puzzle clue: "meeting of vessels at sea", in three letters?

The answer turned out to be "gam".

The Macquarie Dictionary has this to say: "gam = nautical term, a social meeting, visit, or the like, as between vessels at sea".

The *Oxford English Dictionary* (online at www.oed.com) expands this as "a social meeting of whalers at sea. Gam is the word by which they designate the meeting, exchanging visits, and keeping company of two or more whale ships, or a sociable family of whales. In 1851, Hermann Melville (author of *Moby Dick*) in *Whale* II xi 75 wrote "What does the whaler do when she meets another whaler in any sort of decent weather? She has a gam."

Hands up all those who knew the answer!

Phil Helmore

INDUSTRY NEWS

Wärtsilä 46F Engines for Wagenborg Feeder Containership

Wärtsilä Corporation won a contract in April to supply two of the new Wärtsilä 46F engines to power an Ice class 1A, 1700 TEU open-top container feeder vessel ordered by the Dutch shipowner Wagenborg Shipping, a member of the Royal Wagenborg group.

To be built by the Kinderdijk shipyard of IHC Holland Dredgers BV in the Netherlands, the vessel will have dimensions of 167 m length between perpendiculars and 23.7 m breadth, and have a draught of 7.7 m. Her hatchless design will ensure fast turnround times in port, while a speed of about 21 knots will give short transit times. The vessel is scheduled for delivery in mid 2006 and will be mainly employed in northern European waters.

Wärtsilä is to supply the ship with both the two main engines and a controllable-pitch (CP) propeller. The main engines are six-cylinder Wärtsilä 46F engines each with a maximum continuous power of 7 500 kW at 600 rpm. They will drive a single, 5.35 m diameter Lips CP propeller through a combining reduction gearbox. The Lips propeller will be equipped with the latest, compact E-type hub resulting in higher efficiency.

This solution with twin engines driving a single CP propeller provides flexibility in operation on either one or both main engines to provide excellent fuel economy over a wide range of ship speeds.

Wagenborg is one of the largest shipowning groups in Europe of vessels between 1000 and 20 000 t deadweight. Most of the vessels in its fleet are equipped with Wärtsilä engines and Lips propellers.

The new Wärtsilä 46F engine was launched at the SMM marine exhibition in Hamburg in autumn 2004. It offers reliable, compact and economic power based on a further refinement of proven design concepts, complemented by new value-adding features like best in class fuel and lube oil consumption.

Initially available in six-, seven-, eight- and nine-cylinder in-line configurations, the Wärtsilä 46F covers a power range of 7 500 to 11 250 kW at 600 rpm.

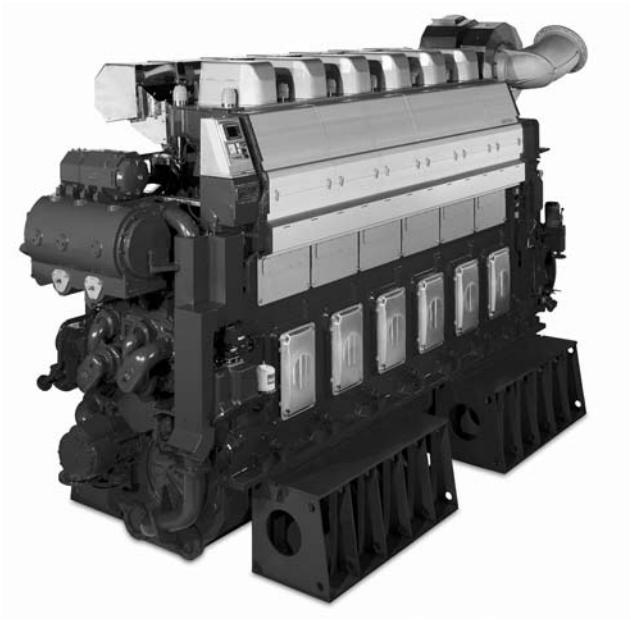
The output of 1250 kW/cylinder enables the engines to have fewer cylinders than alternative engines for a given output. This makes optimum use of space in ships, and reduces the maintenance required.

The Wärtsilä 46F has common-rail fuel injection as a standard, which offers almost unlimited possibilities to adjust the fuel injection process to prevailing engine operating conditions, fuel characteristics and local emission requirements. The Wärtsilä 46F is also available with more conventional fuel-injection equipment. In this case the injection equipment is based on injection pumps of the double plunger type which have been used with good experience on other Wärtsilä engines.

New monitoring technology has been introduced for the continuous measurement of bottom-end bearing temperatures. These are combined with the temperatures of main bearings and exhaust gases to provide real-time

monitoring of engine performance in critical areas. These temperatures and other parameters can also be fed into Wärtsilä's Condition Based Maintenance (CBM) service which is available to Wärtsilä engine users.

The Wärtsilä 46F follows the design philosophy in all new-generation Wärtsilä engines of having modular built-on systems, including the lubricating oil cooler, filter and pump, as well as cooling water pumps and thermostatic valves.



The 6-cylinder Wärtsilä 46F engine
(Image courtesy Wärtsilä)

Panama Tugs with Wärtsilä Power

In the middle of June, Wärtsilä Corporation was awarded a contract by Cheoy Lee Shipyards Ltd, Hong Kong, for the supply of propulsion plants for seven 60-tonne bollard pull Z-Tech tugs contracted by the Panama Canal Authority (ACP).

The award-winning Z-Tech Concept was developed initially for PSA Marine (Pte) Ltd of Singapore by the Canadian naval architects, Robert Allan Ltd. Among the unique features of the Z-Tech tugs are equal bollard pull and speed forward and aft, a safe, flat working deck and a "sea-going" stern for towing in "tractor" mode.

The tugs are being built at Hin Lee (Zhu Hai) Shipyard Co. Ltd at Doumen, Zhuhai, in Guangdong province, China, the yard being owned by Cheoy Lee Shipyards. The tugs will be delivered during the second half of 2006 and in 2007.

The Z-Tech tugs are a modified azimuthing stern-drive type, measuring 27.4 m in overall length by 11.5 m in breadth, with a nominal bollard pull of 60 t and a free-running speed of 12.8 kn.

They will be employed escorting and assisting ships in the Panama Canal. For each tug Wärtsilä will deliver a 3 600 kW propulsion plant comprising twin 9-cylinder in-line Wärtsilä 20 engines, each driving a Lips can-mounted steerable thruster having a fixed-pitch propeller in a high-efficiency HR-nozzle.

