THE AUSTRALIAN NAVAL ARCHITECT

Volume 8 Number 1
February 2004

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THE AUSTRALIAN NAVAL ARCHITECT

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The 50 m ferry *Spirit of Kangaroo Island* delivered by Austal Ships in December 2003 to Kangaroo Island Sealink (Photo courtesy AMD)

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From the Division President

I sit down to write this column fresh from attending the invigorating Pacific 2004 International Maritime Conference.

As was mentioned by Organising Committee Chairman John Jeremy in his address to the opening ceremony, this year marks the 25th anniversary of the establishment of our Division, and the 50th anniversary of the Australian Branch of RINA. And in terms of showcasing the Australian maritime industry, and naval architecture in particular, there can be little doubt that we have people and industries that are world class and that we attract world-class people to come and talk with and to us.

The overseas visitors to Pacific 2004 included our own Chief Executive, the Chairman of the International Maritime Organization's leading technical body — the Maritime Safety Committee, WIG craft designers from Russia and the United States (Boeing), ship structures experts from the United States and Germany, a shipping security expert from Hong Kong, ship safety management experts from the United Kingdom, naval ship designers from the United Kingdom, ship design and construction researchers from Korea and so on. Then there were our own contributors showcasing all aspects of Australian work on the Conference theme *Maritime Engineering — Challenges and Opportunities*. Well done John and the organising committee, Keith Adams, Laurie Prandolini, Bob Campbell and Peter May — in my view the conference was the best ever!

Then there was the accompanying exhibition, clearly the biggest and most comprehensive maritime and defence exposition ever held in the southern hemisphere. Anyone and everyone with something to show or sell was there, with many key people being so busy as not to have time to become involved in the conference. I heard of cases where exhibitors had done enough business in the first morning to make their exhibits profitable.

All of which goes to demonstrate that the Pacific 2004 Congress was *the* place to be for anyone in the maritime industry. Anyone missing out on attending both the conference and the exhibition lost a golden opportunity to bring themselves up-to-date with relevant developments, both within industry and in research and development. Then there's the contribution that attendance at such a Conference makes to the increasingly important issue of Continuing Professional Development, which brings me back to my column in the last issue (but perhaps we'll leave that for another day).

Planning for the next event in this series has already commenced. Knowing the ability of the organising committee to produce something even better, I would urge you to enter the Pacific 2006 International Maritime Conference in your diary for Sydney from 31 January to 3 February 2006.

Rob Gehling

Editorial

As the President observed in his column, this year is the fiftieth anniversary of the formation of the first international branch of the Royal Institution of Naval Architects, the Australian Branch. In 1947, a group of naval architects in Sydney decided to form an association of naval architects in Australia, and in 1954 the association they formed became the Australian Branch of RINA.

Twenty-five years later, in 1979, the Australian Branch became the first international division of RINA, the Australian Division. The anniversary and the upgrading of the Branch to the Australian Division were celebrated at the Australian Symposium on Ship Technology held at The University of New South Wales that year. The symposium was the fifth occasion on which the Australian Branch had joined with the Institute of Marine Engineers and the University to conduct a conference to encourage the exchange of knowledge and experience amongst the members of the institutions in Australia. In addition to the conference at the University, which was opened by the Governor General, Sir Zelman Cowen, the event included an exhibition of ships in Woolloomooloo Bay.

The story of the formation of the Australian Branch was told by the foundation President, Cecil Boden, at the 1979 Symposium, and his address is reproduced in *From the Archives* in this edition of *The ANA*. In later editions this year we plan to tell more of the story of the development of the institution in Australia.

Jointly-organised conferences on maritime themes have continued at regular intervals over the last 25 years. The latest, the Pacific 2004 International Maritime Conference, was organised by the Royal Institution of Naval Architects, the Institute of Marine Engineering, Science and Technology and Engineers Australia and was held at Darling Harbour in Sydney in the first week in February. It was held in association with the RAN Sea Power Conference and the Pacific 2004 International Maritime Exposition. It was an event on a much larger scale than the symposium of 1979, and it would not have been possible without the generous support of Maritime Australia Ltd (the organisers of the Exposition), our sponsors and the volunteers from the institutions who gave their time to help organise the conference.

The Australian Division of RINA has continued to grow over the last twenty-five years, but the members of the institution are spread more widely around the country than they were in 1979. This presents both challenges and opportunities for the institution and its members. It will be interesting to see what the next twenty-five years bring.

John Jeremy

Letters to the Editor

Dear Sir,

May I take space in *The ANA* to thank all those members in Cairns, Canberra, Sydney, Adelaide and Fremantle for their warm welcome and hospitality when I visited the Division recently. I was particularly pleased that so many took the trouble to come to the Institution's stand at the Pacific 2004 Exhibition. Apart from the welcome opportunity to renew old friendships, such visits do allow me to both update members on new developments and, more importantly, to hear their views on what their Institution should be doing.

May I also take this opportunity to congratulate the Australian Division on organising yet another successful International Maritime Conference. I am sure that you would agree with me that successful conferences of that size do not just happen, but are the result of a lot of hard work and dedication by a small number of members. I would like to thank John Jeremy and the Organising Committee on behalf of the Institution, since such events do much to extend the international profile and influence of the Royal Institution of Naval Architects.

I look forward to my next visit to the Australian Division which I judge, on the basis of my last visit, to be in very good heart.

Trevor Blakeley
Chief Executive

Dear Sir,

The November 2003 issue of *The ANA* was another excellent one, and a credit to all concerned.

I am particularly interested in the photograph on the front cover of "our" *Nerida*. She was built here in Adelaide by R.T .Searles & Sons, of Jenkin Street, Birkenhead, in 1933 to a design by that master, Alfred Mylne. She was launched as a gaff cutter, and I have great memories of her. There were three rows of reef points in her mainsail, parallel to her boom, and a fourth row diagonally across the sail from the throat to the third reef earing cringle on the leech, as shown in Figure 1. It was referred to here as a "balance reef". When pulled down, the throat of the sail was just above the tack and the gaff hard up against the mast, thus forming a trysail, as shown in Figure 2. This was used when it was blowing really hard. The mainsail *Nerida* is sporting in the photograph raises a query: With all those battens in the leech how is it possible to furl that sail in a neat harbour stow? The battens would certainly cause a problem there. I shall ask my old friend, Sir James, when he is in the best state next. Many years ago, when she was owned by Colin Hazelgrove, she took part in a Sydney–Hobart yacht race, rigged as a bermudan yawl.

The letter from David Gosling is most interesting, and I agree entirely with his sentiments. Computer calculations are all very well, but the result depends on the program. To my mind, the first requirement in naval architecture is the ability to lay out the lines plan of a ship or boat on the board on completely blank paper. In other words, "from scratch" with only the dimensions and the use and purpose of the required vessel in mind. The mathematics of naval architecture are beautiful and fascinating, and the naval architect should be able to produce all the hydrostatics, including full stability

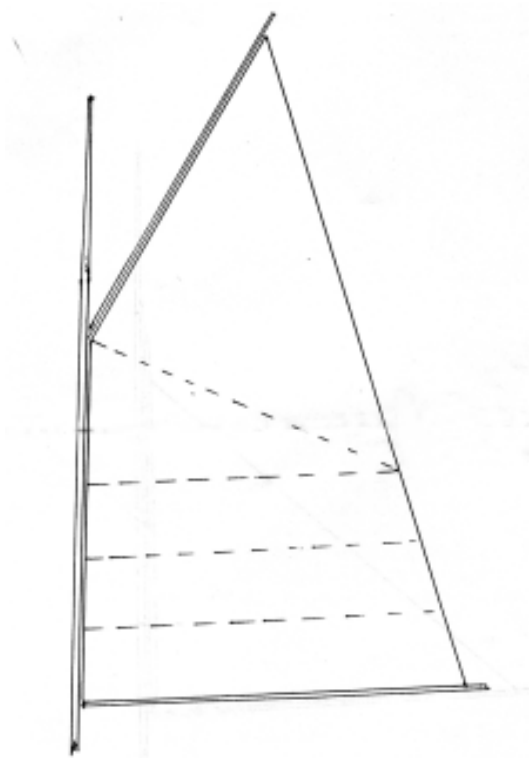

Figure 1 Mainsail Fitted with Balance Reef Points
(Diagram courtesy Neil Cormack)

Figure 2 Mainsail with the Balance Reef Pulled Down and the Gaff Hard Up Against the Mast
(Diagram courtesy Neil Cormack)

data, with perhaps a planimeter as the only aid. A mechanical integrator would be nice, but is a luxury .One can always check one's stability calculations by "rolling the body plan over onto the opposite tack", and the results should be mirror handed. All hydrostatic curves should be laid out down to the base. This would make checking by the authority very easy, as the curve of transverse buoyancy can be readily checked from the curve of displacement, and I have mentioned the relationship between the curves of longitudinal centres of buoyancy and flotation in previous correspondence.

As for the computer? I mind in my surveying days seeing one of the first sat. nav. apparatus being installed in a prawn

trawler and the comment of the skipper "I can now throw my sextant overboard; I won't need it any more". To which I replied, "You had better not do that; one day you may have a power failure, and your sat. nav. will not be of much use to you". Similarly, during a power failure, a computer would be absolutely useless, and one would have to re-engage one's brain.

Again, congratulations on a wonderful journal.

Neil Cormack

Dear Sir,

I would like to inform you how I came to be studying naval architecture at The University of New South Wales.

With my background as a fitter and machinist by trade, and the fact that I had just completed an advanced diploma in mechanical engineering through the TAFE system, I was originally going to enrol in mechanical engineering at UNSW. I chose UNSW because, when I came to enrol, the lecturers conducting enrolments were *extremely more* helpful and willing to answer my questions than lecturers at certain other institutions of higher education in the Sydney metropolitan area. It was at this early stage of enrolment that I was introduced by to the idea of studying naval architecture by the then head of the School of Mechanical and Manufacturing Engineering.

To be completely honest, when I came to enrol I was not aware that UNSW offered naval architecture as one of their degree programs. Subsequent discussions were on the merits of studying naval architecture as compared to mechanical engineering. I immediately became fascinated with one day being involved with the design of various ships, tugs, fishing boats and/or a range of pleasure craft such as yachts and recreational speedboats.

I would like to say that, as the first two years of my degree were not directly related to naval architecture, I found it difficult to motivate myself to study. Since entering my third year, studying some naval architecture courses, and progressively learning more about the industry and the career paths that it may lead to, I have to say that I am very happy with my choice to study this unique field of engineering.

Anthony Brann
UNSW Student

Dear Sir,

It seems that, yet again, we're told by newspapers and TV of more problems with the "trouble-plagued Collins-class submarines".

With a little more information, my understanding of the Collins-class submarines is that they are a highly technical and ambitious project of military capability undertaken by the Australian Submarine Corporation and Kockums, the Swedish designers. Over a decade of intense research and development has gone into this fresh design and, as a result, Australia has what has been termed by more-balanced sources as "the most sophisticated non-nuclear submarines in the world". As your journal itself has reported, "They have performed superbly against US nuclear submarines in recent exercises". How much of the public is aware of this?

If the general populace of Australia is not keen on nuclear power, then that is praiseworthy, but there is also a consequence. We cannot rely on US- or European-developed nuclear submarine technology and must put in some sweat and dollars and take the headaches involved in developing exactly what we want. I think that the Australian Government and Navy should be commended on doing exactly that.

As anyone involved in ship production knows, teething problems should be anticipated and, with something as sophisticated as the Collins class, maybe these development issues should be expected many times over.

Whether the engineers and management behind the Collins project is brilliant or just good, I am not qualified to judge, but I do respect them for the project they've undertaken.

I would like to think that many of Australia's onlooking naval architects would agree that the Collins-class submarines have received too much unqualified cynicism from the media. Media who's strength is imagination after all.

John Hayes
UNSW Student

Dear Sir,

It was with interest that I read David Gosling's letter in the November 2003 edition of *The ANA*. For many years now, I also have had to review submissions for the purpose of approval, and I can certainly empathise with David's concerns regarding substandard submissions.

When a consultant submits plans or stability information to a State or Commonwealth regulator for the purpose of approval, it is important that the consultant understands the regulator's role. A regulator does not see the design of a vessel as a thing of beauty and a joy to behold. A regulator primarily sees a vessel as a life support system, constructed and equipped in such a way that it can operate safely in its intended environment.

A regulator's function is to ensure that a design meets the rules and regulations of the day that are appropriate for the vessel and its operation and, if found to comply, will grant approval. As such, in making a submission, a consultant should ensure that any plans and documentation are clear and concise, leaving little to the imagination. This is not only important from a regulator's point of view, but also for the benefit of the shipyard workers and ship operators.

I agree with David in that computers are wonderful things, but some of the software used is of concern. Not that the software is bad, it's just that some software churns out a lot of superfluous information that is generally not required. I once worked in a design office that did not have computers, and so we did not need a bank of 'wheelie bins' to cart away the paper which computers generate.

On many occasions, I have reviewed computer-generated stability information, and wondered why the master would want to know what the prismatic and waterplane coefficients were for a particular condition of loading. There are no rules prohibiting the inclusion of additional information in a vessel's stability book but, in some instances, it can cause confusion, and if that happens then the master will not use the book effectively. The content of any submission need only satisfy the relevant requirements of an authority's rules and regulations.

Consultants should also remember that the more complex a submission, the longer it takes to examine, and in many cases may incur higher examination costs, particularly when there are errors. As a rule, I find that submissions made by persons trained in naval architecture to be of a high standard. But there are people, who are not really qualified to undertake the work, who need guidance in the application of rules and regulations. And it is not a regulator's role to be a teacher or accept any risk as to the adequacy of the overall design; a regulator can only work within the framework of their Authority's rules and regulations.

The message is: keep information clear, concise, simple, and above all complete. This not only benefits the regulator, but also the shipyard workers and vessel operators.

Lindsay Emmett

Dear Sir,

Mr Sean Cribb (*The ANA*, November 2003) makes some pertinent observations and poses some relevant questions regarding the 1998 Sydney–Hobart yacht race.

I have spent over forty years travelling and working with, on, and under the sea, in a variety of craft, both pleasure and commercial. I suffer a deep love and respect for the sea. But she doesn't love me, and she certainly doesn't respect me.

I offer these thoughts for comment (and/or criticism), particularly regarding the decision as to whether a race should be allowed to start if weather reports are adverse.

When one ventures out onto the open ocean, be it on a surfboard, a yacht, a trawler, or large freighter, one is pitting oneself against the capricious vagary of mother nature. Regardless of any warnings or assurances (or omissions) that third parties may or may not give, it is entirely the responsibility of individual skippers and their crews as to whether they proceed.

It follows that, dare I suggest, in the case of yacht races pre-race briefings and meetings, especially those offered by organisers, should be considered a courtesy which do not diminish the responsibilities of skippers and crews.

The Sydney–Hobart has something of a macho image. Part of the glamour and attraction is the fact that it can be a tough duel against some of the worst seas. Much chest beating and manly qualities are associated with surviving. Well, in 1998 mother nature threw a curly one, and quite a few people suddenly decided the rules were unfair.

In my view, there are no rules, regulations and restrictions, concocted and imposed by the authorities in an effort to make the race 'safer', that will substitute for seamanship, knowledge and respect for the sea, and the acceptance that she ultimately will always have the final say.

Peter Wargent

Dear Sir,

I was pleased to read the outcomes of an Australian project to examine the effectiveness of hydrofoil support for catamarans in the paper by Andrewartha, Doctors, Kantimahanthi and Brandner (2003) in the previous issue of *The ANA*. The paper provides an indication of the potential operating efficiencies of well-designed foil-assisted catamarans compared to conventional catamarans and other craft. The authors also outlined how the resistance of foil-supported catamarans could be calculated using apparently quite reliable numerical methods.

Whilst the Australian marine industry in many respects is a world leader in the design of fast passenger and vehicle ferries, there have been few examples of Australian-designed craft where hydrofoils have been applied to provide any substantial support of the weight of the vessel. A decade or so has passed since WaveMaster International equipped one of its catamaran passenger ferries with a foil to provide significant lift with the aim of reducing overall resistance. In the early 1990s, Incat Designs also released details of a proposal for a trimaran supported by a series of foils, but evidently this project never progressed beyond the early conceptual stage. More recently, in 2001, North West Bay Ships launched a 55 m trimaran with a pair of foils spanning between the centre and side hulls and reported these to provide both lift and motion control. I am unaware of any vessel designed or built in Australia that is wholly foil supported, although in the mid 1980s there was a failed proposal to build an Italian-designed hydrofoil ferry at Carrington Slipways for service on Sydney Harbour.

Prompted by the recent technical paper advocating foil support, I feel now is a good time to 'push the barrow' of hydrofoil craft a little further, with the hope that such vessels will gain a greater acceptance within the Australian naval architecture community, particularly amongst those involved in the design of high-speed passenger ferries. I will do so by presenting additional graphical information comparing the transport efficiencies of monohulls, catamarans, hydrofoils and other types of passenger ferries.

Consistent with the approach by Gabrielli and von Karman (1950), Andrewartha et al. (2003) have briefly compared foil-supported craft with other marine vehicles by comparing specific tractive force [ε = installed power/(displacement x speed)] as a function of volumetric Froude number. This

would appear to be a fairly good indicator of the relative efficiency of various forms of marine transportation, but unfortunately (as noted by the authors) there is a tendency for designers and shipbuilders not to reveal the displacement of their vessels. On this basis, only relatively limited comparisons can be made. In the case of ferries intended for carrying passengers only, an alternative approach to a comparison based on displacement is to consider the passenger capacity. The vessel data presented in trade journals typically includes the passenger capacity, installed power and achieved speed thus increasing the sample base of craft available for comparison.

Considering passenger capacity as a parameter when comparing vessel efficiencies has other advantages. As noted by Gabrielli and von Karman (1950), a "real measure of economy should be the work necessary to transport certain useful load, over a given distance". The passenger capacity for a ferry is a fairly direct measure of the useful load. Displacement on the other hand is a less direct measure since the ratio of useful load to total displacement will vary depending on the type of hullform being considered. For example, a catamaran, with its greater relative girth than a monohull of similar capacity, will have additional structural weight, while a hydrofoil craft incurs the additional weight of its foils and struts. In either case, less proportion of the displacement is available for payload. Also implied by the same authors is the preference to normalise the data for vessels such that they all achieve the same range. Unfortunately, due to a lack of specific data, this is not easily achieved. As a consequence, vessels with relatively greater range will be penalised in the following presentation because the additional fuel load required to achieve their respective range will adversely impact on the cruising speed and installed power. It is assumed that this inconsistency will not substantially skew comparisons between vessel types if a sufficiently large sample of vessels is available.

Some degree of uncertainty is associated with using published data. The quoted passenger capacity generally corresponds to the number of passenger seats, whether this includes or excludes external seating in addition to internal seating, and is accepted as a consistent basis for comparison. The stated speed is a less-reliable parameter, as there is scope for the shipbuilder to list the most optimistic performance figures obtained in a light-load condition whilst the engines are running at 100% of maximum continuous rating (MCR) or a higher intermittent rating. However, some shipbuilders do state the speed achieved in a fully-loaded condition at a given percentage of MCR that is closer to normal operating conditions. In addition, the maximum speed is sometimes also stated. From this supplied data, the typical fully-loaded cruising speeds are typically found to be 90% of the maximum speed regardless of the type of vessel. On this basis, where the published speed is not fully qualified, it should be reduced by 10% to maintain consistency in the data or, at least, avoid cases of overstated performance. Finally, errors or inconsistencies may occur in the published engine power ratings of vessels. For example, on occasions, the engine data intended to be expressed in terms of horsepower is actually shown as kilowatts or vice versa. On other occasions, the number of installed engines of a given rating is incorrectly identified. Additionally, the ratings assigned to any particular engine type vary depending on operating conditions and duty, and it is unlikely for this to be consistently captured in the published data. Nevertheless, these errors and inconsistencies must be ignored in order to tabulate sufficient data for comparison.

Using passenger capacity instead of displacement, the Passenger Transport Efficiency (η_{PT}) is defined as:

$$\eta_{PT} = N.V/P$$

where N is the passenger capacity, V is the ship speed in knots and P is installed power in kilowatts. No attempt is made to non-dimensionalise this ratio in the following presentation although this could be done by assuming a standard passenger weight and adopting consistent units. Other authors have provided comparative data in this form by considering the available deadweight or payload capacity. It can be seen that η_{PT} is the inverse of the format of specific tractive force. In other words, the higher the η_{PT}, the more efficient the craft. The numerator (N.V) in the passenger transport efficiency equation is also a meaningful quantity, which can be referred to as the work capacity (WC), ie. WC = NV. As the name implies, it gives an indication of the amount of productive work the vessel is capable of doing over a nominal period of time. For example, a 75 passenger ferry cruising at 30 kn can transport the same number of passengers the same distance per day as a 150 passenger ferry cruising at 15 kn if the turn-around time alongside a wharf and while manoeuvring is ignored. Work capacity also gives an indirect measure of the possible income from passenger fares.

Fuel consumption makes up a significant portion of the total operating cost of a fast ferry, and is one of the cost drivers that the operator can influence though a smart choice of ferry type. Fuel consumption at cruising speed is approximately proportional to the installed power of the vessel. As such, η_{PT} is a ratio of income potential to operating cost and is therefore a useful indicator of the profitability of a fast ferry when only limited vessel data is available for comparison. This parameter should therefore be of interest to not only naval architects, but also accountants! In practice, an operator must also consider the capital costs, maintenance and crewing requirements, sea conditions, demand for capacity and frequency of service on the operating route, and any special docking requirements, etc., in making an appropriate choice of ferry type as these additional considerations will all have an influence on the profitability of the service.

The results shown in Figure 1 and 2 compare work capacity and passenger transport efficiency of various types of fast passenger ferries. To maintain consistency, vehicle-passenger ferries are omitted. In both cases, cruising speed has been used as the abscissa. With the cruising speed having a strong influence on the power requirement of a vessel, it is more appropriate to compare the performance of different craft types within narrow speed bands.

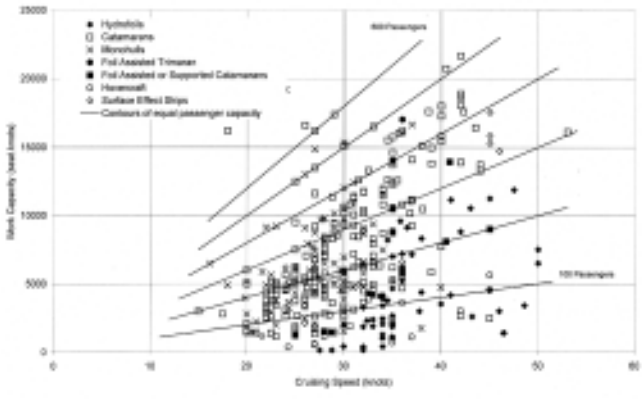

Figure 1 — Work Capacity versus Speed for Passenger Ferries

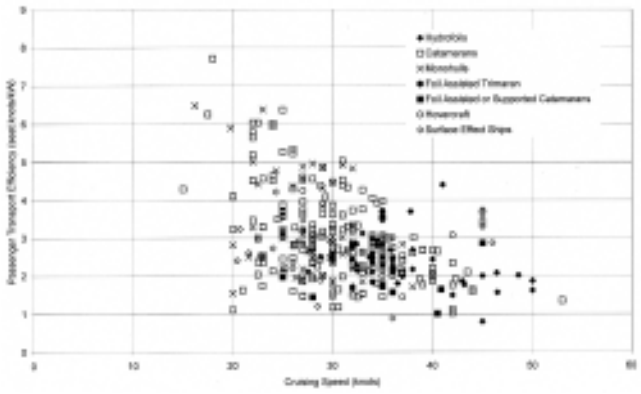

Figure 2 — Passenger Transport Efficiency versus Speed for Passenger Ferries

Examination of Figure 1 shows that most fast monohull ferries are designed for cruising speeds of up to about 35 kn while a number of catamarans are capable of cruising speeds beyond 40 kn. By comparison, the cruising speeds of hydrofoils are between 30 to 50 kn. The work capacity (WC) does not favour any particular vessel types, but all have a broad work capacity range. Some vessels achieve a high work capacity through the adoption of a high-density seating layout, sometimes carried over twin decks. However, the potential to increase the earning capacity of the vessel through higher-density seating may be offset by reduced passenger comfort and the expectation of lower fare costs. The general trend is that hydrofoils achieve a given level of work capacity though higher transit speed but with lower seating capacity compared to monohulls and catamarans. This can translate to an increased frequency of service on some operating routes to the benefit of commuters.

Figure 2, which is derived from calm-water performance, shows that both catamarans and monohulls are able to achieve a relatively high η_{PT} at lower speeds. The 'state of the art' for achieved efficiency falls off with increasing cruising speed. Beyond approximately 35 kn, hydrofoils achieve amongst the highest η_{PT} values within their speed range. Not indicated in Figure 2 is the ability for hydrofoils to maintain high cruising speeds in sea conditions where the speed of other vessel types has been reduced because of added resistance or the desire to maintain reasonable passenger comfort. Objective performance data for vessels operating in waves is difficult to obtain; however, indicative comparisons are presented by Eames (1985) and reproduced in Figure 3. The trend for only modest speed reductions for hydrofoils as sea state increases is supported by full scale performance data presented by Johnston (1985) for various hydrofoils as reproduced in Figure 4.

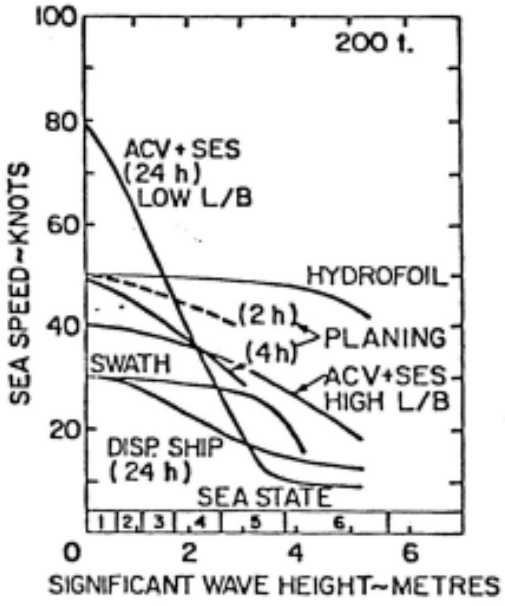

Figure 3 — Maximum Speed in Waves for 200 t Ships [Eames (1985)]

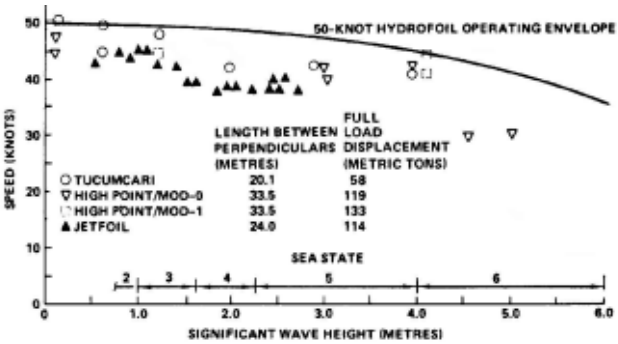

Figure 4 — Effect of Sea State on Hydrofoil Ship Speed [Johnston (1985)]

In conclusion, there is a market for hydrofoils where evaluation of the route suggests the need for a fleet cruising at 35 knots, or more particularly when subject to higher sea states. Apart from potential economic advantages for the operator, the passengers can enjoy a comfortable ride and arrive at their destination a little earlier.

My thanks to Nigel Watson at Seastate Pty Ltd for providing editorial comments and additional insights.

Martin Grimm

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Dear Sir,

I understand the problems David Gosling described in the November 2003 edition of *The ANA* about computer-generated drawings and data. I still draw and build by hand and all of my stability submissions to the Waterways Authority were produced by hand, although I have submitted nothing in the last 5 years.

The majority of my present work is in Malaysia, where we hand cut aluminium vessels for various projects. Last year we launched 11 aluminium boats (four 13.2 m, five 22.8 m, two 6 m) and three 12.2 m GRP boats. We find it cheaper and quicker to draw and cut by hand. A manually-cut boat does not require detailed drawings, compared to a kit boat where every component must be generated, nested and cut. It also helps when the designer (me) is doing the cutting.

The kit boat process is very linear — the designer must generate all of the components (i.e., draw the whole structure), nest them and send them off to the cutter. After possibly waiting in a queue for several days, the plates are cut (usually one at a time), packed, and then shipped overseas.

In contrast, I can produce a material take-off from the GA and scantling calculations, then generate a reduced number of drawings (survey authorities never ask for every frame and bracket). The material is being shipped while the drawings are being completed. I then arrive on site as the material is arriving and we can loft and cut within days.

The time taken to mark and cut the components is not long. For instance, two of us were able to mark all the hull components for five 22.8 m catamarans and have the yard assemble them in four-and-a-half-weeks. Many people think that a kit boat saves a lot of time, but the frames only come as pre-cut components and still need to be tacked on the loft (which many people don't do), rider bar fitted and welded, and so the kit only saves the component cutting (and stringer cut-outs). We generally find that the manual route shaves about 2 months off an overseas project.

The other problem I've experienced with CAD drawings is a lack of planning. No one seems to want to sketch and calculate beforehand and it seems common to just jump onto the computer and draw. Anyone who draws by hand will tell you that changes are difficult, so you must plan the work before you start. This may explain why many CAD drawings look pretty, but contain so many basic construction errors.

Greg Cox

NEWS FROM THE SECTIONS

New South Wales

Committee Meetings

The NSW Section Committee met on 18 November and, other than routine matters, discussed:

- SMIX Bash: Advertising flyer not received by all, to be re-sent; raffle tickets for model of *James Craig* nearly completed and to be sold prior to the day; model to be collected and photographed; sponsorships arriving and ticket sales slow but progressing.
- Technical Meeting Program 2004: We may have a problem with the booking of the venue, this to be monitored; further topics discussed.
- The visit to the FFG Upgrade Project at ADI was cancelled due to lack of interest (three definite, two possible). Visits will only be arranged for special vessels.
- Pacific 2004: Roster for crewing and entry for crew for RINA stand arranged.
- Finance: $3548 at the bank, which is mostly SMIX Bash funding, reducing to $424 when all credits and debits due are accounted.

The NSW Section Committee also met on 5 February in conjunction with Pacific 2004 with the Chief Executive, Trevor Blakeley, in attendance and, other than routine matters, discussed:

- SMIX Bash 2003: Generally regarded as successful; some suggestions made for improvements to the organization, including the provision of credit-card payment. The event has returned a small profit, which has been shared equally by IMarEST (Sydney Branch) and RINA (NSW Section).
- Technical Meeting Program: The Engineers Australia venue has been secured for 2004, but with a change to alternating first Wednesdays and Thursdays each month. Presentation topics still to be arranged for June, July and August; five topics proposed and to be investigated.
- Walter Atkinson Award 2003: List of eligible papers to be prepared for discussion.
- Committee Positions for 2004: All committee members signified their willingness to continue in present positions for another year.
- Finance: Projected budget expenses for 2004 of $1538 advised to Australian Division. $1728 at the bank, which is mostly SMIX Bash funding, reducing to $600 when all credits and debits due are accounted.
- Professional Indemnity Insurance: The Chief Executive outlined the situation: RINA have an arrangement with Marsh for PI Insurance for members worldwide. Bryan Chapman has also been discussing this with Engineers Australia, and they are apparently close to concluding an arrangement for EA members. The Association of Professional Engineers, Scientists and Managers of Australia (APESMA) is also making progress on an arrangement for members, and in limiting the amount of possible claims.

Following the February committee meeting, most of the members (Craig Boulton, Adrian Broadbent, Lina Diaz, Phil Helmore, Todd Maybury, Bruce McRae, Grahame Parker, Graham Taylor, and Martin Williams), together with David Gosling, took Trevor Blakeley to dinner at the nearby Vieri Italian restaurant which overlooks Darling Harbour. Discussions ranged far and wide.

SMIX Bash 2003

The fourth SMIX (Sydney Marine Industry Christmas) Bash was held on Thursday 4 December aboard the beautifully-restored *James Craig* alongside Wharf 7, Darling Harbour, from 1730 to 2230. This party for the whole marine industry was organised jointly by RINA (NSW Section) and IMarEST (Sydney Branch). About 140 guests came from the full spectrum of the marine industry, including naval architects, marine engineers, drafters, boatbuilders, machinery and equipment suppliers, regulators, classifiers, surveyors, operators, managers, pilots, navigators, researchers, and educators. Equally importantly, the full spectrum of age groups was represented, from present students to the elders of the marine community. It was also great to see intrastate and interstate visitors in the throng, including Rob Gehling, president of the Australian Division, from Canberra, a whole cohort from Newcastle, Gregor Macfarlane and Giles Thomas from the AMC in Launceston and Prof. Mike Davis from UTas in Hobart.

Sydney turned on a tropical downpour between 1530 and 1630, causing serious flooding, many traffic accidents and major traffic delays, none of which encouraged or helped SMIX revellers to get there on time or to swell the numbers. However, after the deluge, the rain cleared away by 1730 and turned on a beautiful evening, and many partners in attendance enjoyed the view from the decks of *James Craig.* Drinks (beer, champagne, wine and soft drinks) were provided, and a buffet dinner was served in the 'tween decks.

Formalities were limited to one short speech by the Chair of the NSW Section, Phil Helmore, who welcomed the guests and thanked the organising committee and the industry sponsors.

Bill Weaver had built a magnificent fully-rigged model of *James Craig* in a bottle. Bill is a fifth-generation seafarer, from Solway Firth in Scotland, and went to sea at the age of 16 for the Blue Funnel Line. After 12 years at sea, he worked for the Maritime Services board in Newcastle for 33 years, and retired in 1983. He has built more than 300 ships in bottles, and all of them have been donated. Our thanks to Bill for his expertise and generosity in donating this one. The model was raffled and the winning ticket was drawn on the evening of SMIX Bash by Mrs Ann O'Connor on board the full-sized vessel. The winner was Bill Bixley. Congratulations Bill! The proceeds of the raffle have been donated to the Australian Heritage fleet.

Bill Weaver's Model of *James Craig* in a Bottle
(Photo courtesy Martin Williams)

RINA NSW would like to thank all our wonderful sponsors, without whom SMIX Bash could not happen. Our major sponsor was WARTSILA AUSTRALIA, and the event was also sponsored by:

- Adsteam Marine Ltd
- Akzo Noble (International Paints)
- AMC Search
- American Bureau of Shipping
- Analytical Control Engineering (Schottel)
- Australian Defence Industries
- Beurteaux Marine Interiors
- Captain Cook Cruises
- Det Norske Veritas
- Dilmun Navigation
- Electrotech Australia
- Energy Power Systems (Caterpillar)
- Germanischer Lloyd
- G. James Extrusions
- Incat Designs (Sydney)
- Lloyd's Register
- MAN B&W Diesel Australia
- Maritime Services Group
- North West Bay Ships
- Rolls-Royce Marine Australia
- Teekay Shipping (Australia)

Our thanks to them for their generosity and support of SMIX Bash 2003.

Pacific 2004

RINA had a stand at the Pacific 2004 International Maritime Exhibition, and this stand was crewed continuously from Tuesday through Friday by members of the NSW Section of RINA. The Chief Executive, Trevor Blakeley, also spent many hours there, giving expert advice, chatting to members and recruiting new ones. Many thanks to the crew, Craig Boulton, Adrian Broadbent, Lina Diaz, Don Gillies, Todd Maybury, Bruce McRae, Grahame Parker, Graham Taylor, Andrew Tuite and Martin Williams for their efforts.

Phil Helmore

ACT

On Tuesday 11 November, Mr Doug Beck from AMOG Consulting gave a technical presentation on *Systems Engineering and the ChangingProcess in Naval Ship Design from Naval Architecture towards Systems Engineering*.

The presentation outlined the shift during the past 25 years as the design process for the development of naval ships has changed. It has evolved from being principally a naval-architecture-based approach to a systems engineering based approach. The role and responsibility of the naval architect has also changed during this transition.

This presentation looked at the general process of systems engineering, the reasons why the design process for naval ships has had to change, and the justification that a systems-engineering approach to the design and procurement of the modern naval ship is the right approach. The presentation also reflected on the changing role of the naval architect in this process.

Some basic rules of the systems-engineering approach included:

- each item has its unique place in a system;
- each item will interconnect/interact with at least one other component; and
- each item will have an influence/impact ("cost") on other parts of the system

Some working rules of the systems engineering approach included:

- never confuse change with progress;
- better is the enemy of good;
- if it is not written down it never happened;
- a thing not worth doing is not worth doing well;
- plan your work and work your plan;
- never conduct a test if you can't live with the results;
- nothing is impossible to the person who does not have to do it. (project managers!); and
- we *never* have time to do it right but we *always seem to* have time to do it twice (someone else will fix it?)

Doug outlined the complexity of the naval ship design and its increasing need to adopt the systems-engineering philosophy to design. Some appropriate points from the presentation are given below:

- A Naval ship is one of the most complex design objects imaginable — it is the equivalent of a small town and its infrastructure, contained within a mobile platform, operates in a changing (hostile) environment.
- It is a multi-disciplined task that can readily be broken down to defined work packages.
- It is therefore an ideal product for the application of a systems-engineering approach.

"A (Naval) ship is, in brief, a self-contained body of interrelated members, components, spaces and areas and can, therefore, be defined as being a system of special relationships correlated to a common purpose, and enclosed by physical boundaries of which the form and extent are determined by practical considerations of sea-going efficiency" — RCN DoD Production's *Master Vocabulary of Principal Ship and Cost Components*.

Doug used this definition, dating from 1959, to explain how even more complex the design of naval ships has become since then. Today the naval ship is a fully-integrated, highly-automated fighting machine designed within severe environmental and legislative constraints.

On Wednesday 26 November, at a combined technical meeting of the ACT Sections of RINA and IMarEST a presentation was given by Mr Norman Rattenbury, Principal Surveyor in Lloyd's Register's Research and Development Department in London, on *Lloyd's Register's Rules for Naval Ship Machinery.*

The presentation covered the development and the content of Lloyd's Register's Naval Ship Rules as applicable to machinery and engineering systems. Norman explained the changes in the procurement of naval ships and developments in merchant ship design that led to the publication of the Rules, and provided reasoning why the classification of the machinery and engineering systems in naval ships is appropriate.

The concept of merchant ship classification was described as it forms a baseline for the classification of naval ships. The specific requirements of naval ships were discussed, dealing with the core classification requirements for machinery and engineering systems, plus optional requirements that a navy may choose to adopt in classing a naval ship. The scope of optional requirements, which include the application of international conventions and specific owner's requirements, was also described. The scope and process for machinery classification was explained from design appraisal, through construction to in- service survey.

The structure and content of the Rules and Regulations on which naval machinery class is based, and the interfaces with military operations and safety systems was explained. The application of the requirements and guidance in the Rules is determined by the operating environment and a ship's identified military capability and, in this respect, it is essential that the Naval Authority and the Navy understand their roles in specifying what they expect classification to cover for a particular ship. These issues were addressed in the presentation.

Finally, some of the benefits of naval ship classification and adopting appropriate commercial standards were described.

Michael O'Connor

Queensland

The Queensland Section did not hold its scheduled December technical meeting because of its involvement with the Ausmarine East Conference in Brisbane on 30 October. Instead, a Section Christmas Bash and Dinner was held at the Hamilton Hotel in Brisbane during the Christmas week. About twenty members and guests attended the drinks session, and ten stayed for dinner. The event proved to be most enjoyable and gave the wives a chance to meet. A big vote of thanks must go to Brian Hutchison for organising the event.

Brian Robson

Western Australia

By the time you read this, the WA section will have held its Annual General Meeting and hosted a visit from RINA CEO Trevor Blakeley. There will be some new blood on the committee this year as three of its members — Jim Black, Kim Klaka and Damien Smith — have reached the end of their four year term, and Roger Best is also moving on. More news in the next edition.

Kim Klaka

Built by Image Marine, the patrol boats *Kassir*, *Dastoor* and *Mahroos* in Fremantle on 3 January awaiting shipment to Kuwait (Photo courtesy Martin Grimm)

COMING EVENTS

Australian Division AGM

The Annual General Meeting of the Australian Division of RINA will be held on Tuesday 23 March immediately following the scheduled technical meeting of RINA (NSW Section) and IMarEST (Sydney Branch) at 5:30 for 6:00 pm in the Harricks Auditorium at the Institution of Engineers, Australia, 118 Alfred St, North Sydney; see notice elsewhere in this issue and separate notice mailed to members with this issue.

NSW Section AGM and Technical Meetings

The Annual General Meeting of the NSW Section of RINA will be held on Tuesday 23 March immediately following the AGM of the Australian Division of RINA which, in turn, follows the scheduled technical meeting of RINA (NSW Section) and IMarEST (Sydney Branch) at 5:30 for 6:00 pm in the Harricks Auditorium at the Institution of Engineers, Australia, 118 Alfred St, North Sydney; see notice mailed to NSW members with this issue.