The engines will be resiliently-mounted in the tugs. Minimum smoke operation is important for these tugs, and a particular requirement for the engines is that they must be able to accelerate from standstill to full ahead within 12 seconds without heavy smoking.

Lips can-mounted steerable thrusters are of robust design with high thrust-to-power ratios. Their propellers are of efficient design and mechanical losses are low. The bearings and gears have long lifetimes. Oil leakage and water ingress are prevented by high-quality seals throughout. The thrusters are arranged for ease of maintenance, with the thruster being mounted into its well from above as one unit so that it can be withdrawn for maintenance while the vessel is afloat.

First Wärtsilä Auxpac Generating Sets

Wärtsilä Corporation delivered the first two Wärtsilä Auxpac generating sets in April 2005. Introduced in September 2004, Wärtsilä Auxpac is a standard, pre-commissioned generating set designed to provide auxiliary electricity on board marine vessels. The new concept, with its key advantages of fast and easy installation, proven reliability, and easy maintenance, has already proved highly popular. To date, Wärtsilä has more than 200 Wärtsilä Auxpac generating sets on order, some 70 of which are destined for China.

The first two Wärtsilä Auxpac 20 generating sets, both of 6-cylinder configuration, were supplied from the Wärtsilä factory in Vaasa, Finland to Shanghai Zhenhua Port Machinery Co. Ltd, China, for installation on a new 4000-tonne heavy-lift ship being built at the Jing Jiang Eastern Shipyard for Guangzhou Salvage Bureau (under MOC). The vessel measures 167.5 m long overall, 165 m long BP, 48 m in breadth, and 16 m deep, with a draught of 11.5 m. The heavy lifter will be delivered in April 2006. Several other Chinese companies are reported to be considering building similar vessels.

Wärtsilä will also deliver three 6-cylinder Wärtsilä 32 main engines for diesel-electric propulsion for the same vessel, as well as two Lips steerable thrusters of 1500 kW each for propulsion, running in Lips HR nozzles, and one Lips tunnel thruster. This propulsion package was ordered last autumn.

Features of Wärtsilä Auxpac

Wärtsilä Auxpac is a pre-commissioned standardized generating set based on a modular design. Its purpose is to ensure the availability of sufficient shipboard electrical power when needed. Typical applications include general cargo and container vessels, tankers and VLCCs.

Wärtsilä Auxpac generating sets are supplied in medium-speed and high-speed configurations with outputs from 60 to 2850 kWe for either 50 or 60 Hz operation. The medium-speed range covers an output range from 520 to 2850 kWe and the high-speed range from 60 to 1630 kWe.

The medium-speed generating sets, running on heavy fuel oil, are based on Wärtsilä 20 and 26 engines. These engines are well proven in shipboard auxiliary service and are supplied for operation on the same heavy fuel oil as the ship's main engines. The high-speed Wärtsilä Auxpac range, running on marine gas oil, is based on co-operation with Volvo Penta, through which Wärtsilä will sell and service large Volvo Penta engines for commercial shipping applications.

Wärtsilä Auxpac generating sets are delivered ready for

installation. They are fully outfitted with all necessary ancillary equipment such as pumps, electrical and control systems. The generating sets are put through a well-defined factory-acceptance test which can also include parallel running when multiple sets are being supplied.

The generating sets are designed for resilient mounting in the ship's hull for easy installation and alignment and for lower structure-borne noise.

ShipConstructor's New Parametric-like DDROM Technology

Albacore Research Ltd (ARL), the creator of the 3D product modeling software ShipConstructor, is putting the last touches on this year's new software version, ShipConstructor 2006, scheduled for release towards the end of 2005. ShipConstructor 2006 represents a quantum leap in CAD/CAM with the introduction of the Database Driven Relational Object Model (DDROM) technology, as well as an Application Programming Interface (API). While DDROM will provide ShipConstructor users with a 'better-than-parametric' technology, the API will make it easier for users and third-party developers to tie into the ShipConstructor product model database.

DDROM and other new features will be presented at the SNAME Annual Meeting in Houston — at the booth as well as during the Innovation Sessions. Furthermore, ShipConstructor 2006 will be presented at NEVA Russia, Kormarine, Europort Rotterdam, Pacific Expo, Workboat Show and Marintec China later this year.

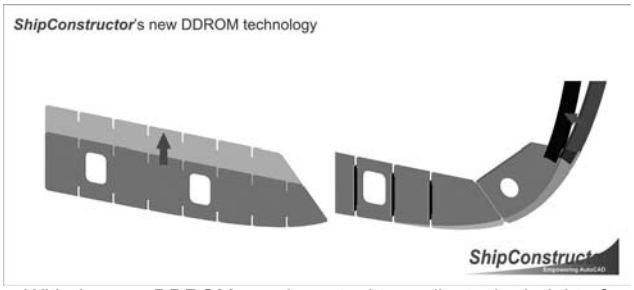
Database Driven Relational Object Model (DDROM)

ShipConstructor's Database Driven Relational Object Model (DDROM) is an exciting new technology which will transform how shipyards and offshore yards design and fabricate. DDROM is similar to parametric modeling, but does not come with all its 'headaches'. In contrast to parametric technology, the powerful DDROM will be usable by designers without extensive training — in fact, relationships within the product model are created automatically. Furthermore, the technology works for even the most complex projects while still running on standard PCs. Thus, parametric-like features will be available on a much more comfortable and workable level.

DDROM's secret lies in storing all geometry in the ShipConstructor database and linking their dependencies automatically. Storing geometry in the database means that all structural, pipe, HVAC and other ShipConstructor entities can be accessed and changed directly in the database. DDROM entities are not only represented in the database with their geometry, but also with their attributes such as materials, weights, revisions, and build strategies. Therefore, all ShipConstructor product model entities such as plates, stiffeners, pipes, ducts, penetrations, etc. can be recreated in the CAD drawings from the database.

The time designers and drafters will spend for modeling structural plate parts will be reduced dramatically (up to ten-fold) due to the many automatic features that replace previously-manual drafting operations. Furthermore, the steps involved in implementing late design changes will be significantly reduced, due to the fact that the database is aware of the interrelation between parts and changes linked parts automatically.

For example, moving a tank top up will adjust the height of all frame plate parts under it as those were automatically linked to the tank top during the design stage. Similarly, exchanging one frame hull trace for another automatically updates all related frame parts, be they plates or stiffeners.



With the new DDROM, moving a tanktop adjusts the height of all frame plate parts under it automatically. Similarly, a hull trace change updates all related parts instantly.