Technical meetings are generally combined with the Sydney Branch of the IMarEST and held on alternating first Wednesdays and Thursdays of each month in the Harricks Auditorium at Engineers Australia, 118 Alfred St, Milsons Point, starting at 5:30 pm for 6:00 pm and finishing by 8:00 pm. The program of meetings for 2004 (with exceptions noted) is as follows:

Wed 11 Feb	Greg Hellessey, Australian Customs *The Operation, Crewing and Maintenance of the Australian Customs Service Bay-class Patrol Boats* (second Wednesday to avoid Pacific 2004)
Tue 23 Mar	Kevin Porter, Lloyd's Register *Applications of Advanced Composites in Ship Structures* (fourth Tuesday)
Wed 7 Apr	Richard Hudson, Consultant *Frozen in Time: a Crankshaft Repair*
Thur 6 May	Hugh Hodgkinson, Hodgkinson and McInnes *Copyright, Patents and Trademarks in the Marine Industry*
Wed 2 Jun	RINA, TBA
Thur 1 Jul	RINA, TBA
Wed 4 Aug	IMarEST, TBA
Thur 2 Sep	Stephen Quigley and Robert Tulk, North West Bay Ships *Trimarans: the Ships of the Future*
Wed 6 Oct	Colin Rudd, Sydney Ports Corporation *Port Botany Expansion*
Thur 2 Dec	SMIX Bash 2004

Queensland Meetings

The next Queensland Section Meeting will be the section Annual General Meeting on 2 March 2004 at 1830 in Brisbane. A short technical meeting will follow the AGM. The meeting location will be advised to section members at a later date.

HoverWorld Expo 2004

In commemoration of the World's First Hovercraft Race held in Canberra in 1964, HoverWorld Expo 2004 will take place from 28 December 2004 to 3 January 2005 at Lake Burley Griffin's Black Mountain Peninsula, near the site of the 1964 race. HoverWorld Expo will be an all-inclusive air-cushion vehicle event patterned after World Hovercraft Week 2002 in Terre Haute, Indiana, USA, in which 18 nations participated.

HoverWorld Expo 2004 will encompass the first World Championship Hovercraft Endurance Race; a Pioneer's Race among the original 1964 competitors; the Hovercraft World Speed Record Challenge; a cruise on the Molonglo River; the Canadian Air Cushion Technology Society's 28th International Symposium on Air Cushion Technology; and the second World Symposium on Hovercraft Rescue. In addition, Tech Talks by notables in the field of hovercraft technology will be given throughout the week, and an elaborate hovercraft exhibit will be on display at the National Science and Technology Centre.

Further details can be obtained from the article elsewhere in this issue, as well as from the website www.hoverworldexpo.com or from Professor Lawrence Doctors on (02) 9385 4098 or email L.Doctors@unsw.edu.au.

CACTS 28th International Symposium on Air Cushion Technology Call for Papers

As a part of HoverWorld Expo 2004, the Canadian Air Cushion Technology Society's (CACTS) 28th International Symposium on Air Cushion Technology will take place from 29 to 31 December 2004 at the Australian National University. Papers on all aspects of air-cushion technology may be submitted; papers addressing sport- and racing-hovercraft design are particularly encouraged. Papers on any aspect of hovercraft rescue may also be submitted for presentation at the second World Symposium on Hovercraft Rescue on 28 December.

The deadline for submission of abstracts is 28 June 2004. Further details can be obtained from the article elsewhere in this issue, as well as from the website www.hoverworldexpo.com, where a list of suggested topics and submission instructions may be found at www.hoverworldexpo.com/callforpapers/callforpapers.htm. You may also contact Professor Lawrence Doctors, who is serving as Chairman of the Symposium, on (02) 9385 4098 or email L.Doctors@unsw.edu.au.

Launch of Last Anzac-class Frigate

The tenth Anzac-class frigate, *Perth*, will be named by Mrs Margaret Gee and launched at the Tenix Defence Pty Ltd Williamstown shipyard on Saturday 20 March 2004. This event will be the last launching in the biggest naval shipbuilding programme for many years, with the construction of the ten frigates and six Collins-class submarines. Unfortunately there is now a gap before the next wave of major naval new construction presents more challenges for Australia's shipbuilders — but it was ever thus.

HoverWorld Expo 2004

Chris Fitzgerald
Chairman, HoverWorld Expo 2004
Sharolyn Herring
Marketing/Public Relations Director, HoverWorld Expo 2004
Editor, *HoverWorld Insider*

HoverWorld Expo 2004

On 14 March 1964, more than 30 000 spectators gathered on the shores of then partially-filled Lake Burley Griffin to watch an event unprecedented in history: the World's First Hovercraft Race. In April 1964, *Flight International* (London) devoted a special supplement to air-cushion vehicles, in which it wrote of the event:

> *14 March 1964 may become a famous date in ACV (Air-Cushion Vehicle) history, for on that day, in Canberra, the world's first competitive hovercraft trials took place. An analogy may be drawn between the Canberra trials of 1964 and the Rheims air meeting of 1909: both mark the beginning of competitive development in their respective fields, with relatively primitive machines conceived by enthusiastic experimenters.*

An upcoming event may well become an equally-important date in ACV history. In celebration of the 40th Anniversary of the 1964 race, the world's fastest hovercraft and leading experts will converge in Canberra on 28 December 2004 through 3 January 2005 for HoverWorld Expo 2004. The event will take place at Lake Burley Griffin's Black Mountain Peninsula, near the site of the original race, and at various venues throughout Canberra and Australia.

The 1964 event was staged by the Canberra Branch of the Royal Aeronautical Society, which has given their full support to HoverWorld Expo 2004. The event is also sanctioned and supported by the National Capital Authority, Australian Capital Tourism, and the Australian Hovercraft Federation.

This all-inclusive event is an expansion of World Hovercraft Week 2002 in the US, in which eighteen nations participated. While complete details may be found on the official website at www.HoverWorldExpo.com, the event will encompass the following:

- The first World Championship Hovercraft Endurance Race.
- Historic Pioneers' Race among the original 1964 competitors.
- Model and human-powered hovercraft races.
- The Hovercraft World Speed Record Challenge.
- The Twenty-eighth International Symposium on Air Cushion Technology.
- The Second World Symposium on Hovercraft Rescue
- "Tech Talks" throughout the week by the world's foremost hovercraft experts.
- The launch of DiscoverHover, an international school hovercraft program.
- Museum exhibits.

The First World Championship Hovercraft Endurance Race

During the last 40 years, hovercraft racing has become an established sport. HoverWorld Expo 2004, however, will debut an entirely new form of racing: hovercraft endurance racing. Ordinary hovercraft races are generally short. The HoverWorld Expo endurance race, in contrast, will be a day-long, 100-lap continuous race over land and water, with pit stops. The introduction of endurance racing is specifically designed to advance hovercraft technology, since this form of racing requires improvements in craft durability and reliability.

Another feature unique to hovercraft endurance racing is that it opens the field to a wider variety of competitors. The starting line-up is determined by handicapping: based on each craft's best time in the time trials, the slowest hovercraft will start first; the fastest will start last. This expands the field of entries to welcome everyone and every type of hovercraft, since a racing model is not required. Novices, world champions, students, women and celebrities will compete together in a race where everyone has an equal chance to win.

Allen Hawkins sitting in the overall winning craft in 1964
(Photo courtesy Lawry Doctors)

Historic Pioneers' Race

An Australia-wide search is underway to find the crews of the eleven hovercraft that competed in the 1964 race and invite them to compete again at HoverWorld Expo 2004 in an honorary Pioneers' Race. As of this writing, seven of the original eighteen participants have been located.

HoverWorld Expo is actually being organized by one of those pioneers. Chris Fitzgerald, formerly of Melbourne and a participant in the 1964 race, is the founder of the World Hovercraft Organization, under whose auspices the event is being staged. Fitzgerald is also President of Neoteric Hovercraft, Inc., the world's original manufacturer of light hovercraft for the recreational, rescue and commercial market. Neoteric is based in Terre Haute, Indiana, USA.

Model and human-powered hovercraft races

Radio-controlled model hovercraft have become a popular hobby amongst both children and adults. HoverWorld Expo will provide an opportunity for enthusiasts from around the world to pit their craft against each other in model hovercraft races.

HoverWorld Expo will also present the world's first human-powered hovercraft race. These unique vehicles, sporting propellers but pedalled like a bicycle, are a challenge to construct since they must be extraordinarily light — typically less than 50 kilograms.

World Speed Record Challenge

The fastest hovercraft in the world will be pushed to the limit at the HoverWorld Expo World Speed Record Challenge. Neoteric Hovercraft, Inc. has offered a handsome prize for the top speed — $US10 000 — provided that the current world speed record is exceeded by 16 km/h. The current record is 137.376 km/h, achieved in Portugal in 1995 by Bob Windt, an American. The top speed at the World's First Hovercraft Race was less than 48 km/h.

Allen Hawkins driving the overall winning craft to the finish line
(Photo courtesy Lawry Doctors)

28th International Symposium on Air Cushion Technology

For more than thirty years, the Canadian Air Cushion Technology Society (CACTS) has held symposia on air-cushion technology, in collaboration with other societies devoted to air cushion vehicles/hovercraft. CACTS is a constituent society of the Canadian Aeronautics and Space Institute.

For the first time, this year's Symposium will occur in conjunction with HoverWorld Expo 2004. The Symposium will take place at the Australian National University, Canberra, from 29 to 31 December 2004.

Papers are now being accepted for presentation at the Symposium. Papers on all aspects of air-cushion technology may be submitted. Since the Symposium will occur concurrently with HoverWorld Expo 2004, papers addressing both sport- and racing-hovercraft designs are particularly encouraged. The symposium registration fee will be reduced by half for one author per accepted paper, and selected papers will be reviewed for publication in the *Canadian Aeronautics and Space Journal*.

The deadline for submission of abstracts is 28 June 2004. Further details can be obtained from www.HoverWorldExpo.com or from Professor Lawrence Doctors, Chairman of the Symposium, on (02) 9385 4098 or email L.Doctors@unsw.edu.au.

Second World Symposium on Hovercraft Rescue

Hovercraft are used widely in search-and-rescue operations due to their unique ability to master terrain that other rescue vehicles cannot, as well as to keep rescue personnel above the danger, not in it. The World Symposium on Hovercraft Rescue will bring together personnel from fire departments, law-enforcement and other rescue agencies across the world in an effort to continuously improve hovercraft rescue standard operating procedures.

"Tech Talks"

Informal onsite "Tech Talks" will take place throughout the week of HoverWorld Expo 2004. A wide variety of topics will be presented by world experts in hovercraft and air-cushion vehicles, from hovercraft to design to choosing the right engine to "how to" demonstrations on using various materials in the construction of hovercraft.

DiscoverHover: the Build-a-Hovercraft International School Program

HoverWorld Expo 2004 will mark the inaugural racing event of DiscoverHover, the World Hovercraft Organization's international school hovercraft program. With the world's foremost hovercraft experts serving as an advisory board, DiscoverHover provides free hovercraft plans, instructions and educational materials to schools and youth organizations throughout the world, enabling students to build a racing hovercraft and compete in local, national and international hovercraft races.

DiscoverHover will pay the shipping costs for qualifying student hovercraft, giving them the opportunity to travel to Canberra and compete in the first World Championship Hovercraft Endurance Race at HoverWorld Expo 2004.

Further details about the DiscoverHover program appear on the web site www.DiscoverHover.org.

Museum Exhibits

The HoverWorld Expo 2004 "Pace Craft" that will start the World Championship Hoversraft Endurance Race will arrive in Australia via shipping container in March; it will be exhibited at various venues throughout Australia until December.

In addition, museum exhibits are being planned for both the Australian National Maritime Museum in Sydney and the National Science and Technology Centre in Canberra. The exhibits will include hovercraft history materials from the British Hovercraft Museum, as well as a one-passenger HoverChair that gives children a chance to pilot a hovercraft on their own.

In summary, HoverWorld Expo 2004 is a unique opportunity for all to celebrate Australia's most notable claim to air-cushion vehicle fame, and to witness history being made once again in Canberra.

Flashback: The World's First Hovercraft Race

Before moving forward into the future of air-cushion vehicles in Canberra this year, we invite you to step back forty years in history to experience the World's First Hovercraft Race. Extensive information about the 1964 event, including photo galleries and video footage, may be found at www.HoverWorldExpo.com.

The World's First Hovercraft Race was, in fact, known in 1964 as "The World's First Ground Effect Machine Race." Sir Christopher Cockerell, the inventor of the hovercraft, copyrighted the term "hovercraft" as a commercial name in 1955 so it was not available for public use. Later, Cockerell generously handed the name over to the public domain.

The judges, including the late Professor Tom Fink (holding a writing pad), studying the craft built by Bill Selge and K.M. McLeod in 1964
(Photo courtesy Lawry Doctors)

Chris Fitzgerald, Chairman of HoverWorld Expo 2004, was the youngest competitor in the 1964 race. In a recent issue of *HoverWorld Insider*, the official newsletter of the World Hovercraft Organization, he editorialised some of his recollections:

"After nearly forty years I can still vividly recall the enthusiasm surrounding the world's first hovercraft race in Canberra. We original participants were filled with a spirit of self-reliance, an intrigue with newness, a frontier mentality, a naiveté of technological difficulties, a dream to experience the sensation of hovering, and a possibility for fame and fortune. Despite hovercraft that wouldn't start, only five that managed to stagger across the finish line, and fame and fortune that is yet to arrive, we were undaunted by difficulties and remain so today.

"That undaunted spirit, widely evident among those in the world of air-cushion vehicles, is the strength behind the evolution of the hovercraft. We've come a long way since those early hovercraft days. Hovercraft racing is now an established sport, and the vehicle that was once an obscure, peculiar hobby is now used in most major nations of the world for a diversity of important purposes. Hovercraft save lives, transport tanks and troops, ferry passengers, enforce laws, control wildlife, assist in agriculture, entertain the public and are enjoyed by private enthusiasts across the globe."

Eric Shackle, an Australian journalist who covered the 1964 event, also recalls:

"Ten mostly backyard-built mechanical hares and tortoises competed in the World's first Hovercraft Race in Australia's capital, Canberra, on 14 March 1964. One of the amphibious hares sank, three had to be towed ashore, and a tortoise was the first of only five to cross the finish line. The tenth failed to start.

"The race took place on a cold, windy Sunday morning, on the city's new man-made scenic Lake Burley Griffin, then only part-filled. The event, one of several celebrations marking the 51st anniversary of the naming of Canberra, was organized by the Canberra Branch of the Royal Aeronautical Society.

"I was there as the Sydney-based public relations officer for the sponsor, BP, which supplied fuel and lubricants for a wide variety of motors, ranging from tiny Victa lawnmower engines to one salvaged from a Catalina flying boat.

"The fastest craft was built by two friends, Arthur Powell and Roy Raymond, both living in the Canberra suburb of Ainslie. Raymond recalls, 'Two motors were needed, one to give it lift and the other for forward drive. The vector motor came from an old World War Catalina flying boat. It was a V-twin generator motor which had been used to keep batteries charged when the Cat was moored in water. The other engine was a two-cylinder Sunbeam motor which had been used in motorbikes. On the demonstration run, disaster struck on the way back to the shore. When I stopped in front of the crowd, the vector drive-shaft broke, so I failed to cross the finish-line, and we were disqualified, after achieving the fastest time over the main course.'"

"Raymond is now Australia's oldest licensed pilot. His lifelong friend, John Coggan, says, 'Roy has built boats, gliders, and powered aircraft. He flies his own plane, a J1 Taylor Cub which he totally rebuilt himself. With his son Barry, he flew around Australia in it a few years ago.'"

"Coggan recalls, 'They were good days when all this happened. We were flying Tiger Moths and building our own sailing boats and life was good.'"

"Hovercraft have come a long way since those days. They are used around the world to perform a variety of tasks. Travelling on a cushion of air, they can traverse any kind of surface — dry land, swamps, water, snow or ice. Large hovercraft have carried millions of passengers in many countries. Armed military hovercraft provided speedy river patrols in Vietnam. Tank- and troop-carrying hovercraft carried out beach landing missions in the Gulf War. Smaller craft are widely used for recreation, racing and rescue."

The craft built by Bill Selge and K.M. McLeod, at speed on Lake Burley Griffin
(Photo courtesy Lawry Doctors)

Further Reading

Further information about HoverWorld Expo 2004 and about hovercraft in general may be found at www.neoterichovercraft.com and www.worldhovercraft.org. You may also subscribe to *HoverWorld Insider*, the World Hovercraft Organization's free email newsletter covering hovercraft information, news and events at www.worldhovercraft.org/insider/index.htm.

ASEAN AUSTRALIAN ENGINEERING CONGRESS 2004 (AAEC 2004)

26–28 May 2004

Sutera Harbour Resort Kota Kinabalu, Sabah

www.tourhosts.com.au/aaec2004

CONGRESS THEMES

- **Regional Security**
- **Safety and Health**
- **Economic Development**
- **Sustainability**
- **Environmental Issues**

Call for Papers Deadline is 5 April 2004.
Submit your paper for consideration in the program to **sec@iem.po.my**

REGISTRATION FEES

Participation is open to all persons interested in engineering.
Those who wish to attend the Conference should register online at **www.tourhosts.com.au/aaec2004**.

Author Registration Fee **$420**

Standard Registration Fee **$485**

Payment Of Fees: *Payment may be made by personal cheque or credit card. Please note all transactions by credit card will appear on your statement as payment to Conference by THPL. Cheques should be made payable to the AAEC 2004 Conference.*

ACCOMMODATION

Accommodation has been reserved for Conference delegates in the 5 star Magellan Wing of Sutera Harbour Resort.

SUTERA HARBOUR RESORT – MAGELLAN WING		
Room Type	Deluxe Sea View Room SGL/DBL/TWN	Deluxe Garden View Room SGL/DBL/TWN
Bed & Breakfast Room Rate	AUD$128	AUD$113

- Room rates include **buffet breakfast** for 1 to 2 people.
- Rates are correct at time of printing and are inclusive of taxes.
- Rates may increase without notice due to changes in government charges, taxes, levies or currency fluctuations due to exchange rate.

How To Book Accommodation: Rooms are being held by the Conference Managers on behalf of the delegates until 23 April 2004. To book online and view terms and conditions please visit www.tourhosts.com.au/aaec2004 and complete the online registration form. The Conference Managers will forward your reservation and credit card details to the Sutera Harbour Resort.

Late bookings can be made through the Conference Managers after 23 April 2004 but are subject to availability.

OFFICIAL AIRLINES

Malaysia Airlines has been appointed the official international airline. Special rates for flights to Kota Kinabalu have been negotiated for conference delegates.

Return Flights **ex SYD/MEL/ADL/BNE**
$1,175.00 plus taxes

Return Flights **ex PERTH**
$1,050.00 plus taxes

malaysia

(deposit of AUD$200 is required within 14 days of booking the flight)

Seats have been reserved on Malaysia Airlines departing Sydney on 25 May to arrive Kota Kinabalu on 26 May and return on 29 May 2004. Other departure dates are available, please complete the airline information on the online registration form to book your flight or if you wish to fly at other times.

Airport Transfers: Transfers can be arranged on your behalf, to and from Kota Kinabalu Airport to Sutera Harbour Resort, at an additional cost of AUD$16 round trip. If required please advise the Conference Managers when booking your flight.

MORE INFORMATION ON REGISTRATION, ACCOMMODATION, FLIGHTS, TOURING OPTIONS AND TERMS AND CONDITIONS IS AVAILABLE ON THE CONFERENCE WEBSITE.

HOW TO REGISTER

To register for the AAEC 2004 Conference and book accommodation and flights please complete the online registration form at **www.tourhosts.com.au/aaec2004** or contact the Conference Managers for a copy of the registration form.

ADDRESS FOR COMMUNICATIONS

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The Institution of Engineers, Malaysia

Austal USA to Build Advanced Technology Demonstrator For ONR

Austal USA was awarded a contract in December to build a high-speed catamaran that will be used to demonstrate advanced hullform technology to the United States Office of Naval Research (ONR).

The 31.2 m vessel will be built for American Marine Holdings, which has been awarded a contract to deliver and demonstrate its SeaCoaster military vessel design to the ONR. The ONR coordinates, executes and promotes the science and technology programs of the Navy and Marine Corps as well as providing technical advice to the Chief of Naval Operations and the Secretary of the Navy.

Bill Pfister, Austal USA's Vice President of Government Projects, said the ONR project was a further example of the US military's strong interest in the use of high-speed vessels.