For user comfort, the new DDROM feature can be initially turned off until a certain level of comfort has been reached. Yet the user will still gain significant time-savings from the much faster modeling features.

Application Programming Interface (API)

ShipConstructor is well-known for its open design, and many users have successfully interfaced the ShipConstructor product model database with their ERP (Enterprise Resource Planning), purchasing, and accounting systems. With the 2006 release, ShipConstructor will introduce a fully-documented Application Programming Interface (API) providing users and third-party developers with an excellent tool for automation and customization. It is the same API ARL's software developers are using in-house. The API will not only provide secure access to the ShipConstructor database but, more importantly, provide users and third-party developers with a stable interface to the ShipConstructor database which will remain unchanged regardless of any changes ARL's developer make to the ShipConstructor database. Thus users with tight integrations to the ShipConstructor product model database can rest assured that their own applications will still work after a ShipConstructor version upgrade.

About Albacore Research Ltd (ARL) and ShipConstructor

Albacore Research Ltd (ARL) is the creator of ***ShipConstructor***, the AutoCAD-based 3D Product-Modeling software for the design and fabrication of ships and offshore structures.

ShipConstructor is proving its capabilities on a wide range of new construction, conversion and repair projects, including the US Navy's Littoral Combat Ship, the US Coast Guard's Deepwater Project and the Devil's Tower Spar. More than 150 yards and designers worldwide, among which you find well-known names such as Northrop Grumman Ship Systems, Gibbs & Cox, and Dubai Drydocks, trust ShipConstructor with their projects.

ShipConstructor provides functions for curved plates, structure, pipe, HVAC, equipment, and NC-processing and also generates sophisticated production documentation, including assembly drawings, pipe spools, and production reports.

For further information regarding ARL and its ShipConstructor software visit www.ShipConstructor.com.

Tinted Window Guidelines Released

The National Marine Safety Committee (NMSC) has just released Guidance Circular 05–01 to allow tinting of navigational-space windows on vessels of less than 45 metres in length. The circular, available on the NMSC website, provides solutions for tinted glazing of navigational-space windows on vessels of less than 45 metres in length which are subject to the Uniform Shipping Laws Code Section 5C Clause 73.3 and Section 5D Clause 36.3.

"Modern design styling and the frequent use of air conditioners have increased the demand for more flexibility in the use of tinted glazing materials on commercial vessels," said NMSC CEO, Maurene Horder. "The guidance circular was developed by NMSC's Technical Reference Group (surveyors) and has been endorsed by all state marine agencies and the Northern Territory."

Details outlined in the circular include limitations on the use of tinted windows, minimum light transmission of tinted glazing materials, and the colour of tinted glazing materials

To download a copy, go to www.nmsc.gov .au and follow the links. For further information, contact Maurene Horder on (02) 9247 2124.

Taga Faasisila

Australian Builders Plate

A major marine safety reform for recreational boats, the Australian Builders plate (ABP), is being progressively introduced around Australia from 1 July 2005. All states and territories are aiming to enact legislation to have the ABP fully implemented nationally by 1 July 2006.

The ABP will make recreational boating safer and details vital information about the capacity and capability of boats, including the maximum number of people and load allowed, engine rating and weight, and buoyancy performance.

All new recreational vessels will require and ABP with the exception of amphibious vessels, canoes, kayaks, surf skis, pedal-powered boats, second-hand vessels, rowing shells, sailboards or sail kites, surf rowboats, hydrofoils, hovercraft, sailing vessels, submersibles, acquatic toys, personal watercraft and inflatable boats in certain conditons.

There are two types of ABP, one for boats under 6 metres in length, which includes a buoyancy statement, and one for boats of 6 metres or more in length, which does not include a buoyancy statement.

The time for national implementation by 1 July 2006 allows for industry and government to work together to promote and develop systems needed to ensure the ABP's practical introduction. The CEO of NMSC, Maurene Horder, said that the boating industry and all marine safety authorities around Australia would be working together to promote and monitor the ABP's introduction over the next twelve months. "This transition phase is very important, as it allows us to educate the boating public and industry, and allows time for jurisdictions to develop state legislation to introduce the ABP by 1 July 2006", said Ms Horder. "The manufacturing sector has been very supportive and some boat manufacturers are already fixing plates to new boats."

The Australian Marine Industries Federation provides on-line facilities for ordering plates as a service to manufacturers at www.amif.asn.au.

Safety Lines, June 2005

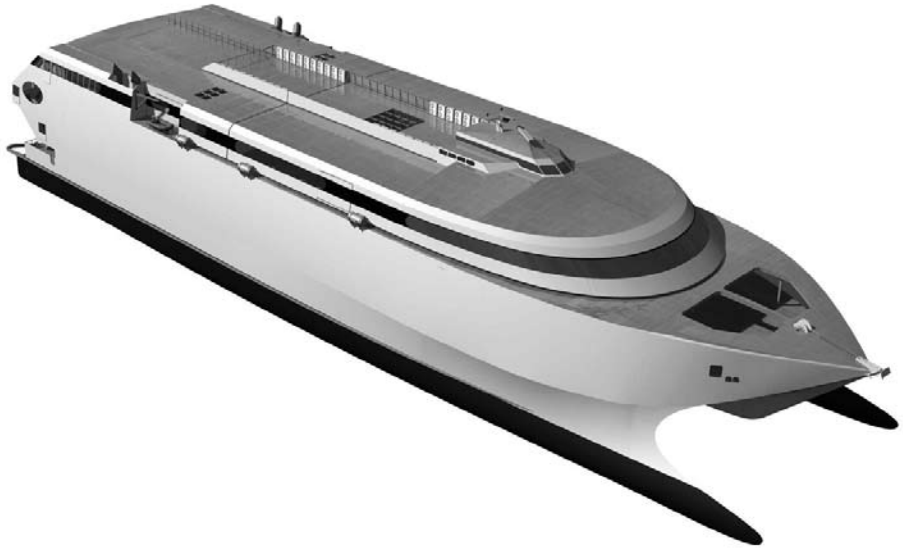
NSCV Stability

The intact stability section of the National Standard for Commercial Vessels and its regulatory impact statement have been drafted and are expected to be available for public comment in early September. Keep an eye on the NMSC website, www.nscv.gov.au, or call the secretariat on 9555 2954 for your copy.

NMSC has Moved

The National Marine Safety Committee has moved offices to Level 5, 9–13 Young St, Sydney. The new mailing address is PO Box R181, Royal Exchange 1225. Phone and fax numbers remain unchanged, (02) 9555 2954 and 9247 5203, respectively. You might like to update your address book.

Phil Helmore



An impression of Incat's 112 m wave-piercing catamaran, now under construction in Tasmania

(Image courtesy Incat)

MEMBERSHIP NOTES

Australian Division Council Meeting

The Australian Division Council met on 22 June, with teleconference links to all members and the President, Robin Gehling, in the chair.

Eleven members of Council were present and the President extended a welcome to Messrs Crosby, Jeremy and Taylor as new members of Council. The President also thanked Mr Limpus (who was retiring from Council at the conclusion of the meeting) for his contribution to the business of Council.

Council appointed Dr Stuart Cannon to the position of Vice-President for a term to conclude at the Annual General meeting in 2007.

Matters, other than routine, which were discussed included:

- Report of the sub-committee on the Walter Atkinson Award: This very thorough report was discussed at length and its main recommendations were accepted by Council. They have been included in the Call for Nominations for the Award carried elsewhere in this issue of *The ANA*. Council accepted that there was a need for greater awareness of the Award and, to this end, will appoint either a member of Council, or a non-council member reporting to the Division President, who will have the responsibility for coordinating and promoting the Walter Atkinson Award and will establish an Award Plan for its future operation.
- Course in Offshore Engineering and Naval Architecture at UWA: Contact had been maintained with the University of Western Australia concerning accreditation of this new course, with the university advising that accreditation will be sought from the appropriate bodies at a later date.
- The Australian Builder's Plate for Recreational Boats: A comprehensive paper on this subject was examined and discussed, in depth and detail, during the meeting. Council expressed concern over some aspects of the proposals and it was agreed these concerns would be communicated to the National Marine Safety Committee.
- RINA Council Meeting in London: The President advised that the main business at this meeting had been discussion of the role of the Institution. Following that meeting, the Chief Executive of RINA had published in *RINA Affairs* a 'snap shot' of the Institution. The next meeting of the Council is scheduled for 13 July 2005 in London and the Australian Division President was preparing a document for discussion at the meeting on the future role of the Institution.
- CEng/CPEng Reciprocity: A letter had been written to the major employers of naval architects seeking their confirmation of the reciprocity of CEng and CPEng status. At the time of the last Council meeting, several employers had replied acknowledging their acceptance of this status.

The next Australian Division Council meeting is scheduled for Wednesday 21 September.

Keith Adams
Secretary

RINA Council and Committee Members

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

Australian Division

President	Robin Gehling
Vice President	Stuart Cannon
Secretary	Keith Adams
Treasurer	Allan Soars
Members appointed by Sections	
	Stuart Cannon (Vic)
	Brian Hutchison (Qld)
	John Lord (ACT)
	Roger Best (WA)
	Giles Thomas (Tas)
	Martin Williams (NSW)
Members elected or appointed by Council	
	Jim Black
	Werner Bundschuh
	Peter Crosby
	John Jeremy
	Mark Smallwood
	Graham Taylor
Website	Mike Warren and Jude Stanislaus

Sections of the Australian Division

ACT

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

NSW

Chair	Phil Helmore
Deputy Chair	Graham Taylor
Secretary	Lina Diaz
Treasurer	Adrian Broadbent
Members	Craig Boulton
	Don Gillies
	Craig Hughes
	Bruce McRae
	Grahame Parker
	Martin Williams
Website	Bruce McRae

Queensland

Chair	Bill Barlow
Deputy Chair	Dion Alston

Sec./Treasurer	Brian Hutchison
Members	Gillian Carter
	Mark Devereaux
	Tommy Ericson
	Marc Richards
	Brian Robson
	James Stephen
Website	Brian Robson, Brian Hutchison

Tasmania

Chair	Gregor Macfarlane
Secretary	Stuart McDonnell
Treasurer	Andrew Davies
Members	Guy Anderson
	Russell Brice
	Ed Dawson
	Alan Muir
	Giles Thomas
Website	Gregor MacFarlane, Stuart McDonnell

Victoria

Chair	Bryan Chapman
Secretary	Samantha Tait
Treasurer	Ken Hope
Members	Stuart Cannon
	Sean Johnston
	Allan Taylor
Website	Stuart Cannon, Samantha Tait

Western Australian Section

Chair	Colin Spence
Deputy Chair	Roger Best
Secretary	Kalevi Savolainen
Treasurer	Damien Smith
Members	
Website	

Publications Committee

Editor-in-chief	John Jeremy
Technical Editor	Phil Helmore
Referee	Noel Riley

Safety Committee

Chair	Graham Taylor
Members	Adrian Mnew
	Mike Seward
	Andrew Tuite

Walter Atkinson Award Committee

Chair	Brian Hutchison
Members	Lance Marshall
	Brian Robson

RINA London

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

RINA/Engineers Australia Joint Board of Naval Architecture

Chair	Bryan Chapman
Member	Robin Gehling

Marine Safety Victoria Marine Industry Advisory Group

Members	Bryan Chapman
	Mark Hughes
	Martin Jaggs
	Adrian Mnew
	Dennis Pratt

National Marine Safety Committee Industry Advisory Group

Members	Werner Bundschuh
	Bryan Chapman
	Sri Srinivas

National Professional Engineers Register Naval Architecture Competency Panel

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

Pacific 2006 IMC Organising Committee

Chair	John Jeremy
Members	Keith Adams
	Laurie Prandolini

Standards Australia Committee AV006 Machinery Noise

Member	Mark Smallwood

Standards Australia Committee CS051 Yachting Harnesses and Lines

Member	Bruce McRae

Standards Australia Committee ME059 Shipbuilding

Member	Bryan Chapman

Phil Helmore

NAVAL ARCHITECTS ON THE MOVE

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

Mathew Addison has moved on from Austal Ships where he worked as a naval architect supporting the Marketing Department, and taken up a position with Rolls Royce in Fremantle.

Michael Andrewartha has moved on from North West Bay Ships and has taken up a position as a naval architect with Quigley Marine Designs in Sydney.

Allan Falconer has moved on from his position as Surveyor with Lloyd's Register in Fremantle and has taken up a position as Naval Architect with Qatar Gas in Doha, Qatar, working on the new 216 000 m^3 LNG ships on order in Korea.

Alistair Allen has moved on from the Directorate of Navy Platform Systems and has taken up a position in the Amphibious Deployment and Sustainment Program Office, Defence Materiel Organisation in Canberra, where he is involved with the amphibious ship acquisition project.