"The Navy, Army and Marine Corps have all experienced the benefits of the types of ships Austal is able to design and build, and they are clearly seeking to expand the application of this technology," he said, pointing out that Austal is already heavily involved in the defence arena.

"The 101 metre Austal catamaran, *WestPac Express*, has been a tremendous success story for the Marines from the day it was chartered by Military Sealift Command in 2001, and we are currently working on the design for the Navy's Littoral Combat Ship. The Army's Theater Support Vessel acquisition program is another project we are eagerly anticipating," he said.

The SeaCoaster catamaran design features cavities in each hull into which air is blown with the aim of reducing resistance and thus allowing higher speeds to be obtained. Following its evaluation by the ONR, American Marine Holdings expects various departments of the US military to decide on potential applications for the air-inducted technology and subsequently order additional vessels for specific uses.

American Marine Holdings President, Mr Mike Collins, said Austal USA was selected to build the vessel for ONR due to its expertise in aluminium vessel construction.

"Austal USA brings to this market a new dimension in high-speed marine transport, utilising the company's leading-edge technology and construction capabilities that were not previously available to US customers," he said.

Austal USA will build the vessel in its specialised aluminium shipbuilding facility in Mobile, Alabama, where a 58 m catamaran is also currently being constructed for Milwaukee-based ferry operator Lake Express.

Principal particulars

Overall length	31.2 m
Beam	9.75 m
Hull depth (moulded)	3.35 m
Main engines	Four 1045 kW diesels
Propulsion	Four surface-piercing propellers
Speed	Over 50 knots

THE ROYAL INSTITUTION OF NAVAL ARCHITECTS

AUSTRALIAN DIVISION

NOTICE OF ANNUAL GENERAL MEETING

Notice is hereby given that the Annual General Meeting of the Australian Division of the Royal Institution of Naval Architects will be held in the Harricks Auditorium of the Institution of Engineers, Australia, Eagle House, 118 Alfred Street, Milsons Point NSW on Tuesday 23 March 2004. The meeting will commence immediately following the combined RINA/IMarEst Technical Meeting commencing at 5.30 pm for 6.00 pm Sydney Time.

AGENDA

1. Opening
2. Apologies
3. To confirm the Minutes of the AGM held in Melbourne on Tuesday 25 March 2003
4. To receive the President's Report
5. To receive, consider and adopt the Financial Statements and Auditor's Report for the year ended 31 December 2003
6. Announcement of appointments to the Australian Division Council
7. Other business

Keith Adams
Secretary
February 2004

Spirit of Kangaroo Island Completed

Spirit of Kangaroo Island, a 50 m Ro-Ro ferry built by Austal Ships at Henderson in WA, was delivered in December last year to Adelaide-based Kangaroo Island Sealink.

At 50 m overall, with a beam of 18.3 m and a deadweight capacity of 350 t, the new vessel will be slightly larger than *Sealion*, the former flagship of the Sealink fleet.

Aluminium was chosen as the preferred material for both hull and superstructure, the reduced structural weight compared to steel construction enabling the deadweight capacity to be increased by 100 t over that of *Sealion*, while achieving a slightly higher speed with the same installed power.

Sydney-based AMD Marine Consulting carried out the preliminary and technical design and the detail design was completed by Austal Ships.

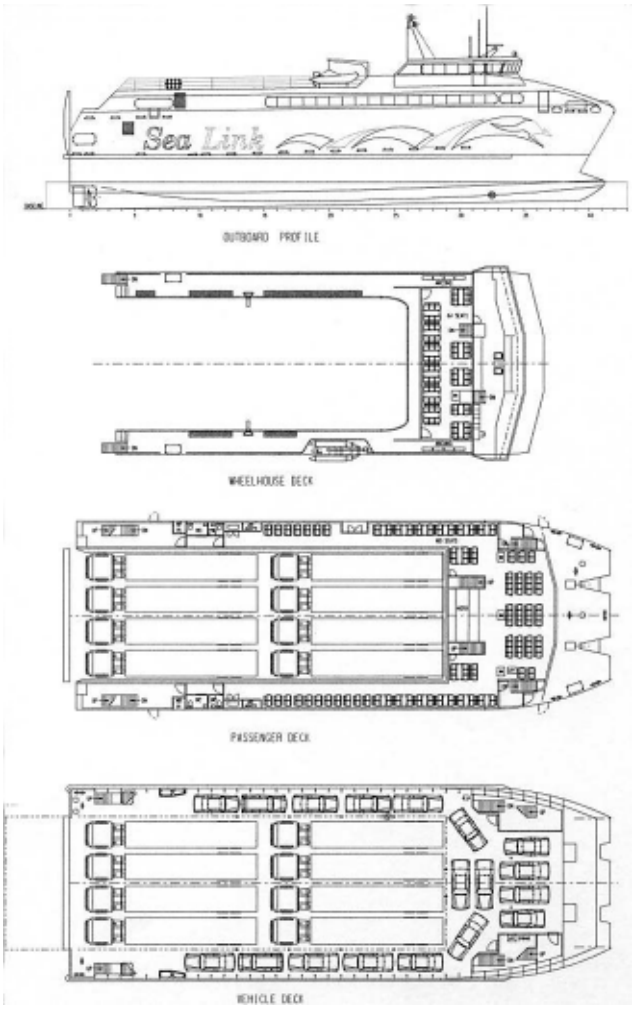
The vessel is truly multi-purpose, being used as a commuter vessel by Kangaroo Island residents, as a tourist ferry by national and international visitors and as a produce carrier by island-based businesses. The vessel can carry over 50 cars, or a combination of cars, trucks and coaches.

The deck layout and deadweight capability provides for the carriage of 8 semitrailers with room left for 16 cars. The open garage deck enables high loads to be carried, so large items of machinery or earth-moving equipment can be transported to the island. The vessel is also licensed to carry fuel and gas tankers and other dangerous goods, and has a fire-fighting system appropriate for this use; however, in fuel/gas-carrying mode, no more than 25 passengers are permitted on board.

The main passenger cabin is arranged in an elongated U-shape, starting at the front of the vessel and extending along each side of the central vehicle garage. The forward area is spacious, with large front windows providing visitors with a panoramic view of Kangaroo Island as the vessel approaches its base at Penneshaw. A licensed café is located at the aft end of this area. The arms of the U-shape extending aft along the sides of the vessel enable tables and pairs of aircraft-style seats to be arranged along the side windows, maximising the number of window seats.

In keeping with its role of ferrying tourists to visit the beaches, wildlife and national parks on Kangaroo Island, the vessel is fitted out with modern amenities inside the passenger lounges, and also provides outdoor areas for watching the dolphins which often shadow the vessel on its journey.

Launching day for *Spirit of Kangaroo Island*
(Photo courtesy AMD)



General Arrangement of *Spirit of Kangaroo Island*
(Image courtesy AMD)

Another passenger cabin is located in the port hull, providing a refuge for locals and truck drivers who have seen it all before, to read a book or snooze on the way home. The starboard hull is fitted with crew cabins and includes a shower and galley, as a number of crew sleep on board to reduce their own commuting time and to increase overnight security on the vessel.

Propulsion is provided by two Caterpillar 3512 engines driving five-blade fixed-pitch propellers through Reintjes gearboxes. Due to the small size of the mainland port at Cape Jervis, excellent manoeuvrability is required and this is provided by articulated rudders and two 160 kW electric bow thrusters.

Hypac of Adelaide supplied most of the hydraulic systems, including the anchor winch, four mooring capstans, stern ramp winch, dual steering gear, rescue boat davit, control valving for the deck machinery, and two dual electro-hydraulic power units (one aft and one forward). Having experienced the reliability and ease of maintenance of the Hypac units on other vessels, Kangaroo Island Sealink were insistent on using the Hypac equipment for *Spirit of Kangaroo Island*.

The vessel runs up to five return trips per day between

Penneshaw and Cape Jervis and, together with *Sealion*, provides the capacity to move 5 980 passengers and 1 080 cars per day in peak periods.

Principal Particulars

Length	50.4 m
Beam Moulded	18.3 m
Draft loaded	2.50 m
Passengers	250
Crew	6
Deadweight	370 t
Speed loaded	16 kn

Image Marine Deliveries

Cruise vessels produced by Image Marine grace the waters of two of the world's most famous harbours following the delivery of a pair of highly-customised catamarans to Hong Kong's New World First Travel Services Limited in October last year.

Equally suited to both sightseeing and charter roles, *First Travel XXXI* and *First Travel XXXII* are at 41.4 m, similar in length to Image Marine's two preceding completions, *Salten* and *Steigtind*. Whilst *Salten* and *Steigtind* transport passengers and cargo at 33 kn in the often sub-freezing temperatures of northern Norway, the two First Travel vessels will cruise the warmer climes of busy Hong Kong Harbour at around 16 knots.

"Image Marine's ability to successfully achieve the vastly different requirements of these consecutive projects speaks volumes for our design and construction capabilities," said Mr Mark Stothard, Image's Sales and Marketing Manager.

First Travel's new 'Hong Kong Dragon Cruise' service offers four different routes daily, including morning, afternoon, sunset and night cruises. These all depart from Victoria Harbour and cover sights such as Tsing Ma Bridge (the world's longest suspension bridge, carrying both vehicles and trains), the elegant Island South, and the laid-back outlying islands.

Mr Adolf Hsu, Managing Director of First Travel, said "Targeting both tourists and Hong Kong people, Hong Kong Dragon Cruise is positioned as the 'First Cruise in Hong Kong' for tourists and also as the people of Hong Kong's number one recommendation to their visitors."

Mr Hsu said the comfort and luxury provided by the Image Marine vessels contributed to his confidence in the future of the new service.

"By combining advanced new vessels featuring first-rate facilities with premium customer service and unique and comprehensive routes, Hong Kong Dragon Cruise has unveiled a new page for the local harbour cruise service and provides Hong Kong with a premium harbour-cruise service," he explained.

The vessels themselves are sights worth seeing, combining the New World group's striking orange, purple and green livery with an even more eye-catching Chinese golden dragon on the top deck. Over 16 m long, the dragons are particularly

spectacular when spraying water from their mouths and when highlighted in colourful light shows during evening cruises.

In traditional Chinese culture the dragons represent strength and opulence, which is fitting given the high standard of workmanship and fit out evident in *First Travel XXXI* and *First Travel XXXII*. In addition to the open top deck which provides panoramic views, passengers can choose between upper and lower enclosed decks which feature extra-large side windows and broad expanses of glass on the forward bulkheads to maximise viewing opportunities. Dimmable interior lighting enhances the evening and night cruise experiences and a multi-lingual onboard tourist information system provides insights into the city's history, culture and attractions.

The layout of the vessels features lounge and table arrangements throughout, with seats for 172 passengers on the main deck and 182 passengers on the upper deck. Each vessel can also carry passengers in wheelchairs. Other onboard facilities include a kiosk on the main deck serving a variety of drinks and light meals, an upper-deck bar and cultural booths providing explanations of Hong Kong's unique east-meets-west culture. Adding to the cruise experience, a variety of performances will be staged onboard, ranging from magic and live music to traditional Chinese acts including acrobatics.

To facilitate this, the vessels are equipped with professional-level audio-visual systems and part of the main deck forward converts to a dance floor, complete with lighting. This is achieved by removing the central section of seating, a process that takes only a short time. The incorporation of these features, plus catering facilities on the main deck and in the port hull, contributes to the catamarans' versatility and makes them an attractive charter option for functions, seminars and entertainment.

Principal Particulars

Length overall	41.4 m
Length waterline	39.5 m
Beam moulded	11.8 m
Hull depth moulded	3.5 m
Draft	1.8 m
Passengers	355
Crew	5
Fuel (maximum)	6 800 L

Propulsion

Engines	Two MTU 12V 2000 M70; 788kW at 2100 rpm each
Gearboxes	Two ZF 2500
Propellers	Two Stone Marine fixed pitch
Speed (85% MCR)	16 kn

Survey

Structure	Lloyds Register
Survey	Hong Kong Marine Department Harbour Cruise class

Queensland Industry News

After the delivery of a 43 m vessel to America in December, NQEA Australia Pty Ltd has continued with the building of four vessels, a 63 m passenger ship, a 58 m Ro-Pax ferry, a 35 m private yacht and a 24 m dive vessel.

On 10 January the aluminium superstructure of the 58 m ferry, *Moreton Venture*, was positioned on top of the separately built steel hull. The superstructure of the vessel was lifted with four cranes and the hull moved beneath using two Goldhofer hydraulic platform trailers owned by Lampson.

The particulars of *Moreton Venture* are:

Length overall	58 m
Beam	16 m
Design speed	16 knots
Passengers	400 max.
Designer	Incat Designs Sydney
Deadweight	250 t comprising 49 x 4WD vehicles or 6 x trucks and 10 x 4WD vehicles.

Erecting the superstructure of *Moreton Venture*
(Photo courtesy NQEA)

Azzura Yachts on the Gold Coast has just successfully completed the sea trials of their new 30.5 m motor yacht. The $9 million vessel achieved the expected 21 kn with the overall performance exceeding expectations. Being the largest vessel ever to be completely built at the Gold Coast City Marina, the vessel has received much media attention with the launch being attended by journalists, photographers and camera crews. The vessel is powered by four shafts each driven by a Caterpillar 3412E diesel. It will serve Moreton Island, operated by Hawkins Ferries Pty Ltd

The design office at Riviera Marine is busy working on new models for 2004, while all other local Gold Coast production boat builders are expecting another busy year ahead

In the Brisbane region, Aluminium Marine continues with the construction of a 23 m catamaran passenger ferry for operation out of Darwin. This vessel will have a design speed of 28 knots while carrying up to 160 passengers. A second 23 m cruise boat/passenger ferry is also under construction at this yard. This vessel is a shallow-draft design. Propulsion is by 708 kW MTU engines, coupled to Seafury surface drives. Both of these vessels are due for launch in the first half of this year.

At Brisbane Ship Constructions, work continues on three 30 m river passenger ferries for export. These vessels are in-house design with high speed and low wash.

Brisbane Shipworks has recently completed a 44 m luxury yacht. This company is planning to merge with Warren Yachts of NSW.

Commercial Marine Consulting Services have supplied the

design of another 29 m passenger ferry which is to be built in Hong Kong. This design is to Lloyd,s Rules.

New Wave Catamarans are currently building an 18m catamaran charter fishing vessel.

South Pacific Marine has delivered a 47 m car ferry to Stradbroke Ferries for operation in Moreton Bay, and now have a second 47m car ferry building for the Bahamas. Both ferries were designed in Queensland by Sea Transport Solutions.

Southern Hemisphere Shipyards have constructed the aluminium superstructure of a 47 m car ferry, designed by Sea Transport Solutions. The superstructure has been fitted to the steel hull of the vessel and it is now being outfitted.

Brian Robson

RAN Apprehends Suspected Illegal Fishing Vessel

A Royal Australian Navy warship has successfully apprehended a vessel suspected of fishing illegally in isolated Australian territorial waters, Defence Minister Robert Hill and Fisheries Minister Ian Macdonald announced in January.

The fishing vessel *Maya V* was apprehended late on 23 January after it was believed to have been fishing illegally within Australia's exclusive economic zone around the remote Heard and McDonald Islands, over 4000 kilometres south-west of Perth.

"Our frigate HMAS *Warramunga* and her sailors on patrol in Australia's southern oceans battled extremely bad weather and high seas to intercept and board *Maya V*," Senator Hill said.

"It is a credit to their skill and professionalism that they were able to overcome dangerous conditions to successfully board the vessel. These types of operations are always dangerous, but our sailors have exceptional training and extensive experience in environments ranging from Antarctic waters to the Persian Gulf."

The Navy boarding party first made contact with the *Maya V* on Thursday 22 January and an attempted boarding was abandoned after the prevailing weather worsened.

Maya V was issued with a legal direction to proceed to Fremantle and when weather conditions permitted late yesterday, the Navy took control of *Maya V* after sailors fast-roped to the fishing vessel's deck from *Warramunga's* Seahawk helicopter.

HMAS *Warramunga* at sea in the southern ocean, proving that she is a ship and not simply a naval platform
(RAN photograph)

RAN personnel boarding *Maya V*. The radar outfit is interesting for a fishing vessel
(RAN photograph)

Maya V had a Navy steaming party embarked and was escorted by HMAS *Warramunga* to Fremantle where she docked on 1 February. The Australian Fisheries Management Authority also had officers on board.

"This joint Defence Force-AFMA apprehension marks another blow to illegal fishers and proves once again that Australia has the capability to act decisively in all sorts of locations and conditions to protect our fisheries resources and territorial waters," Senator Macdonald said.

"This apprehension further builds on the announcement that the Prime Minister and myself made late last year of an $80 to $100 million commitment to fund armed patrols to protect this nation's sovereignty and the sustainability of our fisheries resources."

In October last year, suspected illegal fishing vessel *Viarsa I* was returned to Australia from the South Atlantic Ocean by a Navy steaming party after a 21-day hot pursuit and apprehension by Australian Customs and Fisheries Patrol Vessel *Southern Supporter*.

New CEO for Defence Materiel Organisation

On 30 January the Minister for Defence, Senator Robert Hill, welcomed the appointment of Dr Stephen Gumley as the new Chief Executive Officer of the Defence Materiel Organisation (DMO).

Dr Gumley has been the Chief Executive Officer and Managing Director of the Australian Submarine Corporation since July 2002.

The Secretary of the Department of Defence, Mr Richard Smith, made the appointment following consideration by a Selection Advisory Committee of some 100 applications or expressions of interest in the position.

DMO is responsible for the delivery of around 240 current capital projects at a total cost approaching $50 billion. If DMO were a commercial enterprise it would be considered as one of Australia's largest companies.

Dr Gumley, a Rhodes Scholar with high-level engineering qualifications, is 47 years of age. During his career he has served as a Vice-President (information services) for Boeing's Commercial Airplane Services in Seattle, USA, and as CEO of Global Lightning Technologies Group. He took up the new position on 25 February.

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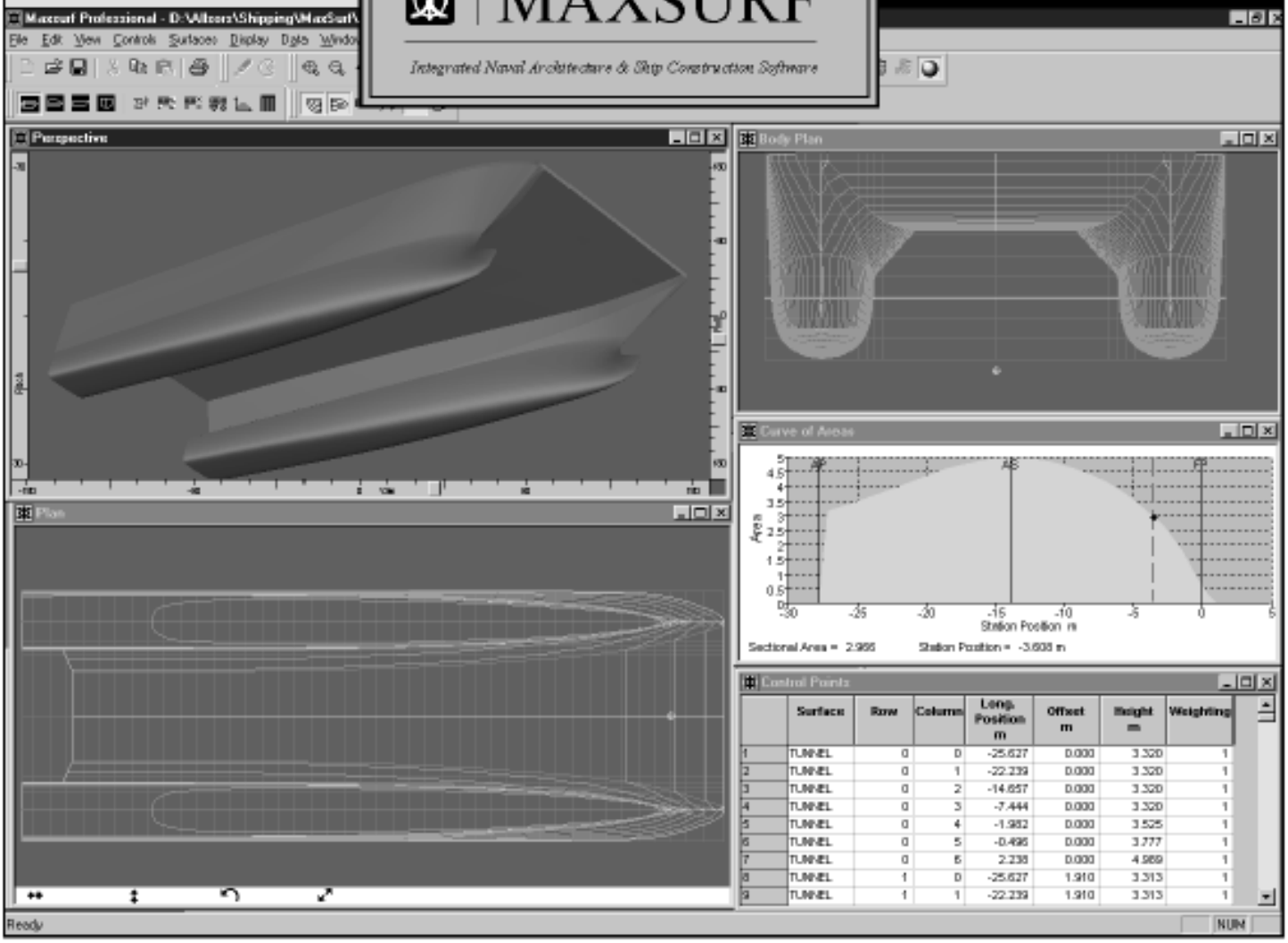


Work Starts on Armidale Class

In January, Defence Maritime Services Pty Limited (DMS) and Austal Ships began project start-up and pre-production activity for the Royal Australian Navy's new Armidale-class patrol boats. The twelve 56.8 m patrol boats will be delivered to the Defence Materiel Organisation. Austal also signed a contract with CEA Technologies for supply of the ships' communications and radio direction-finding systems.

The DMS–Austal partnership was selected ahead of eight other companies, after an exhaustive, multi-phase tender process begun in mid-2001. Austal Ships designed and will build the vessels at its shipyard in Henderson, Western Australia. All twelve patrol boats will be built within 42 months, with the first vessel, HMAS *Armidale*, scheduled to be delivered in May 2005, with the second and third six months later. DMS is managing development, integration and delivery of the full-capability package, including all training and logistic support requirements, and will provide in-service support to the vessels throughout their operational lives. CEA is supplying their Australian designed and developed Integrated Ships Communications System (CEA-ISCS) and the WARRLOCK Direction Finding (DF) system, both of which are already used by the Royal Australian Navy (RAN).

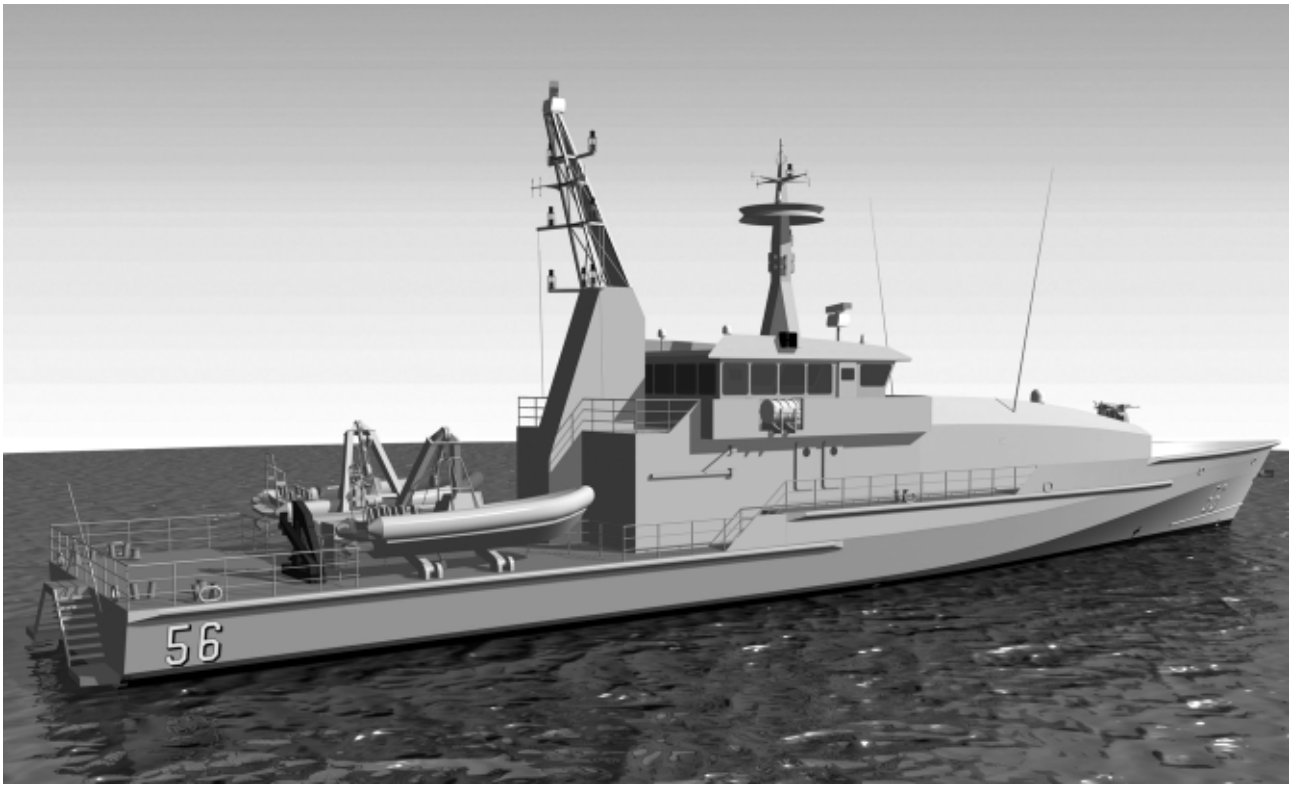
The vessels will be home ported in the northern Australian ports of Cairns and Darwin and will replace the RAN's current fleet of 15 Fremantle Class Patrol Boats, which are nearly 25 years old. As the principal maritime patrol and response element of Australia's National Civil Surveillance Program, the new vessels will primarily carry out surveillance, interception, investigation, apprehension and the escort to port of vessels suspected of illegal fisheries, quarantine, customs or immigration offences.

The Austal 56 m Patrol Boat

The new patrol boat will be a 56.8 m high-performance monohull that has been purpose-designed to meet to the RAN's operational requirements in an extremely affordable manner. Austal's design draws on the expertise gained through producing over 90 advanced purpose-built vessels, including Australia's Bay-class Customs patrol boats. DMS' experience as a ship operator, fleet manager and support provider to the RAN has also been directly applied to optimising long-term performance and operational reliability. Design and construction will be principally to internationally-accepted commercial standards for patrol boats, but with pertinent RAN standards and requirements applied where necessary.

The hard-chine semi-planing hull minimises resistance and will deliver superior seakeeping performance. Like the vessel's superstructure, the hull will be constructed from aluminium, which results in a lighter, more easily-driven platform that also requires less maintenance, particularly ship husbandry tasks such as the application and maintenance of anti-corrosion surface coatings. Adding to this, the reliability and supportability of onboard systems is enhanced through carefully-planned system back-ups and by maximum use of readily-available commercial equipment and spare parts.

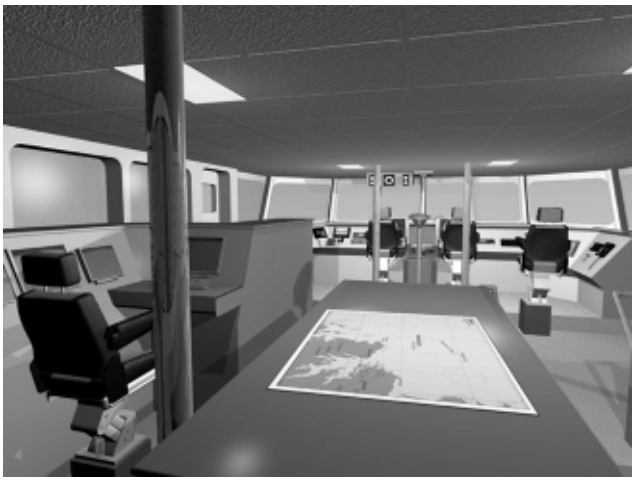
Detailed comparisons between equivalent steel and aluminium hulls established that there is only a minor difference in overall construction cost between the two alternatives. However, the aluminium patrol boat offers major savings in operating and through-life support costs. Tank testing and calculations showed that the aluminium vessel achieved the same performance with less power, resulting in a reduction in fuel consumption of over 20 per cent. This equates to around 1.8 million litres of fuel per year for a 12 boat fleet.



A starboard quarter view of the Armidale-class patrol boat
(Image courtesy Austal Ships)

The new boats have been designed to operate without re-supply for up to six weeks, but are equipped for replenishment at sea. This includes transferring personnel and light cargo between the boat and helicopters, and provision for refuelling from a supply vessel. The onboard fuel capacity provides a steaming range in excess of 3 000 n miles, which is a 20% increase over the RAN's existing patrol vessels.

The Fremantle-class boats have been averaging a total of 2 700 operational days per year (180 days/boat/year), whilst the more capable Armidale-class vessels and the DMS support system will provide the RAN with a total of 3 000 patrol days per annum (250 days/boat/year), plus up to 600 days per year surge capacity to meet operational contingencies.



An impression of the bridge of the new patrol boats
(Image courtesy Austal ships)

Propulsion for the new patrol boats will be provided by twin MTU diesel engines, developing 2 320 kW each and driving fixed-pitch propellers. This will enable the vessels to achieve speeds of at least 25 kn in Sea State 4. An electronically-controlled loitering system on the gearboxes enables sustained operation at speeds as low as four knots.

Twin spade rudders will give a tactical diameter of five boat lengths, with the counter-rotating propellers providing uniform turning characteristics to either port or starboard. The patrol boats can also be brought to rest from maximum speed within five boat lengths. Directional stability is enhanced by a centreline skeg, as well as bilge keels and active foils included in the motion control system, and at low speed a bow thruster will assist with berthing and unberthing evolutions.

Although based in the ports of Darwin and Cairns, and thus designed for operation in the tropical sea and weather conditions of Australia's northern waters, the new patrol boats will be suitable for deployment in southern waters, such as the South Tasman Rise fishery which lies some 300 nautical miles south of Tasmania (48°S). They will also be capable of deployment to Christmas and Cocos Islands and to other countries in the region for occasional exercises and cooperative operations.

At 56.8 m in length overall, the Austal design is some 15 metres longer than the RAN's existing patrol boats. Extensive testing has shown that this extra length, coupled with the active motion control system, means that the new vessels will be able to operate in a greater range of sea conditions than the Fremantle-class boats. They will be able to undertake surveillance operations to the top of Sea State 5, and interception, investigation, apprehension, escort and towing operations to the top of Sea State 4.

Designed and manufactured by Australian company Seastate, the motion-control system consists of two active fins in the midship region and transom-mounted trim tabs. These control elements reduce pitch, yaw and roll motions while underway. Fixed bilge keels and skegs also contribute to damping roll motions at rest and at slow speeds.

In addition to substantially improving ship operability, the better seakeeping of the Armidale-class vessels will reduce safety concerns raised by excessive ship motion and crew fatigue which is potentially a major inhibitor of operational performance. The emphasis that Austal and DMS placed on these and other habitability issues during the design process is reflected in the vessel layout, which has been specifically designed to maximise crew performance and comfort.

Situated in the midship region to reduce the effects of vessel pitching, the bridge has also been located as low as possible to minimise the lateral motions that will be experienced. Based around proven commercial solutions, the bridge arrangement allows for all-round vision from the control station. In addition to a command position and two navigating helm stations, the bridge features dedicated consoles for engineering, communications and weapons, plus bridge wing stations. The Austal Marine Link system enables all ship systems to be monitored and controlled from the bridge via an integrated network, and the vessels will operate with unmanned machinery spaces.

The Armidale-class patrol boats will be fitted with specialised systems to enable surveillance and threat detection as well as communication with all of the appropriate authorities in meeting their national surveillance role and other assigned tasks. In developing the design, Austal and DMS worked closely with CEA Technologies, an Australian company which specialises in the design, development and manufacture of such systems. The superstructure design, for example, has been optimised for communications and surveillance activities without placing restrictions on other mission-critical functions such as weaponry and sea-boat evolutions. These considerations resulted in the adoption of the distinctive twin mast arrangement.

Key components of the electronics fit include CEA Technologies' Integrated Ships Communications System (CEA-ISCS) and the WARRLOCK Direction Finding (DF) system, both of which are already used by the RAN.

CEA-ISCS integrates the vessels' secure, non-secure and internal communications systems and enables them to communicate with a wide variety of military, government organisations and civilian craft. Access to the system is available from various locations on the ship, allowing greater flexibility for the communications staff. The design of CEA-ISCS has evolved from that supplied to the RAN's coastal minehunters, and integrates new communications devices as well as providing improved supportability. Commercial-off-the-shelf equipment has been used wherever possible. The use of multiband antennas and multicouplers reduces the number of aerials required, which in turn reduces the risk of mutual interference.

The WARRLOCK DF system produced by CEA is a state-of-the-art, yet affordable, ship-borne radio intercept and direction finding system consisting of a broadband active DF antenna system, antenna multiplexer and a DF receiver. It is an important tool for locating illegal activities as well as being an aid to search and rescue.

To reduce the vertical accelerations associated with pitching, the accommodation has been located as far aft as practical and incorporates a number of innovative features which maximise its functionality and habitability. These include a dedicated boarding-party room, storage facilities all located on the main deck for ease of access, an austere laundry and a self-contained galley with all refrigerated storage located within the space.

The vessels have been designed to operate with a complement of 29, comprising seven officers, four senior sailors and 18 junior sailors. The accommodation will exceed the requirements for personal and communal space in all cabins and mess/recreation spaces, as well as providing the flexibility to cater for mixed-gender crews at all ranks. Incorporating improvements made as a result of in-service experience on the Bay-class vessels, each of the modular cabins will have an en-suite bathroom comprising a toilet, shower and hand basin.

Each rank will have its own combined mess/recreation area, all featuring a combination of lounge and individual seating, tables, tea- and coffee-making facilities, refrigerator, entertainment equipment and bookcases. The wardroom will double as a medical treatment area.

The primary roles for the new vessels are civil law-enforcement duties such as surveillance, interception, investigation, apprehension and the escort to port of vessels suspected of illegal fisheries, quarantine, customs or immigration offences. These duties, as well as search-and-rescue and evacuation operations, often necessitate carrying extra people onboard. The Armidale-class vessels represent a significant improvement in this regard, as they will have the capacity to sleep up to another 20 people in an austere accommodation area with adjacent bathroom and laundry facilities. The Fremantle-class vessels have no space dedicated for this.

In many instances it is necessary to tow vessels to a safe haven and, for this reason, the patrol boats have been designed and equipped so that they can tow vessels of up to 300 tonnes displacement or 12 smaller vessels.

The provision of two rigid inflatable sea boats on the new patrol boats will also provide the RAN with a significant increase in capability, making it possible to conduct simultaneous boarding operations. Heave-compensated davits with anti-pendulation devices facilitate the launch and recovery of the boats to the top of Sea State 4, or Sea State 6 for critical evolutions. The Armidale-class vessels can be operated with 11 crew, allowing up to 18 personnel to be deployed in boarding parties.

The dedicated boarding-party room on the main deck includes showers so that returning crew members can clean up and remove soiled or contaminated clothes prior to entering the accommodation area. The compartment also includes equipment storage and drying lockers, a small-arms locker and stowage for scuba and wet-weather gear.

In addition to their important civil roles, the patrol boats will enhance the RAN's capacity to protect harbours and coastal shipping during times of conflict. Their primary weapon system is the Rafael Typhoon Mk 25, which will be fitted with a marinised 25mm Bushmaster cannon. Selected by Australia's Department of Defence, the Typhoon Mk 25 is expected to provide vastly-superior range and accuracy to the non-stabilised 40mm gun on the Fremantle-class boats. Two 12.7mm machine guns will also be fitted.

Principal Particulars

Length overall	56.8 m
Length waterline	52.1 m
Beam moulded	9.5 m
Hull depth moulded	5.0 m
Hull draft (max)	2.7 m
Fuel	68 000 L
Fresh water	10 000 L (plus 6 200 L/day water-making capacity)
Main engines	Two MTU 16V 4000 M70 2320 kW at 2000 rpm each
Gearboxes	Two ZF 7550 A
Propellers	Two fixed pitch, counter-rotating
Generators	Two 220 kW MTU 6R 183
Bow thruster	14.5 kN thrust
Maximum speed	>25 kn
Loiter speed	4 to 10 kn for up to 60 hrs
Range	3 000 n miles
Towing capability	up to 12 vessels and 300 t total displacement

Crew

Officers:	7
Senior sailors:	4
Junior sailors:	18
Total complement:	29

Accommodation

Officers	Single berth CO's cabin, three 2 berth cabins
Senior Sailors	Two 2 berth cabins
Junior Sailors	One 2 berth cabins, four 4 berth cabins
Austere accommodation	20 berths

Armament

Primary weapon	25mm Rafael Typhoon MK 25 stabilised naval gun
Secondary weapons	Two 12.7mm M2HB machine guns

Communications and Sensors

Communication system	CEA Integrated Ships Communications System
Direction finding system	CEA WARRLOCK

Other Equipment

Sea boats	Two 7.24m RIBS with diesel/waterjet propulsion
Motion control system	Seastate, two active fins amidships and two active transom flaps; bilge keels

Survey

Classification	Det Norske Veritas +1A1 HSLC Patrol EO NAUT NV Crane (aus)

North West Bay Ships delivers *Simply Magistic*

The latest vessel to emerge from the North West Bay Ships' stable was delivered to Magistic Cruises in November 2003 for operations on Sydney Harbour. The 34 m catamaran, *Simply Magistic*, will be utilised both as an up-market sightseeing cruise vessel and an exclusive charter vessel.

The introduction of *Simply Magistic* represents a broadening of the operations for Blue Line Cruises (operators of Magistic Cruises). Sudhir Warrier, CEO of Blue Line Cruises, comments "The world's best harbour deserves a premium sightseeing service, and we identified an opportunity to run an up-market sightseeing cruise from Circular Quay. It was very important to us that the new vessel reflect the same high standards as our current luxury charter vessels, *Magistic* and *Magistic Two*."

Magistic Cruises, in conjunction with Glen Davis Marine Design, developed a detailed concept design and specification for the vessel, with the contract awarded to NWBS in April 2003.

Simply Magistic under construction
(Photo courtesy NWBS)

Hull

Simply Magistic was based on Red Jet 4 — a 40m, 38 kn, low-wash catamaran delivered by NWBS to Red Funnel in the UK in June 2003 — with modifications to improve performance at the required 18 knot design speed. A full-length docking skeg ensures that the vessel can be slipped at a range of slipways in Sydney.

Performance

Two Caterpillar 3406E diesels, rated 448 kW brake power at 2100 rpm each drive a Bruntons five-bladed propeller via a ZF 350 gearbox.

"Magistic Cruises required a service speed of 18 kn in order to achieve an hourly turn-around service. Whilst other yards were unable to meet this requirement, NWBS were prepared to guarantee 18 kn and were able to demonstrate a significant reduction in fuel consumption" reports Warrier. "This performance difference was the major factor in the decision to award the contract to NWBS."

This decision was vindicated on trials, with *Simply Magisitic* achieving 21.2 kn on the measured mile. The design speed of 18 kn was achieved at just 75% MCR, each engine consuming 85 L/h. "We are ecstatic with the vessel's performance" says Warrier, "In fact, the higher speeds achieved have presented Magistic Cruises with an opportunity to run additional routes on the harbour and still meet the one-hour sightseeing timetable."

A *Simply Magistic* engine room
(Photo courtesy NWBS)

Passenger decks

Passenger entry to the vessel is on the port side aft, where the traffic is split to either a feature curved stair leading to the upper deck, or to a short passage leading to the main cabin. Feature lighting inside the cabin highlights the Atlantic jarrah panelling, and guests are met at a reception table before proceeding towards the aft deck bar. The cabin has been expressly designed to provide a clean and open space, devoid of pillars, to enable passenger seating to be arranged according to each charter's requirements. Expansive windows and NWBS's specially-designed tapered window-post extrusions enhance passenger viewing angles. Whilst the vessel is certified for 300 passengers in cocktail cruise mode, numbers will be limited to approximately 120 seated guests for formal functions where meals are served.

A fully-equipped restaurant-style galley is located aft behind the main deck bar. On each side of the vessel at midships is a buffet/waiter station, with a further buffet across the front of the cabin under the forward-facing windows. Toilets are located at the forward corners of the cabin, and have been recessed down into the hull to allow the windows to continue past.