Tim Gates has moved on from the Submarine Project and has taken up a position in the Amphibious Deployment and Sustainment Program Office, Defence Materiel Organisation in Canberra, where he is involved with the amphibious ship acquisition project.

Ray Duggan has moved on within the Defence organisation and has taken up the position of Director of Navy Platform Systems (DNPS) in Canberra.

Ruth Jago has moved on from North West Bay Ships and has taken up one part-time position as a naval architect with Quigley Marine Designs in Sydney, and another waitressing, while she completes her degree at The University of New South Wales.

Nigel Lynch has moved on from North West Bay Ships and has taken up a position as a naval architect with Quigley Marine Designs in Sydney.

Adrian MacMillan has moved on from Det Norske Veritas' Houston, USA, office where he worked on deepwater floating production systems for the oil and gas industry. He has taken up a position with Woodside Energy in Perth and is responsible for coordinating floating production systems activity.

Shinsuke Matsubara, a recent graduate of The University of New South Wales with his Master of Engineering degree, has commenced research for his PhD degree at the Australian Maritime College in Launceston, where he is investigating wave loads on ship structures in concert with the University of Tasmania.

Todd Maybury has moved on from North West Bay Ships and has taken up a position as a naval architect with Quigley Marine Designs in Sydney.

Esteban Navarette has moved on from North West Bay Ships and has taken up a position as a naval architect with Quigley Marine Designs in Sydney.

Bernard O'Shea has moved on from Austal Ships, where he has been the project naval architect on a recent 86 m ferry, and taken up a position with Strategic Marine in Henderson, only two doors away from Austal.

Stephen Quigley has moved on from North West Bay Ships and has taken up the position of Managing Director of Quigley Marine Designs in Sydney.

Aminur Rashid has moved on from the Directorate of Navy Platform Systems and has taken up a position in the Air Warfare Destroyer System Program Office, Defence Materiel Organisation in Canberra, where he is involved with the destroyer acquisition project.

Kalevi Savolainen has moved on from Strategic Marine and taken up a position with Austal Ships in Fremantle, where he is working on the Littoral Combat Ship project

Felix Scott, a recent graduate of The University of New South Wales, has taken up a position as a naval architect with High Modulus, the composite engineering consultancy specialising in the marine field, in Auckland, New Zealand.

Robert Tulk has moved on from North West Bay Ships and has taken up the position of Senior Naval Architect with Quigley Marine Designs in Sydney.

Nick Whyatt has moved on from the Submarine Engineering section of the Directorate of Navy Platform Systems in Canberra and has taken up the position of Engineering Assurance Manager for the Collins-class Systems Program Office based at HMAS *Stirling* in WA.

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
Martin Grimm

MISSING IN ACTION

Three members are missing in action. They are Mr F. Brazier, Mr R. Irvin and Ms H. Lees from Western Australia.

If anyone knows their present location, thenplease let Keith Adams know on (02) 9878 4140, fax (02) 9876 5421 or email kadams@zeta.org.au

THE SYDNEY MARITIME INDUSTRY CHRISTMAS PARTY
(SMIX Bash)

All involved with the Maritime Industry, their partners and friends are welcome to join the
Institute of Marine Engineering, Science and Technology
and the
Royal Institution of Naval Architects
on board the unique 19th century iron barque

"James Craig"

for drinks, dinner and great conversation while berthed at No. 7 Wharf, Darling Harbour

On Thursday, 1 December 2005

At 5:30pm for 6:00pm

Cost is $25.00 per head for Early Birds (prior to 31 Oct, 2005)

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FROM THE ARCHIVES

CALLED TO ANOTHER DUTY

Part 2

John Jeremy

Twenty years after the end of World War I and the return to trade of the many requisitioned commercial vessels, the outbreak of World War II on 3 September 1939 revived the need for merchant ships to be adapted for tasks for which they had not been designed. During the war this process of adaptation was developed to a high degree, with commercial vessels filling many roles including armed merchant cruisers, troop transports and hospital ships. As the war progressed, the conversions included roles as diverse as depot and repair ships, landing ships and even a brewery ship. Perhaps the most high-profile conversions were those of the great ocean liners to transports, and much of this work during the first year of the war was done in Australia.

On 15 September 1939, Prime Minister Menzies announced the Government's intention to raise an Infantry Division of some 20 000 men for service at home or abroad, and in November, after talks in London with the British Government, that the 6th Division AIF would be sent overseas. At the same time, the raising of a second division that would ultimately become the 7th Division was approved.

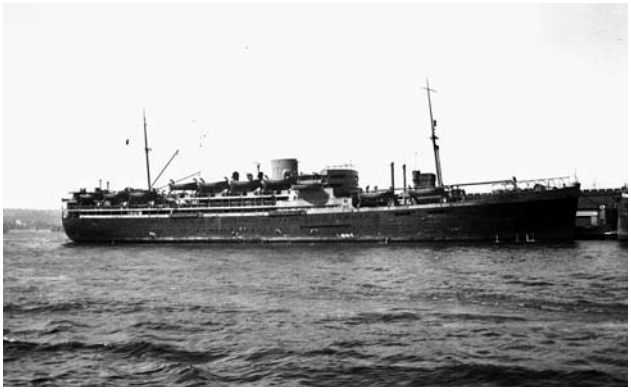
An advance party of Australian troops with a New Zealand contingent sailed for the Middle East in the P&O liner *Strathallan*, arriving at Suez on 7 January 1940. These men had travelled on a normal voyage for the liner, but the transport of the whole 6th Division required the requisition of a significant number of ships. The selected ships began to arrive in ports in Australia and New Zealand in December 1939 and preparations were made for their new role as troopships [1].

In Sydney, most of the work converting passenger ships to transports and other roles was done by Cockatoo Dockyard and Morts Dock. The first liner to be taken in hand by Cockatoo for the troopship task was the Orient Line's *Otranto*. She was fitted with paravane gear, gun stiffening and bow protection between 6 September and 20 September 1939. By 8 January 1940 *Orion*, *Orcades*, *Orford*, and *Otranto* had completed a minimum conversion as troopships [2]. *Strathnaver* had been partly converted before leaving Liverpool for Australia, and the work was completed by Cockatoo after her arrival in Sydney on 4 January 1940. Some cabin spaces were stripped completely and fitted with hammocks and mess tables for troops, extra bunks were fitted in other cabins, and dining rooms converted to sleeping accommodation. When the work was completed on 9 January *Strathnaver* had been fitted to carry about 3 000 troops [3].