Forward access doors permit passengers to move to the large open foredeck, an ideal place to sip champagne and take in the harbour sunsets.

The main passenger cabin in *Simply Magistic*
(Photo courtesy NWBS)

The upper deck has fixed seating for 60 persons, popular for sightseeing, and a large open space encourages guests to congregate around the upper-deck bar. Additional toilets are located on this deck behind the wheelhouse.

NWBS worked closely with Magistic Cruises to ensure that corporate branding was carried throughout the vessel, with extensive use of jarrah timber panelling, colour-backed glass and stainless-steel feature railing.

NWBS reports "Noise levels were within specification, measurements at 18 kn were 69 dB(A) in the cabin at amidships, 57 dB(A) in the wheelhouse and 78 dB(A) in the galley with all ventilation and extraction fans at maximum settings.

Wheelhouse

Designed for operation by a dual-ticketed master/engineer, the wheelhouse has ample space to allow VIP passengers access to the bridge. ZF/Mathers Controls have been utilised, and external P&S bridge wings are provided. The main switchboard is located immediately behind the helm seat. A folding navigation mast has kept the vessel's air draft to less than 7 m, allowing access under bridges to the secluded areas of Middle Harbour.

Simply Magistic on Sydney Harbour
(Photo courtesy NWBS)

Environmental

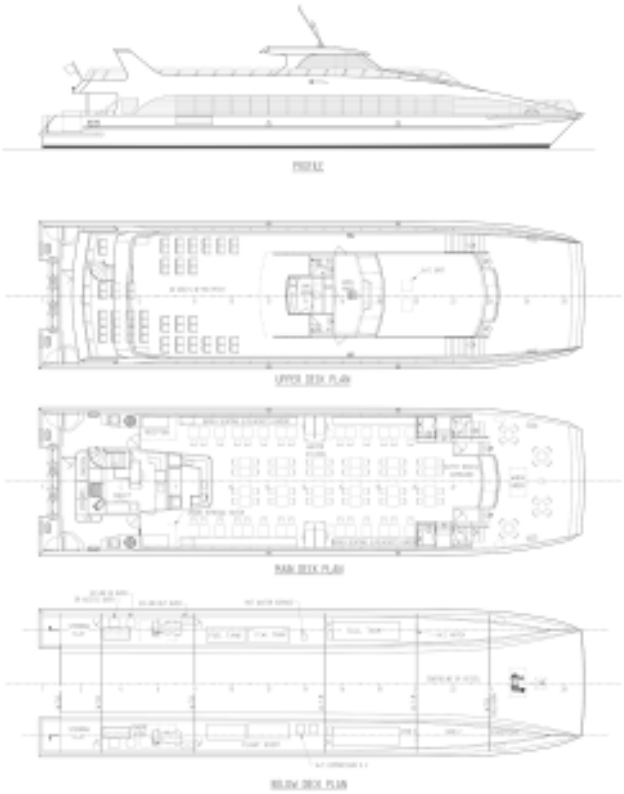
The Caterpillar engines fitted to *Simply Magistic* comply with the strict International Maritime Organisation NOx emission standards.

In addition, there are no discharges from the vessel into the harbour; even the rinsing water and steam generated in the galley is processed and kept onboard in large-capacity storage tanks for discharge ashore.

NWBS report that the combination of lightweight technology and an advanced hull shape has resulted in a wash height less than 300 mm, and well within Sydney Harbour guidelines.

Delivery

The vessel was delivered from Hobart to Sydney in just 36 h steaming, averaging 18 kn and consuming an average of 70 L/h per engine. Across Bass Strait, *Simply Magistic* maintained 15 kn, burning 45 L/h on each engine. Speed was increased to 20 kn along the coastline of NSW. The delivery crew reported the NWBS low-wash hullform as having excellent seakeeping, allowing maximum speed to be maintained and providing a comfortable passage.



General Arrangement of *Simply Magistic*
(Image courtesy NWBS)

New roll stabiliser developed in Western Australia

Research conducted at Curtin University's Centre for Marine Science and Technology has led to the formation of a spin-off company, Sea Gyro Pty Ltd. to design and build gyroscopic roll stabilisers. Numerical simulation studies conducted by postgraduate student Colin Ayres, under the supervision of Kim Klaka and Tim Gourlay, showed that gyroscope technology had developed sufficiently for brute gyroscopes to be a very attractive option for stabilising roll motion of small vessels. Scale model tests confirmed these findings.

In September 2003, this work was presented by Colin in the student's competition section at the Interferry Conference in Rotterdam. And as the winner of the competition, he has been invited to the Interferry Conference in Grand Bahamas in November 2004. A great deal of interest has been developed around this device since its inception, which incorporates new techniques for improving efficiency and reducing the gyroscope size.

Many types of devices have been designed to reduce a ship's motion, and most are effective in their normal mode of use. However many of these devices are ineffective outside their narrow zone of operation. For example, active anti-roll fins are used in the case of many craft. The fins are able to control the unwanted motion quite well while the vessel operates at a reasonable speed. However, given a situation of reduced speed (for low-speed manoeuvres) or even being stationary (at anchor), this same vessel may become extremely uncomfortable due to its large rolling motion.

Advantages of the Sea Gyro include:

- No external appendages (less drag).

- The stabiliser is not prone to damage by floating debris or grounding.
- The stability is consistently controllable at any vessel speed, including whilst at anchor.
- Improved vessel stability properties in extreme weather conditions, as the vessel is stabilised even at slow speeds.
- The stabiliser equipment can be located anywhere in the vessel, and may be incorporated as trimming ballast.
- Installation of the Sea Gyro increases the vessel's displacement by less than 2%.
- The Sea Gyro can provide (optional) emergency power to vessels for short periods of time.

Further prototype work is now being carried out on an 18 m vessel, and the first orders have been received for an overseas client. Additional research is being conducted through CMST on the benefits of the Sea Gyro in reducing pitch and heave in small craft. These results will also be presented at the next Interferry Conference together with other developments involving this new roll-reducing device. For further details contact Colin Ayres at sunyacht@webace.com.au or Kim Klaka at k.klaka@curtin.edu.au

Kim Klaka

Forgacs and Raytheon Strategic Agreement

Forgacs Managing Director, Mr Peter Burgess, and Raytheon Australia Managing Director, Mr Ron Fisher, have jointly announced the formation of a Strategic Agreement between their two Companies for naval shipbuilding, repair and maintenance on the East Coast.

Raytheon Australia's Ron Fisher said, 'Our two companies share a vision for the future of shipbuilding- and repair- and maintenance activities on the East Coast, and we have already teamed for the replacement of HMAS *Westralia*'.

Forgacs Engineering Pty Ltd is a long established and successful company with corporate headquarters located in Newcastle, NSW. They employ 650 people across Australia.

Raytheon Australia is a wholly-owned subsidiary of Raytheon Company, USA. Raytheon is an industry leader in defence and government electronics, space, information technology, technical services, and business and special-mission aircraft. Raytheon employs 78 000 people worldwide.

Western Australian Industry News

It has all been go at McAlpine Marine Design in the last few months. They have had two 15 m workboats delivered to DMS — one for operations at Garden Island in WA and the other for Darwin. Two 23 m tugs that were a collaboration between MMD and McIllwain have also been delivered to Gove.

Kim Klaka

The two 15 m workboats for DMS
(Photo courtesy MMD)

Tug *Baru*
(Photo courtesy MMD)

New Design

Incat Designs – Sydney and Gladding Hearn Shipbuilding recently announced that they have received an order from Bay State Cruise Company (BSC) of Boston, USA, to design and build a 30 m catamaran for service on its Boston-to-Provincetown run.

The new vessel will be built at Gladding Hearn's shipyard facility at Somerset on the upper reaches of Narragansett Bay. This will be Gladding Hearn's 29th catamaran built under the license agreement which the shipbuilder formed with Incat Designs – Sydney in 1987.

BSC has been operating the Provincetown Express service since 1998, using another ICDS–GH vessel, *Friendship IV*. This new vessel, likely to be named *Provincetown III*, will replace *Friendship IV* on the 55 n mile run between Boston and Provincetown. Incat Designs – Sydney's newly-appointed General Manager, Ben Hercus, said "This contract shows the importance of building a sound, good-quality vessel. *Friendship IV* is now approaching 10 years in service, and it is this vessel's sound construction and reliable service that has led the customer to the same design and construction team."

Following the success of *Friendship IV*, the new vessel will provide a more comfortable level of service on the run, allowing BSC to compete with larger rivals while maintaining the more personal service that they have been offering on the current Provincetown Express service.

The new vessel will have a service speed of approximately 30 kn while carrying 149 passengers. The vessel will be powered by two Cummins KTA 38-M2 diesel engines providing 1007 kW @ 1950 rpm. These will drive two five-bladed fixed-pitch propellers through ZF reduction gearboxes. The vessel will feature Incat Designs – Sydney's second-generation S-bow configuration, providing increased performance in both speed and ride quality, while the floating superstructure will provide much-reduced levels of noise and vibration in the passenger spaces.

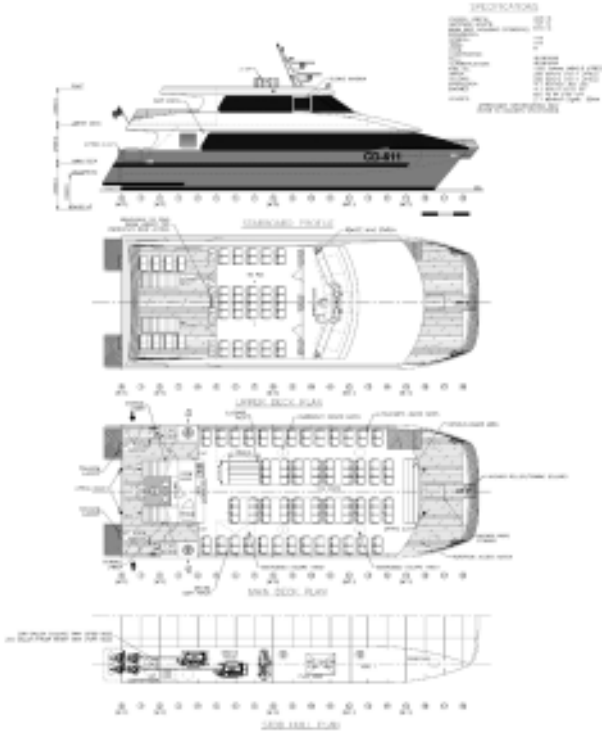
This vessel brings to five the number of Incat Designs – Sydney vessels currently under construction worldwide, and to 169 the number of high-speed catamarans built under Incat Designs – Sydney's direction.

Principal particulars of the new vessel are:

Length overall (excl. sponsons)		29.74 m
Length waterline		28.80 m
Beam overall (excl. sponsons)		9.10 m
Beam demihull		2.75 m
Draft		1.85 m (approx)
Pax	Tier 1 internal	142
	Tier 2 external	20
Total		162 seats for 149 pax
Main engines		Two Cummins KTA38-M2 1007 kW @ 1950 rpm
Gearboxes		Two ZF 2550
Propellers		Two 5-bladed fixed pitch
Speed (full load displacement)		30 kn

Port Bow of Incat Designs – Sydney's *Provincetown III*
(Image courtesy Incat Designs – Sydney)

Crowther Design and NQEA Australia have signed contracts to provide Kwajalein Range Services (KRS) with a 22 m aluminium transit catamaran. The catamaran will be operated by KRS in their logistic and support operation on Kwajalein Atoll. The atoll is located in the Northern Pacific Island region, within the Republic of the Marshall Islands. The vessel is to be designed by Crowther and built by NQEA to USCG Sub-chapter T classification. The companies are looking forward to working together on a vessel for use by the US Armed Forces. The vessel will be fitted out as a transit ferry with capacity for 142 internal passengers. Due to the nature of the operation, a high-quality yet robust finish is required. four MTU/Detroit Diesel Series 60 engines of 447 kW shaft power will be fitted, coupled to four Hamilton HJ362 Waterjets for a 30 kn operating speed. Range at 30 kn will be approximately 270 n miles. The four engines provide redundancy — typical for military operations. The vessel will be launched in mid 2004 with an order for a sister vessel likely.



General Arrangement of Crowther Design's Catamaran for KRS
(Drawing courtesy Crowther Designs)

New Construction

Construction is proceeding apace at Norman Wright and Son in Brisbane on the Grahame Parker-designed ninth CityCat

for the Brisbane City Council. The vessel has a length OA of 25 m and will carry 165 passengers at 25 kn (more details are given in *The ANA*, November 2003). Launching is due in June 2004.

Construction of Ninth CityCat at Norman Wright and Son in Brisbane
(Photo courtesy Grahame Parker Design)

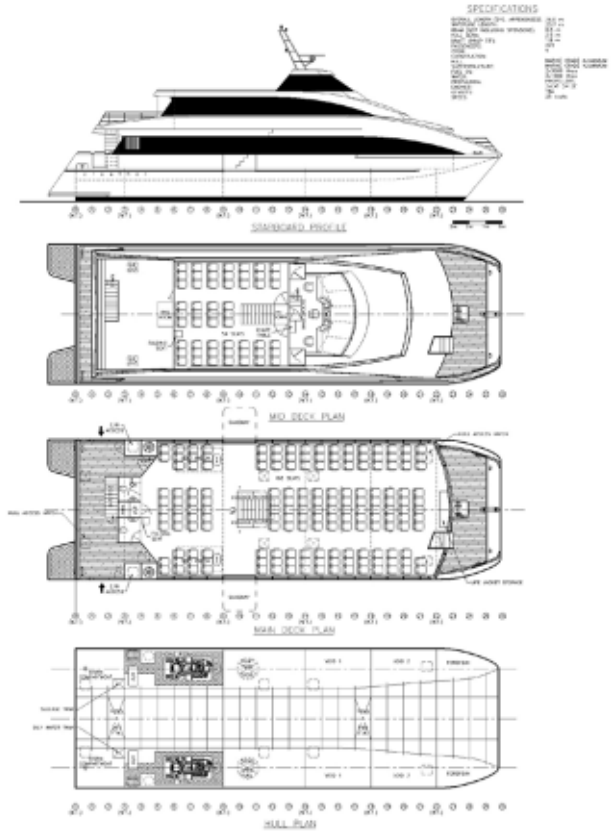
Frames Standing on Ninth CityCat at Norman Wright and Son in Brisbane
(Photo courtesy Grahame Parker Design)

A 26 m catamaran, *Park Island 7*, to a design by Crowther Designs, has recently been launched by Cheoy Lee shipyards in Hong Kong.

Principal particulars are as follows:

Length OA	26.00 m (excl. appendages)
Beam OA	8.50 m (excl. sponsons)
Demihull beam	2.50 m
Draft (prop)	1.80 m
Passengers	222
Crew	5
Fuel capacity	2 x 3000 L
Fresh water capacity	2 x 1000 L
Engines	Two Caterpillar 3412E
Speed	25 kn
Construction	Aluminium

A catamaran, *Big Cat Express*, to a design by Crowther Designs, has recently been launched by Gulf Craft Shipyards in the USA.



General Arrangement of Crowther Design's *Park Island 7*
(Drawing courtesy Crowther Designs)

Crowther Design's *Big Cat Express*
(Photo courtesy Crowther Designs)

Currently there are eleven significant vessels designed by Crowther Design which are under construction in yards in Australia, North America, South America and Asia.

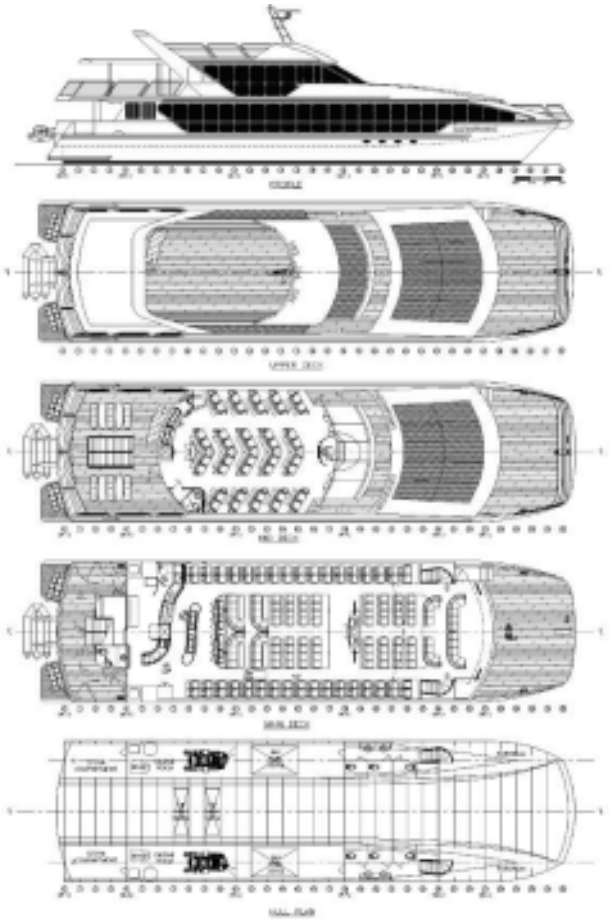
Deliveries

A 32 m river cruise catamaran for the Gordon River, *Lady Jane Franklin II*, to a design by Crowther Designs, has recently been completed by Richardson Devine Marine in Hobart and delivered to the operator, Gordon River Cruises in Strahan, Tas. Spear-Green Design was contracted by Crowther Design to provide assistance with interior design as part of their total design package.

Principal particulars are as follows:

Length OA	32.00 m
Length WL	29.25 m
Beam OA	9.00 m
Draft (hull)	1.25 m
Draft (prop)	1.65 m

Passengers	
Internal:	172 (main deck) 40 VIP (upper deck)
External:	18
Crew	6
Fuel capacity	2 x 3000 L
Fresh water capacity	2 x 1000 L
Deadweight	25.0 t
Engines	Two MTU 16V 2000 M70 each 1050kW @ 2100 rpm
Gearbox	Two ZF 2050
Speed	31 kn
Construction	Aluminium
Survey	USL Code Class 1D



General Arrangement of Crowther Design's *Lady Jane Franklin II*
(Drawing courtesy Crowther Designs)

Crowther Design's *Lady Jane Franklin II*
(Photo courtesy Crowther Designs)

Around and About

The work on the Australian Heritage Fleet's *John Oxley* restoration project continues apace. Some of the original watertight deck plates have been replaced with marine plywood, cleverly laid and painted to look like the steel decks they are replacing. The fresh water tank in the forward compartment has been blasted with abrasives to remove the coating of hazardous red lead paint (in accordance with WorkCover OHS Regulations, and safely disposed of according to EPA requirements) and prime coated. The project continues to provide volunteers with opportunities for learning a range of skills. A series of NSW WorkCover-accredited courses have been held on site for volunteers who are involved in construction activities. For more details of the project, visit www.australianheritagefleet.com.au/jorest/jolatest.html.

Star Princess arrived in Sydney Harbour for the first time at 0400 on 26 November with 2700 passengers on board, and berthed at the Overseas Passenger Terminal at Circular Quay. She off-loaded one set of passengers and loaded a new set before sailing at 2100 the same day, pausing off the Opera House for a firework display. At 107 000 GT and 6750 DWT, she is the largest passenger vessel to enter Sydney Harbour (ahead of *Queen Elizabeth* and *Queen Mary*) and the second-largest vessel (behind the iron-ore carrier *Iron Pacific*, at 118 491 GT and 232 000 DWT). She has a length OA of 290 m, length BP of 242 m, beam 36.03 m, summer draft 8.45 m, and the top of her exhaust bank is more than two metres higher than the road deck of the Harbour Bridge at centre-span. She has 2×21 MW electrical propulsion motors driving fixed-pitch propellers for a maximum speed of 24 kn. She was built by Fincantieri at their Monfalcone yard in Italy and was completed in 2002, the second sister to *Grand Princess*. When launched in 2001, *Grand Princess* was the largest passenger vessel in the world. For a webcam showing the view from the bridge of any P&O Princess Cruises vessel, updated every 60 s by satellite, visit www.princess.com/home.jsp and click on the link to webcams.

Star Princess alongside in Sydney Harbour
(Photo John Jeremy)

While researching the details of *Star Princess* and the Sydney Harbour Bridge, Don Fraser of the Heritage Committee of Engineers Australia supplied some interesting information about the bridge itself. Between summer and winter, with a temperature range of 60°F (33°C) the road deck of the bridge (59 m above mean sea level) varies in height by about 280 mm, and the top of the arch (134 m above mean sea level) by about 500 mm! Looking more closely, only one-fifth of this is due to vertical linear expansion; the remainder is due to additional bowing from the direct linear expansion. The *additional* deflection of the deck from the unloaded to fully-loaded condition is 100 mm. All of this was allowed for in Bradfield's design.