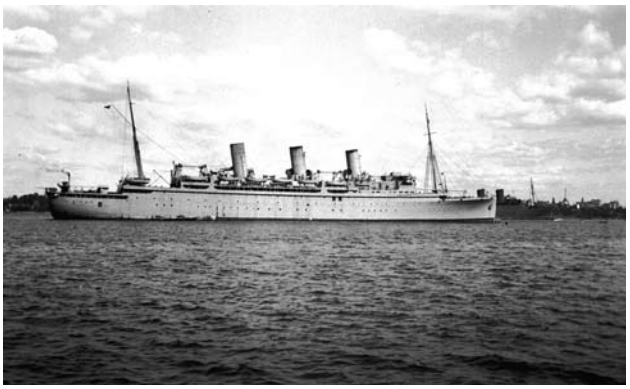
These ships were joined in Australia by *Empress of Canada* and *Empress of Japan* (the latter partly converted to trooping in Esquimalt in Canada), *Rangitata*, *Sobeiski* and the troopship *Dunera*. Together they comprised the first Australian and New Zealand troop convoy of the war, US1, leaving Sydney escorted by the battleship HMS *Ramillies* on 10 January 1940.

Meanwhile, plans were in hand to make use of the great liners *Queen Mary*, *Mauretania* and *Aquitania*.

Since the outbreak of the war, *Queen Mary* and *Mauretania* had been laid up in New York. They were joined on 7 March 1940 by the incomplete *Queen Elizabeth*, which had sailed directly from her shipbuilder's yard on the Clyde with launching gear still attached to the hull. Regarded by some people as white elephants which would be of more use to the war effort as scrap metal, others recognised their potential as transports capable of carrying large numbers of troops at high speed over long distances. The troopship argument won, and in March 1940, *Queen Mary* was requisitioned by the British Government followed shortly thereafter by *Queen Elizabeth* and sixteen other Cunard-White Star liners.



The troopship *Dunera* in Sydney Harbour. After the first convoy additional troop accommodation was fitted out by Cockatoo Dockyard before the ship sailed in the second convoy (US2) in April 1940
(Photo John Jeremy Collection)

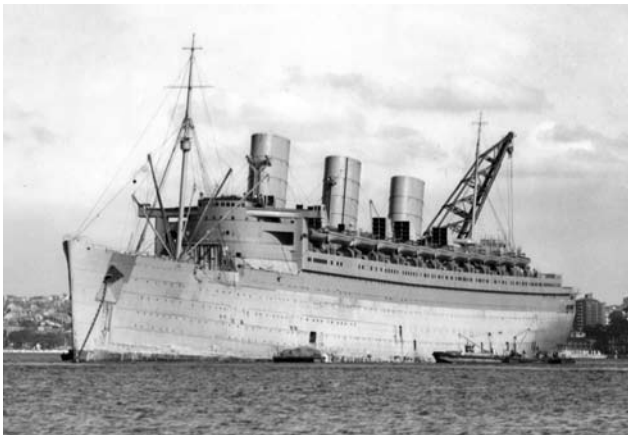


Empress of Canada in Sydney Harbour in 1940
(Photo John Jeremy Collection)

The first ship to leave New York was *Mauretania* on 20 March 1940, bound for Sydney and conversion for her new role. *Queen Mary* sailed the following day, after much of her furniture, carpets, crystal, china and silverware had been removed for storage. The dash to Sydney had begun — a voyage of 14 000 n miles that was completed at an average speed of 27.2 knots when she arrived off Sydney Heads on 17 April 1940 [4].

Mauretania arriving in Sydney

(Photo John Jeremy Collection)



Queen Mary in Athol Bight in 1940

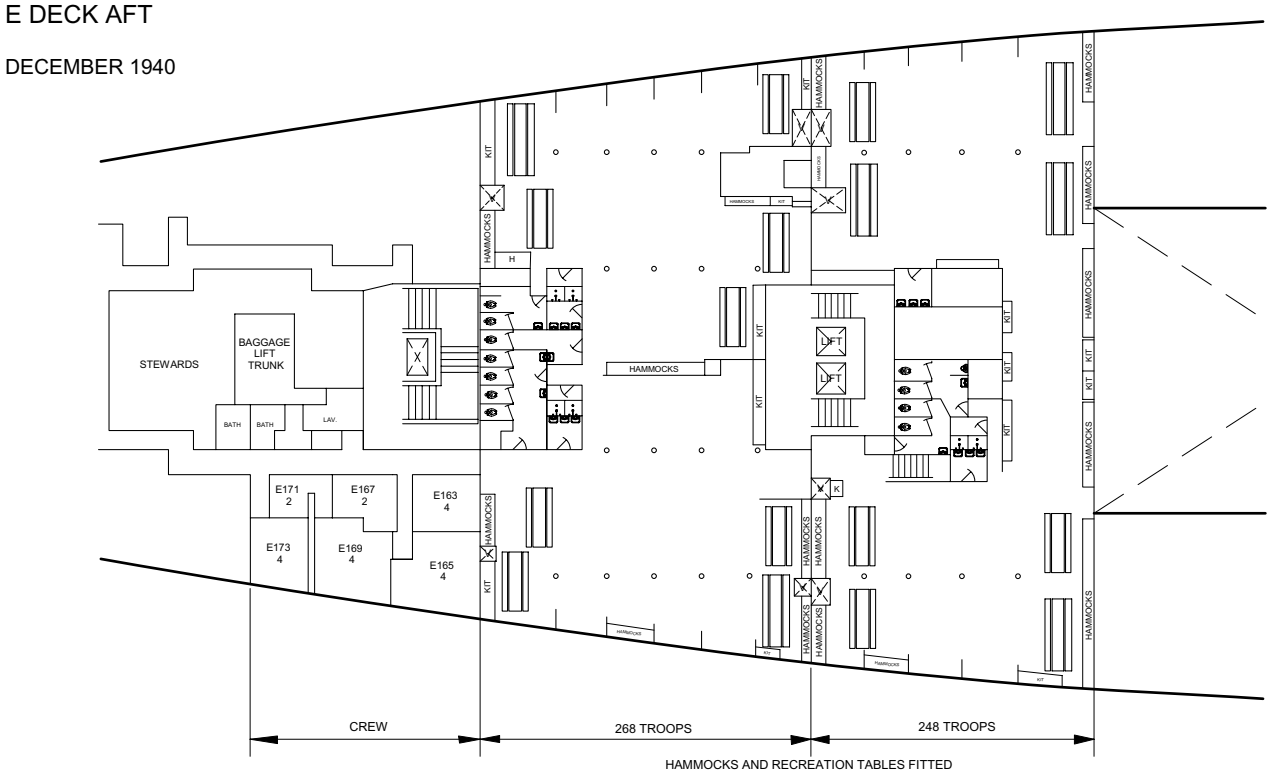
(Photo John Jeremy Collection)

There was no berth in Sydney capable of accommodating *Queen Mary*, and the great ship anchored in Athol Bight, where her conversion to a troopship by Cockatoo Dockyard began. In only two weeks the ship was transformed, with most of the remaining furnishings and cabin doors removed and stored ashore. Additional wooden bunks were fitted in cabins and other spaces, including public rooms, were fitted with hammocks and mess tables. Additional toilets were fitted, and hospital facilities provided. Work continued around the clock with the floating crane *Titan* secured alongside to service the workforce. In addition to the accommodation changes, a number of anti-aircraft guns were fitted as well as a 6-inch gun aft. By the time the work was completed on 3 May 1940, the ship which had been built to carry 2 100 passengers was capable of embarking some 5 000 troops.

Whilst *Queen Mary* was a very visible job in the middle of Sydney Harbour, the men of Cockatoo Dockyard were busy with other ships as well. *Mauretania* had arrived a few days earlier than *Queen Mary*, on 14 April, and was able to berth alongside in Circular Quay. The work on this ship was extensive, with changes on all eight passenger decks. Accommodation for 2 000 troops was provided, together with hospital facilities and troop latrines. Guns and rocket launchers were also fitted, as well as splinter protection to the wheelhouse. Work on *Mauretania* was also completed on 3 May 1940 [5].

Other work undertaken in Sydney during March, April and May 1940 included extra troop accommodation or changes in the liners *Aquitania*, *Strathaird*, *Empress of Canada*, *Empress of Japan* and *Orcades* [6].

On 5 May 1940, *Queen Mary* sailed from Sydney with the last of the dockyard workers (who had been fitting the gun) disembarking by boat at the heads. She joined convoy US3 for the Middle East.

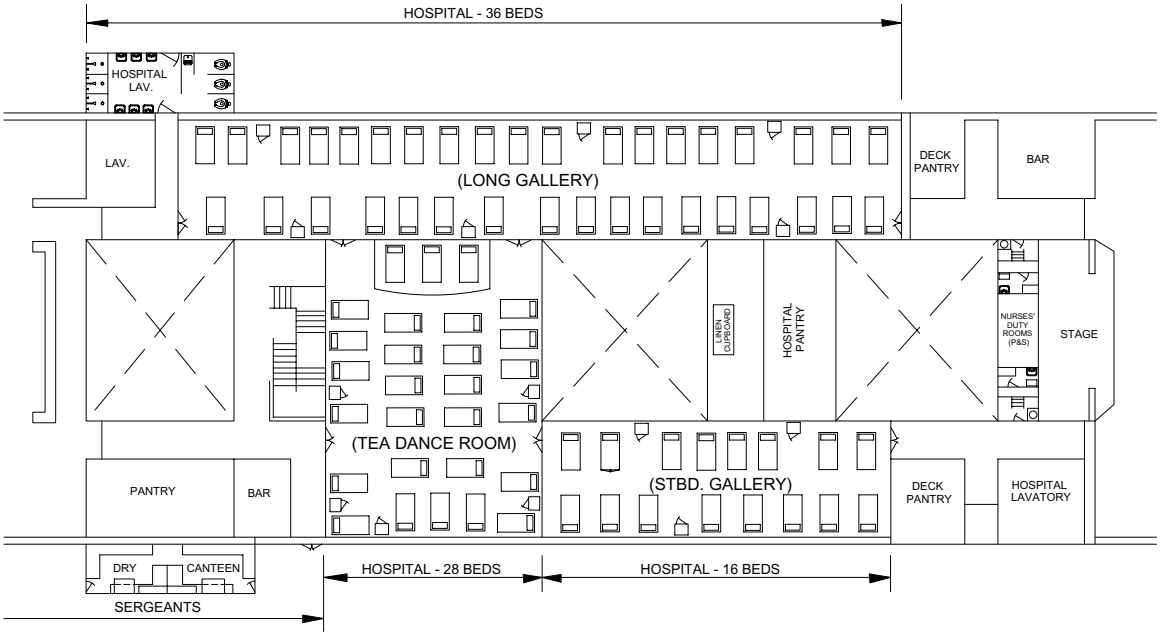


Typical arrangement of troop accommodation in *Queen Mary* [10]

HM TRANSPORT QUEEN MARY

ARRANGEMENT OF PROMENADE DECK HOSPITAL

DECEMBER 1940



The general arrangement of the Promenade Deck Hospital in *Queen Mary* [9]

Further troopship conversions or modifications were undertaken in Sydney in the following months, including *Zealandia*, *Orontes*, *Strathallan*, *Nieuw Holland*, *Indrapoera* and *Nieuw Zeeland*. Further work was also undertaken on *Queen Mary*, *Aquitania* and *Mauretania* on regular occasions during their visits to Sydney between 1940 and 1942.

When *Queen Elizabeth* arrived in New York in March 1940, she was far from complete. Electrical, ventilation and plumbing systems were unfinished, and the ship was festooned with temporary electric lights. During her time in New York considerable progress was made towards completing the fitting out of lighting, heating, ventilation, water and sanitary services. In September 1940 it was decided that she should follow her older sister to Sydney for conversion as a troopship but she did not sail until 13 November [7].

The first destination for the liner was Singapore, for her first docking since launching in September 1938. Whilst there, she was fitted with a 6-inch and two 3-inch guns, and preliminary work on the conversion was begun. She left Singapore on 11 February 1941, escorted by HMS *Durban* for Sydney via Fremantle for fuel. The voyage, passing south of Tasmania, was made at an average speed of 25 knots. *Queen Elizabeth* arrived in Sydney on 21 February and anchored, like her sister, in Athol Bight.

Cockatoo Dockyard had begun preparatory work for the conversion before the ship arrived, and work began immediately to outfit the ship to carry 5 500 troops. Once again, work continued around the clock installing bunks and hammocks in every available space. A sizeable hospital was built and, to supply the needs of the greatly-increased complement, additional fresh water tanks were fitted.