Spirit of Tasmania III arrived in Sydney Harbour for the first time at 1015 on 7 January and was escorted up the harbour to the Overseas Passenger Terminal at Circular Quay, accompanied by Sydney Ports' fire tug *Ted Noffs* giving a spectacular water display with her monitors. She transferred on 9 January to her regular berth at Sydney Ports' new purpose-built berthing facility at Darling Harbour, located adjacent to Sydney's CBD. The berthing facility has been specifically designed to cater for the transfer of both passengers and motor vehicles on and off the vessel. *Spirit of Tasmania III* was built by Schichau Seebeckwerft in Bremerhaven, Germany, in 1995. She has a length OA of 173.7 m, beam 24.0 m and GT 23 663. She commenced her new service between Sydney and Devonport, Tasmania on Tuesday 13 January 2004. She now arrives in Sydney every Tuesday, Friday and Sunday at 1130 and departs for Devonport at 1500 the same day. This is a 20 h voyage from Sydney to Devonport, compared to the 10 h voyage from Melbourne to Devonport. The sailing and fare schedule for *Spirit III* may be found at www.spiritoftasmania.com.au.

Spirit of Tasmania III Arriving in Sydney Harbour
(Photo John Jeremy)

Other cruise vessels to visit Sydney over the summer have included *Pacific Sky* (six times), *Pacific Princess* (six times), *Silver Shadow* and *Seabourn Spirit*.

The Australian National Maritime Museum has dropped admission charges for public entry to the main exhibition galleries for a trial period of six months. This move was prompted by soaring numbers on the isolated occasions when charges are dropped, as on Australia Day each year. The ANMM is the first of Sydney's major museums to drop admission fees, and brings them into line with other major museums in Australia and worldwide. While entry to the main galleries will be free, admission will still be charged for admission to former Royal Australian Navy vessels *Vampire* and *Onslow*, and to special temporary exhibits. If you haven't been to the ANMM for a while, or ever, then come on down!

Phil Helmore

Image Marine Order for new *True North*

Image Marine announced in November a contract for a live-aboard adventure vessel for North Star Cruises. Representing the larger and more-sophisticated end of the market, the repeat contract demonstrates the confidence the client has in Image Marine's expertise in this specialist field.

North Star Cruises took delivery of its first live-aboard vessel, the Image Marine-built *True North*, in January 1999. With capacity for 28 passengers in 14 cabins, the 34.5 m vessel has proved hugely successful cruising the remote Kimberley region of North Western Australia and led to North Star Cruises' reputation as one of the most-renowned tourist operations in Australia.

North Star Cruises' Director, Mr Craig Howson, said Image Marine was an obvious choice to build the vessel. "The performance of *True North* has been outstanding and is a testament to the shipbuilding skills of the Image Marine team; their reputation in the live-aboard market is excellent and our experience with the company through our previous build certainly gave us the confidence to build with them again," he said.

Image Marine Sales and Marketing Manager, Mr Mark Stothard, said the success of *True North* had raised the profile of both companies. "Image Marine is very proud of their association with the development of the live-aboard industry and of *True North*, which is well known in the market," he said. "North Star Cruises has demonstrated to other live-aboard operators the possibilities available with this kind of vessel and we are very pleased to have the opportunity to work with them again on the new boat."

As one of the largest, most luxurious and best-equipped vessels of its type in the world, the new *True North* will set a new standard in the live-aboard market. The 49.9 m, 36 berth aluminium monohull will provide North Star Cruises with capacity for eight more passengers than the existing vessel and greater space throughout, including four additional cabins.

On board, North Star Cruises has upgraded the standard of cabins compared to the previous vessel, and offers three options: four premium staterooms on the upper deck, six staterooms on the main deck and eight large double cabins on the lower deck. Demonstrating the company's commitment to maximising guests' comfort and convenience, each cabin has its own ensuite.

The increased common area is split over two decks on the new vessel, offering an alternative to the adjacent lounge-dining area on the original *True North*. Dining takes place on the main deck, and the lounge-bar is located on the upper deck and opens onto an outdoor area, providing guests with a spectacular viewing platform on which to wind down after a day filled with fishing, diving and touring.

The fitout onboard *True North* will reflect the Asian-influenced colonial charm of the Kimberley region, with a

serviceable, workable space for its 15 crew, while ensuring a luxurious yet relaxing holiday-feel for guests.

Scheduled for delivery in February 2005, the new *True North* will cruise the Kimberley coast at 13 knots and, with a Bell 407 helicopter on the upper deck and six tenders on board, guests will have greater flexibility in selecting a variety of on-shore activities and enjoying the spectacular scenery.

Principal Particulars

Length overall	49.9 m
Length waterline	44.6 m
Beam moulded	10.0 m
Hull depth moulded	4.05 m
Maximum draft	2.2 m
Passengers	36
Passenger cabins	18
Crew	15
Fuel	40 000 L
Main Engines	Two Cat 3508B – B 783 kW at 1600 rpm
Gearboxes	Two Twin Disc 6619
Propellers	Two fixed pitch
Service speed (at 90% MCR)	13 kn
Structure	Lloyds Register
Survey	Australian Maritime Safety Authority

$20 m Navy Data Management Contract

A $20million Defence contract awarded to a North Sydney technology company will result in improved and cost-effective maintenance reporting of all RAN ocean-going vessels.

Kaz Technology Services will develop an improved data-management regime that will monitor the maintenance and inventory needs of all Defence maritime vessels. These include the Anzac frigates, FFGs, the minehunters and the landing platform amphibious ships, *Manoora* and *Kanimbla*.

Defence Minister Robert Hill said the configuration of systems and equipment on Navy ships will also be better-managed and controlled as a result of this contract.

"Accurate data is critical to the cost-effective and safe operation of all Defence maritime vessels," Senator Hill said.

"The contract will lead to increased accuracy and quality of the current maintenance reports that Defence receives. These relate to combat, weapons, radar, sonar and propulsion (engine) systems, and naval shore communication systems across Australia.

"The new data-management system expands on gains made in recent years, such as computerised maintenance-management systems and configuration-management systems for the minehunters and the Anzacs," Senator Hill said.

Korean orders highest for 30 years

The Korean shipbuilding orders for the full year of 2003 almost doubled to 16.75m GT, a record high since 1973. Of the orders placed at shipyards in 2003, 43% were for containerships, 22.3% for tankers, and 2.6% for LNG carriers, and prices for vessels rose around 20% in an end-year-on-year comparison. Yards delivered 223 ships of 7.27m GT during 2003. The boom in orders for 2003 has been attributed to the increase in global trade, particularly from China, and owners' moves to upgrade their fleets in the wake of the *Prestige* sinking.

HMA ships range far and wide in their duties. HMAS *Success*, seen here in southern waters, recently provided logistic support for HMAS *Warramunga* during the latter's apprehension of *Maya V*
(RAN Photograph)

Pacific 2004 Opened by Defence Minister

In Sydney on 3 February the Minister for Defence, Robert Hill, opened the Pacific 2004 International Maritime Exposition and the Pacific 2004 Congress. The Congress included the RAN Sea Power Conference and the International Maritime Conference organised by Engineers Australia, the Institute of Marine Engineering Science and Technology and the Royal Institution of Naval Architects. In his opening address, the Minister said:

This is now the most comprehensive and significant maritime trade show and conference program staged in the southern hemisphere. It showcases the latest in commercial maritime and naval defence technology, and provides an unrivalled opportunity for representatives from Government, industry and the Defence community to meet and discuss matters of mutual interest. I am pleased to see that the event has attracted so many overseas visitors and I welcome them all.

No one country has a monopoly on our maritime environment, so it is particularly important that we use opportunities such as this to build regional global understanding.

Since I opened Pacific 2002, a lot has happened in the global strategic environment. We have addressed threats as they have presented and are now building a force for the less-predictable world of the future — balanced and capable of responding to the unexpected as well as the expected.

Our Maritime Environment

To Australia, the maritime environment is fundamentally important. Although much of our trade is still dependent upon maritime transport, historically Australians have tended to think of the sea as a barrier.

However, in the modern world, we know that the sea is much more than a moat and imposes far more complex considerations on our security policy. We have a responsibility to manage, preserve and protect our maritime environment. Since its formation our navy has been intimately involved in this task of sovereignty enforcement and border protection.

For many years we have maintained a regular program of coastal patrols, and even in the farthest reaches of the Southern Ocean we continue to demonstrate our commitment to the protection of fragile eco-systems. We do this by actively targeting the rapacious activities of illegal fishing boats and by bringing the guilty to justice. I congratulate the captain and crew of HMAS *Warramunga* on their recent apprehension of a suspected poacher of toothfish some 4000 km to the south-west of Perth in the most hostile of marine environments.

The traditional problems of poaching, pollution, foreign diseases and people seeking entry without detection will continue. Our Navy will continue to protect Australian interests in concert with our civilian law-enforcement authorities. These tasks are being carried out capably and effectively. But of course, much more is expected of our Navy. We must be able to project power in the littoral environment and transport and support our troops further afield.

Over recent years the Australian Defence Force's operational tempo has doubled. Our forces have also had to adapt to a broader spectrum of concurrent operations than ever before. The Navy has provided the essential lifeline to our forces in East Timor, helped and maintained the blockade of Iraq to uphold the Security Council's mandate, conducted war-fighting operations in the effort to remove Saddam Hussein's regime, and supported the international effort in Solomon Islands — to name just a few of its missions. Again, all tasks have been completed successfully and to the highest standards of naval tradition.

But as I said a moment ago — the strategic environment is changing, and force structure and capabilities must change with it.

Rebalancing the Defence Capability Plan

As a consequence, the Australian Government undertook a Defence Capability Review last year. The result is a rebalanced ten-year Defence Capability Plan that has been amended to meet the capability requirements that have emerged in the past eventful few years. I will release the public version of that plan at this exposition tomorrow. *[The DCP is available for download from the DMO website — Ed.]*

The plan will result in a particularly challenging naval construction program.

The acquisition of two new amphibious ships and a strategic sea-lift vessel, together with replacement replenishment ships and additional troop-lift helicopters will give Australia the best capability that it has ever had to safely deploy, lodge and sustain forces away from Australian bases and without reliance on bases elsewhere.

The missile upgrades for our guided-missile frigates, the already-agreed improvements to missile defence for our Anzac frigates, and the acquisition of state-of-the-art air-warfare destroyers will allow us to provide layered protection from air and missile attack to our forces.

This protection will enable our forces to operate throughout the littoral environment with an unprecedented level of air cover. This capability will dramatically enhance our ability to conduct joint operations from a sea base and it significantly expands the strategic options available to us.

The presence in the air warfare destroyer of appropriate weapons, sensors, and systems will be a critical component of the Navy's ability to network both with the other services and with allied forces. This capability will also be the cornerstone of our commitment to providing our forces with a shield against attack by cruise and ballistic missiles.

Networking will be ever more important. The exercises in which our Navy is involved in the Proliferation Security Initiative are an example of the importance of inter-operability in meeting challenges of today.

To these assets must be added our six Collins-class submarines with new combat systems, new state-of-the-art torpedoes and upgraded sensors. Twelve new Armidale-class patrol boats, larger than our existing boats and with longer reach and a new weapons system, will complement the major fleet assets.

In aggregate, this significant but balanced investment in future

naval capability will best ensure that the Royal Australian Navy is equipped to meet future threats as well as contemporary challenges.

The Role that Industry Must Play

The major ship construction and upgrade programme which flows from these announcements will be a real challenge for the Australian shipbuilding industry.

Our commitment to the Australian industry is not just to achieve construction, but to ensure whole-of-life support. This is a partnership. We see a strategic need to invest in industry through these construction programs in order for industry to be able to support and upgrade our assets in the future.

And, as it is not possible for Australian industry to cover the field, this industry investment will also include strategic alliances with key allies. Thus, in 2001 we signed a Statement of Principles on Submarine Matters with the United States Navy to allow our respective navies to assist each other in providing fully-capable, sustainable and inter-operable submarine forces.

Under the aegis of this cooperative statement, we have entered into joint development programs with the United States Navy for the Collins' new combat systems and torpedoes, and we have negotiated a capability partnership agreement with Electric Boat Corporation under which that company can provide technical and managerial support to the Australian Submarine Corporation (ASC).

Similarly, we have already taken the decision to acquire a United States-designed core air-warfare system for the new air warfare destroyers.

But we must be able to support and maintain our equipment, and the investments in Australia in systems integration, weapons integration, electronic warfare protection, new generation radar, advanced communications and other critical areas remain very important.

Our acquisition program will not therefore be just best value for money in the short term. We are committed to building and strengthening Australia's investments in this industry sector as an important contribution to our long-term security.

This is likely to require a reshaping of industry, as industry did in fact recognise in the Naval Shipbuilding and Repair Plan, which was developed in consultation with my Department. I applaud those within industry who are actively working towards an industry restructure which will better provide us with long-term strategic capability. For its part, the Government is now in a position where it can play an important role through the construction contracts for ships that were confirmed by the Defence Capability Review and the upgrade programs we have announced.

As I alluded to earlier, the naval program presents challenges from both the Defence and industry perspectives, and the Government has taken a number of steps to facilitate progress.

In relation to the *Westralia* replacement, which is to be in service in 2006, Defence signed a contract last month with the shipbroker Teekay Shipping to identify potential replacement tankers that are operating, are double-hulled and are environmentally sustainable. While it is still early days, indications are that the commercial market for these vessels is vigorous and it is anticipated that the Government will purchase the base ship by the end of June.

It is envisaged that the primary designer, who will be responsible for designing the conversion of the replacement tanker so that it meets capability requirements, will be appointed by the end of September.

In order to meet the in service dates of 2010 and 2013 for the new amphibious ships, Defence will proceed to consider the merits of a number of existing designs in the near future. I expect that Defence will bring forward advice to Government on a preferred design for the amphibious ships by the end of June.

In relation to the air-warfare destroyers, Defence is finalising its advice to Government on the process for selecting platform designs, and I envisage that Government will also consider this advice in the next couple of months.

In the midst of this activity, we are also keen to ensure that the full value of ASC in terms of its assets and skills are part of this outcome.

The Australian Submarine Corporation is now functioning well in providing full-life support for the Collins class and the long-term agreement it has with the Government to provide these services has assured its place in naval construction and support infrastructure.

The Minister for Finance and Administration and I have retained John Wylie of Carnegie Wylie and Co. to provide commercial advice on a range of these issues including implementing the naval shipbuilding program contained in the Defence Capability Review, the sale of ASC and other matters relating to the Naval Shipbuilding and Repair Sector Strategic Plan. This advice will assist Government to take decisions on these issues later this year.

But the Government also believes that the needs of the Royal Australian Navy will not be sufficient to sustain the Australian industry. For this reason the Government is keen to support those parts of industry that are export oriented. Australia does have niche capabilities that are internationally competitive and even small niches of large international projects are very important.

We are also conscious that delivering capabilities on time and on budget is not a one-way street. For that reason we are continuing to reform the Government's acquisition processes. The Defence Procurement Review, ably chaired by Mr Malcolm Kinnaird, is being implemented and I was pleased last Friday to announce Dr Stephen Gumley as the new Chief Executive of the Defence Materiel Organisation. He will build on the significant progress that we have made in acquisitions in recent years.

Conclusion

The task of continuing to develop cutting-edge maritime capabilities is essential to Australia's security and it is a vital part of our contribution to regional and global stability. It is an ongoing responsibility, shared by us all. That is why events such as this are so important.

I wish you every success in your deliberations and look forward to meeting many of you in the course of today and tomorrow. I am now pleased to officially open the Pacific 2004 Maritime Exposition and Congress.

Australian Maritime College

Pacific 2004

A number of AMC staff recently made technical presentations at the Pacific 2004 International Maritime Conference in Sydney. These included:

- Mohan Anantharaman, *Ship Economy.*
- Dr Laurie Goldsworthy, Henk Kortekaas and Peter Niekamp, *Predictive Monitoring System for Oxides of Nitrogen Emissions from Marine Diesel Engines.*
- Predrag Bojovic (ABS, Houston), Dr Prasanta Sahoo and Prof. Marcos Salas (Austral University, Chile), *A Study of Stern Wedges and Advanced Spray Rail System on Calm Water Resistance of High Speed Displacement Hull Forms*.
- Dr Jinzhu Xia, *On Seakeeping Assessment in Rough Seas.*
- Hung Nguyen, *Marine Automatic Control Systems Using Recursive Estimation Procedures.*
- Dr Jimin He (Australian Maritime Hydrodynamics Research Centre), *Activities of the Australian Maritime Hydrodynamics Research Centre*.

PhD Completion for AMC Lecturer

Giles Thomas graduated from the University of Tasmania in December 2003 with a degree of Doctor of Philosophy. He received the award for his work on a collaborative project between the University of Tasmania and Incat Tasmania on the wave-slam response of large high-speed catamarans. The project investigated the occurrence and severity of wave-slam events and the vibratory response of the ship structure to such events. The work identified the loading due to extreme slams and the structural modes and transient dynamic response of the ship structure using modal and transient dynamic finite-element analysis. Giles joined AMC as a lecturer in naval architecture in July 2003.

AMC Cavitation Tunnel Update

Dr Paul Brandner, Cavitation Tunnel Manager, attended the Fifth International Symposium on Cavitation in Osaka, Japan, in late 2003. This conference series runs every three years with the most recent held in the United States in 2001 and France in 1998. For unknown reasons this one was run a year early. The field of cavitation is quite broad and a range of new topics were included in this conference. The traditional areas of marine hydrodynamics and fluid machinery were well represented, but there was also considerable emphasis on bubble dynamics, acoustics, etc., and the application of cavitation to biomedical, environmental and materials processing. This included innovative applications such as diagnostics for the human body using cavitation and bubble dynamic phenomena as well as non-invasive surgery.

The latest in fluid mechanics experimental/numerical capabilities are in laser diagnostics and computational techniques, and these were well represented at the conference. A much greater understanding of the nucleation process and the role of turbulence is being achieved — these being goals set in the upgrade of the AMC cavitation tunnel during 2004. Little new testing infrastructure has been developed since France, Germany and the US built the 'mega' tunnels for Naval research in the 1980s and 90s and, apart from the French facility, these do not contain nucleation control. It is expected that this will provide AMC with opportunities for further international collaboration and to attract scholars. This is evident with the Cambridge collaboration currently under development and, hopefully, progress can be made at AMC on nucleation physics among other topics following the tunnel upgrade. With the recent development of the AMHRC high-performance computer at AMC and collaborations with the Tasmanian Partnership for Advanced Computing (TPAC) and the Australian Partnership for Advanced Computing (APAC), inroads are also being made to make use of computational advances.

The next conference is to be held at MARIN in the Netherlands, which is ideal as far as marine hydrodynamics/ fluid mechanics is concerned

Visiting Professor

Professor Wataru Sera recently completed a ten-month research sabbatical at AMC. Professor Sera is a lecturer in the Maritime Science faculty at the Kobe University and he has been working on research relating to the simulation of swell and seastate within AMC's Ship-handling Simulator. This work has involved the development of mathematical simulation techniques as well as the conduct of a series of ship model experiments within AMC's Model Test Basin to assist with the validation of the simulations. It is envisaged that research in this field will be continuing at AMC over the next few years.

Visiting Students

A group of around twenty third-year engineering students from the University of Delaware visited AMC as part of a four-week course they have undertaken in Tasmania during January 2004. The leader of the group, Professor Len Schwartz, accompanied the students on a host of lectures and demonstrations by Jonathan Binns (in the Towing Tank), Prasanta Sahoo and Jan Soholt, Peter Klausen in the Ship-handling Simulator, John Frearson in the Survival Centre, Jonathan Duffy in the Model Test Basin and Paul Brandner in the Cavitation Tunnel.

AMC Researchers Visit Japan

In late November/early December 2003, Dr Jinzhu Xia and PhD student Tim Lilienthal conducted a series of very successful model experiments into dynamic ship stability in following seas at the National Research Institute of Fisheries Engineering (NRIFE) in Japan. Jinzhu also attended the Fourth Japanese Towing Tank Committee Symposium on Ship Performance at Sea in Yokohama and visited the National Maritime Research Institute (NMRI) in Tokyo where he presented a seminar on his own research regarding wave loads and ship motions in rough seas.

AMC Towing Tank Upgrade

The planning for the major upgrade of the existing Towing Tank and associated equipment is now well underway. Conceptual designs for the extension of the entire wing of the Swanson Building have been completed. This includes

the extended Towing Tank in the basement and additional classrooms, computer laboratories and offices within the ground and first floors, plus landscaping of the surrounds to keep within the vision of the heritage-listed site. Stuart McDonnell, a graduate of the AMC BEng (Naval Architecture) degree, has recently commenced employment to assist with the duties associated with the facility upgrade.