Inside the Promenade Deck Hospital in *Queen Mary* (the Long Gallery)

(Australian War Memorial Negative No. 004291)

Substantially more engineering and electrical work was needed compared to *Queen Mary*, due to the incomplete shipbuilder's work. The conversion was completed on 31 March, although *Queen Elizabeth* had left Sydney the previous day to make way for *Queen Mary*, which arrived on 1 April after a docking in Singapore. Both ships could not berth in Sydney together. *Queen Elizabeth* anchored in the Derwent River near Hobart that same day.

Two days later, another famous liner arrived in Sydney. *Ile de France* had been taken over by the Royal Navy in July 1940, but work to convert the ship to a troop transport was not begun until November 1940, in Singapore. Her capacity as converted was 4 300 troops, but the work was unfinished when she arrived in Sydney, and it was completed by Cockatoo Dockyard by 10 April.

HM Transports *Aquitania* and *Queen Mary* departing Sydney Harbour on 20 October 1940 to join convoy US6 with the 7th Division AIF embarked

(Australian War Memorial Negative No. 004304)

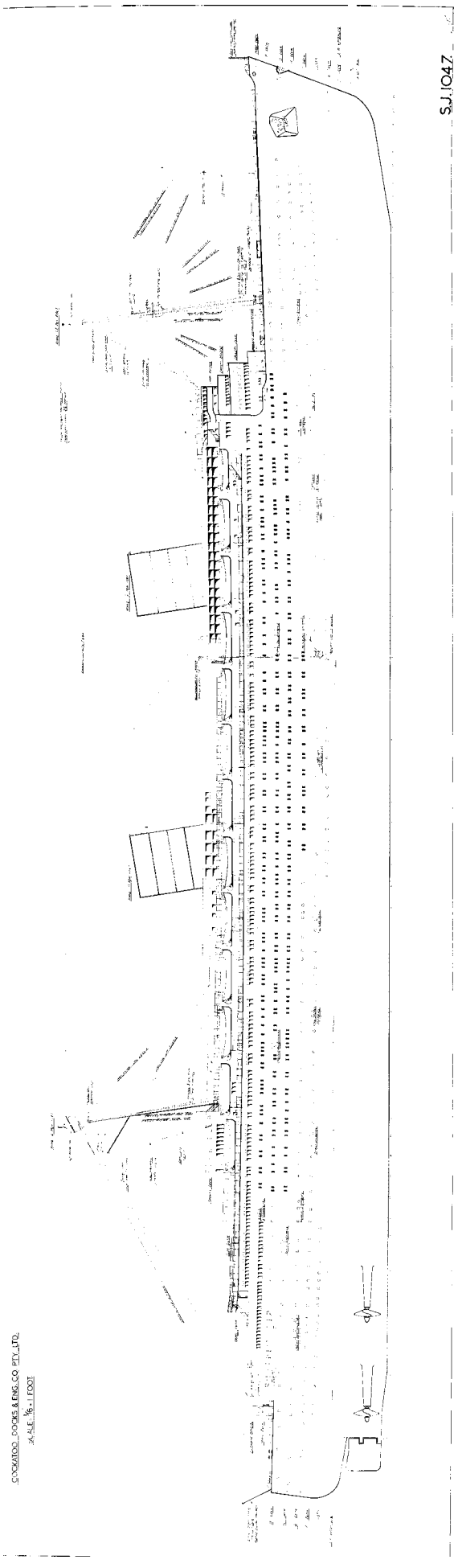
HM Transport *Aquitania* backing out of Woolloomooloo on the morning of 27 December 1940. Troops are still being embarked in *Queen Mary* — she sailed the following morning (with the author's father on board) to join *Aquitania* and convoy US8 for the Middle East

(Australian War Memorial Negative No. 005572)

Queen Mary embarked 6 000 troops and sailed on the morning of 9 April. As she cleared Sydney Heads, she passed her younger sister, *Queen Elizabeth* (inbound), for the first time. *Queen Elizabeth* embarked a further 5 333 troops and sailed on 10 April, followed to sea by *Ile de France*, *Mauretania* and *Nieuw Amsterdam*. They joined *Queen Mary*, which had been waiting in Jervis Bay, and proceeded to Fremantle. Convoy US10, with 22 000 troops, left Fremantle for the war on 19 April, escorted by the cruisers *Australia*, *Canberra* and *Sydney* [8].

Most of the work required of the Australian dockyards for the conversion of troopships was now complete. Further repairs to the liners followed, but the last major task for Cockatoo Dockyard in support of these ships was boiler repairs for *Queen Mary* in April 1942. All the big ships continued to serve as troopships throughout the war, carrying thousands of men and women safely across the oceans. In the 79 months that *Queen Mary* served, she steamed some 600 000 n miles and carried almost 800 000 people. She was the only ship ever to carry more than 16 500 people on one voyage. *Queen Elizabeth* steamed more than 500 000 n miles and carried almost 750 000 passengers. It was a remarkable achievement which began with their conversion to this special duty in the magnificent surroundings of Sydney Harbour.

To be continued.



The rigging plan of HM Transport *Queen Elizabeth* dated 14 February 1941 [11]

1. Plowman, Peter, *Across the Sea to War*, Rosenberg, Sydney, 2003, pp. 82-85.

2. Jeremy, John, *Cockatoo Island: Sydney's Historic Dockyard*, UNSW Press, Sydney, 1998 (Second Edition), 2005, p. 231.

3. Plowman, Peter, *Across the Sea to War*, p. 88.

4. Harding, Steve, *Gray Ghost: The RMS* Queen Mary *at War*, Pictorial Histories Publishing Company, Missoula, Montana, 1982, pp. 1-7.

5. Plowman, Peter, *Across the Sea to War*, pp. 118-120.

6. Jeremy, John, *Cockatoo Island*, pp. 213-219.

7. Konings, Chris, Queen Elizabeth *at war: His Majesty's Transport 1939-1946*, Patrick Stephens, Wellingborough, 1985, pp.15-18.

8. Plowman, Peter, Across the Sea to War, pp. 213-219.

9. Drawn by the author, based on Drawing No SJ1018 Sheet 1, *Queen Mary* Accommodation Plan, dated 12 December 1940, copy in J C Jeremy Collection, original missing.

10. Drawn by the author, based on Drawing No SJ1018 Sheet 4, *Queen Mary* Accommodation Plan, dated 12 December 1940, copy in J C Jeremy Collection, original missing.

11. Copy of print of Drawing No SJ1047 in J C Jeremy Collection, original missing.

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