The Tank is to be extended from its current 60 m length to 100m. This will provide the ability to test up to 30% higher vessel speeds along with 100% longer test runs and will support increased model size. It is envisaged that the Towing Tank will cease normal operation in October 2004 and re-open in early March 2005.

Throughout this down time, major modifications will be made to the carriage, such as improving the quality of carriage ride through upgrading of the rail guide system, reconfiguring the working platform and incorporation of the latest OH&S requirements. As well as the upgrades discussed above, it is also planned to utilise this opportunity to implement a new data-acquisition and analysis system and wavemaker-control system.

UNSW Research Projects

On two occasions during late 2003 and early 2004, Professor Lawry Doctors utilised AMC hydrodynamic facilities for the conduct of model experiments as part of his ongoing research into the wave generation of marine vessels. Lawry and Stephen Helmstedt, an undergraduate student from UNSW, made good use of both the AMC's Towing Tank and Model Test Basin.

AMC Presence at NSW SMIX Bash

Once again AMC Search Ltd was a co-sponsor for the annual SMIX Bash held by NSW Section of the Royal Institution of Naval Architects onboard the restored *James Craig* in Darling Harbour, Sydney. Representing AMC and AMC Search at the event were Jon Duffy, Phillip Evans, Gregor Macfarlane and Dr Giles Thomas.

Update on AMC *Less Stress* $\sigma<$ at the National Moth Championships

Many will have read the short article on page 38 of the November 2003 edition of *The Australian Naval Architect* about the three AMC undergraduate students who designed, built and race their own International Moth Class sailing dinghy. A report on how they fared at the National Championships on Lake Cootharaba in January 2004 follows.

Gregor Macfarlane

National Moth Championships

Despite the substantial wind that was endured during the regatta, the Moth National Titles were an experience worth the effort. Camping at Lake Cootharaba, just north of Noosa on the Sunshine Coast, the AMC moth crew did what they could to have all three competing in the regatta. Alan Goddard was given the reigns to AMC *Stress Less*, Nick Billett borrowed a slightly older/wider moth from a Sunshine Coast sailor and, despite last minute phone calls, a sea-worthy vessel could not be found for Mark Hughes. However, Mark and his girlfriend, Vanessa, were kept busy being shore crew for the regatta, which was greatly appreciated.

The Invitation Race was abandoned after a severe rain squall forced the majority of the 43 boat fleet to head home before a course was even laid. While Nick waited out the storm in the middle of the lake and, with visibility down to about 20 m at times, Alan capsized during a ferocious gust that bent the boom around the sidestay. Two other booms were broken in the fleet, as well as a few other bits and pieces.

Race 1 was started in a stiff 18 kn breeze that looked like it would produce some fast racing. After starting right behind the eventual national champion, Nick picked the wrong side of the course and came into the top mark below mid fleet, right behind Alan who had started late. After an exhilarating downwind leg, another rain squall went across the lake in which half the fleet got lost. Abandonment of this race was inevitable and welcomed by those who were lost.

Race 2 was postponed until just before the scheduled start of Race 3. This caused confusion amongst the moth crew, resulting in being late for the start. While sailing around waiting for the next race, Nick's rudder delaminated its carbon skin and Alan severely bent the forward beam of *Stress Less*. It's interesting to note that two other boats also had problems with their forward beams. As a result of these breakages, Nick and Alan were out until Race 6 while repairs were made.

Races 6, 7 and 8 were still as windy as the rest of the regatta, but both Alan and Nick finished the races with minimal damage. Places obtained were Nick 23rd, 25th and 24th and for Alan 35th, 31st and 30th. We were happy just to finish some races. It was evident that *Stress Less* had the boat speed to be competitive, but was quite difficult to control in these heavy breezes, especially downwind. There were no severe breakages, but Nick was getting low on sail repair tape as the old sail was requiring a new repair after every race.

Race 9 saw the destruction of the previously-delaminated rudder of Nick's boat and the end to his regatta. Alan was keen to seize the moment and finally beat Nick in a race but it was not to be, a large rip in the bottom of his sail ending his dream.

With Nick out of the last race, Alan was hoping to take the lead in this personal match race. Unfortunately for him though, the rudder gave way in a similar fashion to Nick's in the previous race. At the end of the regatta, Nick was placed 31st with Alan close behind in 32nd. Not too bad for our first regatta in new boats. It was interesting to note that the overall winner of the Championships sailed a hydrofoil-borne vessel, which is a first for a major international event.

Due to the deluge of breakages to our boats, we gained an immense wealth of knowledge about moth dinghy structures. At the time of writing, this new knowledge is being put into practice with Alan building a new boat to the *Stress Less* hull shape, but with modifications to the areas that are known to be too weak. Considering that *Stress Less* is made of a completely foam-cored fibreglass laminate and is only about 5 kg heavier than the foam-cored carbon-fibre boats that are winning the races, we are very happy with the design. Now we just need to learn how to sail it before the Worlds in Melbourne next year.

To see our progress throughout the year check out academic.amc.edu.au/~moth-crew/.

AMC Stress Less at speed
(Photo courtesy AMC)

Curtin University

The Centre for Marine Science and Technology at Curtin University continues to expand its naval architecture research activities. Recent projects include:

- Calculating effect of bilge keels on roll reduction of a research vessel for Tenix Defence.
- Ongoing work in optimising seakeeping performance for Tenix Defence.
- Seakeeping assessment of a pilot vessel for Fremantle Ports.
- Developing new under-keel clearance guidelines with the New Zealand Maritime Safety Authority.
- Seakeeping calculations and wave-induced under-keel clearance calculations for bulk carriers with Silver Fern Shipping.
- Calculating the shape of hydrophone arrays towed by ships and submarines for DSTO.
- Provision of design advice to ISO-12215-8 Working Group 18 (Small Craft Scantlings).

Together with the Departments of Mechanical Engineering and Chemical Engineering at Curtin, CMST has formed a Fluid Dynamics Research Group and gained funding and recognition within the University as a designated area of emerging research strength. This will help in attracting research funding and commercial work across wider areas of fluid dynamics.

Kim Klaka

The University of New South Wales

Staff Changes

During 2003 Robin Ford resigned as Head of the School of Mechanical and Manufacturing Engineering. Robin has been succeeded as Head of School by Prof. Hartmut Kaebernick, who will be better known to graduates as Head of the Department of/Plan Coordinator for Manufacturing Engineering and Management. Hartmut has been at UNSW for thirteen years.

Undergraduate News

Among the interesting undergraduate thesis projects completed last year were the following:

- An investigation by Graeme Collins into the effectiveness of trim tabs and interceptors for ride control. Graeme tested models in the wind tunnel and backed that up with a computational fluid dynamics analysis using the Fluent package. He found that end plates on trim tabs do little to affect the performance of trim tabs, and that trim tabs generally perform better than interceptors.
- An investigation by Gerard Engel into the prediction of catamaran resistance using the computational fluid dynamics package, Fluent. He found that the best results were obtained using a two-phase unsteady analysis, i.e. with the free surface present and accounted for.
- An investigation by one of our Norwegian exchange-program students, Olav Opheim, into the wave generation of catamaran hullforms. Olav tested the wave heights generated by models in the Ocean Basin at the Australian Maritime College and compared the results with those predicted by Lawry Doctor's Hydros program, finding good correlation. As a sideline, it was interesting to learn that a macro can be written in an Excel spreadsheet to generate a graph from data in a file; a real time-saver if you have hundreds to do!
- An investigation by Carl Vlazny into the analysis of ducted propeller performance using the combined comutational fluid dynamics packages TurboGrid and TascFlow. Carl found good correlation between the CFD results for thrust, torque and efficiency, and those predicted by the MARIN polynomials for Ka series propellers.

An internal review of the undergraduate program in the School has begun, springing from an Academic Board requirement for review. The review commenced with a request for each of the five plan coordinators (Aerospace Engineering, Manufacturing Engineering and management, Mechanical Engineering, Mechatronic Engineering and Naval Architecture) to formulate the changes thought to be beneficial. Naval Architecture had a meeting of all the full-time and invited lecturers in early December, where much discussion ensued and suggestions for changes were proposed. These have now been consolidated, and a meeting to consider meshing with changes proposed by other plans is due in February. Any changes decided will be due to come into operation in 2005.

Taste of Research Summer Scholarship in Naval Architecture

In an initiative of the Dean of Engineering at UNSW, Professor Brendon Parker, summer scholarships are presented to outstanding undergraduates so that they can experience research under the guidance of appropriate academics. The number of scholarships is small, so it was particularly pleasing that one of the recipients, Mr Stephen Helmstedt, an outstanding UNSW student now entering Year 3 of his course, chose to work on a naval architecture problem.

His supervisor, Professor Lawry Doctors, provided Mr Helmstedt with two projects. The first project was to study more carefully the wave generation of a model catamaran travelling at low speeds. This work has already demonstrated

that the theory correctly predicts the surprisingly large variations in the wave generation that can be measured in this condition.

The second project, currently in progress, is devoted to the more challenging case of a trimaran. Here, the object is to study the effect of moving the sidehulls fore and aft (sidehull stagger).

The model tests have been conducted in the Towing Tank and the Ocean Basin at the AMC, while the computer software has been developed at UNSW.

Post-graduate and Other News

The current graduands of the naval architecture degree program have started a web group devoted to making communication between graduates easier. If you have graduated from UNSW in naval architecture, then you can join the group by visiting http://groups.yahoo.com/group/unsw_naval_architecture/ and submitting your details. When subsequently logged in as a member of the group, you can post details of what you are up to now, send messages to others, etc.

In mid-November, a team from Harbin Engineering University in China visited the School of Mechanical and Manufacturing Engineering to explore the possibility of an exchange program in naval architecture. The team comprised Prof. Liu Zhigang (President), A/Prof. Wang Pintlui (Vice-director, Learning and Teaching), and Ms Wang Xiaoshu (Department of Foreign Languages, translator). HEU started life as Harbin Shipbuilding and Engineering University, and now has about 20 000 full-time and 5 000 part-time students. Of these, about 1 500 are naval architecture students, spread over the four years of the degree course, or about 400 in each year! China is now the third-largest shipbuilder in the world, and is aiming for the top position by 2020. Naval architects are in strong demand, and they are having a hard time keeping up; hence their interest in an exchange program.

Pacific 2004 International Maritime Conference

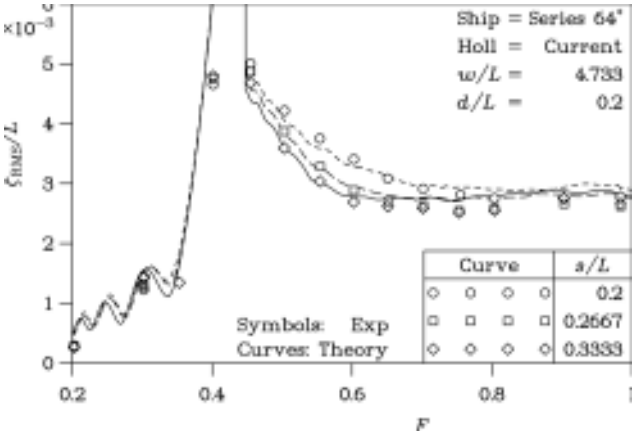
Two presentations were made at the Pacific 2004 International Maritime Conference by UNSW staff:

Prof. Lawry Doctors made a presentation on *Prediction of the Wavemaking of High-speed Marine Vehicles*. The wave generation of a 1.5 m long model catamaran was considered in great detail by conducting a large number of tests in a towing tank with different settings of the water depth, demihull spacing, and forward speed. In addition, the previously-developed computer program was executed so that the predictions could be compared with the experiments.

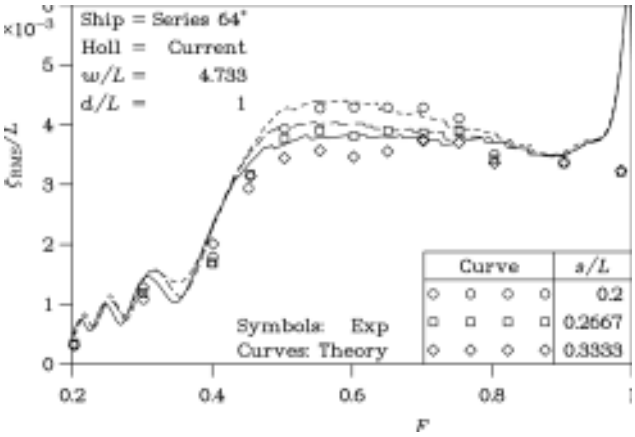
An improvement to the computer program was an enhanced method of estimating the length of the hollow that is generated in the water behind the transom stern. It is demonstrated here that the more realistic transom-stern-hollow model did indeed improve the correlation between the predicted wave profiles and the measured wave profiles. This is particularly true at the lower Froude numbers.

Two figures extracted from the paper are reprinted here. They correspond to different ratios of the water depth to the vessel length. The root-mean-square wave elevation (made dimensionless with respect to the vessel length) is plotted as a function of the Froude number. Excellent agreement is demonstrated, except in the region close to the critical speed, when the depth Froude number equals unity. In this condition, the experiments will also be unreliable, since the steady-state situation cannot be achieved in a towing tank. The results also verify that increasing the demihull spacing reduces the wave generation.

It is believed that additional refinements to the calculations, in which the surface tension and the viscosity of the water are considered, will further improve the theoretical predictions.



Effect of Demihull Separation on Wave Generation (Shallow Water)
(Graph courtesy Lawry Doctors)

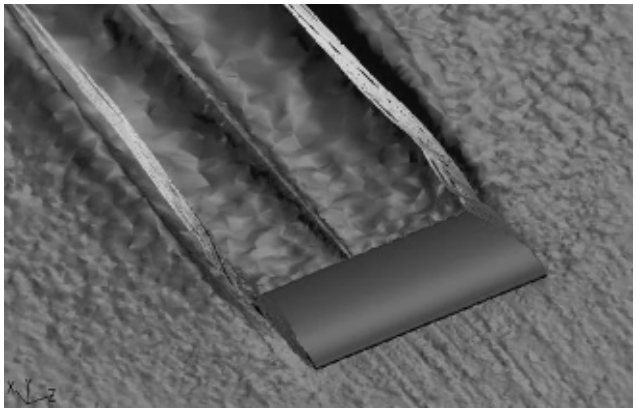


Effect of Demihull Separation on Wave Generation (Deep Water)
(Graph courtesy Lawry Doctors)

Tracie Barber, our honorary naval architect who specialises in wing-in-ground-effect craft and computational fluid dynamics, made a presentation on *The Free Surface Deformation Caused by a Wing in Ground-Effect Flying Over Water*. The accurate prediction of ground-effect aerodynamics is an important aspect of wing-in-ground-effect (WIG) vehicle design. When WIG vehicles operate over water, the deformation of the non-rigid surface beneath the body may affect the aerodynamic performance of the craft. The likely surface deformation has been considered from both theoretical and numerical positions. Both two-dimensional and three-dimensional cases have been considered, and results show that any deformation occurring on the water surface is likely to be caused by the wingtip vortices rather than an increased pressure distribution beneath the wing.

Phil Helmore
Lawry Doctors

Orlyonok ekranoplan in cruising flight
(Photo from Komissarov, *Russia's Ekranoplans*, Midland Publishing, UK 2002)



Surface deformation and vectors in the YZ plane using Fluent
(Image courtesy Tracie Barber)

FROM THE CROW'S NEST

Taking on the World

Solo-sailing aficionados will realise that Ellen MacArthur's new trimaran, which is under construction by Boatspeed at Somersby, NSW, is the next phase of her remarkable sailing career. Ellen is better known in Britain and France, where she is as much a household name as Kay Cottee is in Australia. Her book, *Taking on the World*, was published in 2002 and tells the story of her early sailing; solo circumnavigation of Britain in *Induna* in 1995; the Mini-Transat from St Malo, France, to Martinique, West Indies, in 1997; the Route du Rhum from St Malo to Guadeloupe, West Indies, in 1998; her win in the Europe 1 New Man STAR from Plymouth, England, to Newport, USA, in 2000; and her second place in the Vendee Globe solo non-stop around-the-world in *Kingfisher* in 2000–01, sailing from and returning to Les Sables d'Olonne, France. It is very readable, and ranks up there with Kay Cottee's *First Lady*, Francis Chichester's *Gipsy Moth IV Circles the World*, Robin Knox-Johnstone's *A World of My Own*, Chay Blyth's *The Impossible* Voyage, and the grand-daddy of them all (and the most readable), Joshua Slocum's *Sailing Alone Around the World*, the story of the first-ever solo circumnavigation in his *Spray.* If you are an aficionado, then this is a must-read. If you are not, then it will whet your appetite for what is to come when the new trimaran hits the water.

Find out more about Ellen MacArthur, her achievements and program at www.ellenmacarthur.com.

NOHSC Safe Design Issues Paper

The National Health and Occupational Health and Safety Commission is a tripartite body established to provide strategic leadership and coordination of national efforts to improve occupational health and safety performance. NOHSC comprises representatives of the peak employer and employee bodies: the Australian Chamber of Commerce and Industry (ACCI), the Australian Council of Trade Unions (ACTU), as well as the Australian state and territory governments.

NOHSC's vision is Australian workplaces free from injury, death and disease. To pursue this vision, NOHSC has developed the *National OHS Strategy 2002-2012.*

One priority under the Strategy is to eliminate hazards at the design stage (safe design). Designing out potential OHS hazards before they enter the workplace can be the most effective strategy to eliminate hazards at their source, the highest level of workplace injury and disease prevention.

NOHSC distributed the Issues Paper *Eliminating Hazards at the Design Sage (Safe Design)* in December 2003. The paper was written to explore, debate and develop options to improve outcomes of safe design in Australia. The paper is available for download from www.nohsc.gov.au, or in hard copy from your local office of NOHSC. It is interesting to consider how these issues and their solutions might impact on the work of naval architects.

Comments on the issues paper may be provided by post to Safe Design Team Leader, National Occupational Health and Safety Commission, GPO Box 1577 Canberra ACT 2601; by fax to (02) 6279 1190; or by email to safedesign@nohsc.gov.au by close of business on Friday 27 February 2004. *The ANA* regrets the proximity of posting of this issue to the closing date and suggests that, if you are interested, you comment anyway.

Phil Helmore

Spirit of Ontario I arriving in Fremantle Harbour on 17 January for an open day to raise funds for charity. Built by Austal Ships for Canadian American Transportation Systems, the 86.6 m ferry will run between Rochester in New York State and Toronto, Canada. She can carry 774 passengers and 238 cars for the 2 hour 15 minute voyage across Lake Ontario
(Photo courtesy Martin Grimm)

THE INTERNET

WWSR Update

Ken Warby has proudly announced that Sterling Estates Pty Ltd have enthusiastically joined the World Water Speed Record team as the major sponsor. Check them out at www.sterling.net.au.

The new boat has been named *Aussie Spirit.* Ken's son, David, will also run the new boat and it is planned that once Ken has broken the long-standing record, David will take the record further and keep the Warby name on the WWSR. It is expected that the world record runs will take place on Blowering Dam late this year.

Michael Tait has been busy for the last couple of months, updating everything on the website. If you haven't visited it lately, it is worth another look for all the latest on where the team is up to, at www.kenwarby.com.

The New Internet

Have you experienced a shutdown trying to download a large file? Are you inundated with spam? You're not alone. The Internet is now 30 years old and a mess. More than 600 million people use web services worldwide with 72 percent of Americans online once or more a month and 30 percent of Chinese, among others. Over $3.9 trillion in e-business transactions took place over the Internet in 2003.

The problem is that the Internet wasn't designed to handle this kind of volume and, certainly, no one in the 1970s anticipated its tremendous growth. Now we are adding technologies such as streaming media, file sharing, and video conferencing to this antiquated system.

According to David duVernay, writing in *The Monadnock Shopper*, who quotes from an article in the October issue of *Technology Review*, nearly 100 leading computer scientists, backed by some heavyweight industrial sponsors, are working to replace the Internet with a newer, smarter model. A project called PlanetLab will revitalize the Internet within three years. PlanetLab hopes to achieve several improvements. You won't need to haul around your own laptop because your files will be readily accessible from any Internet terminal. You won't need to worry about computer worms and viruses as the new network will detect and destroy rogue data packets for you. You'll retrieve video and other bandwidth-hogging data instantly, no matter how many other users are competing for the same programs. You won't need disks and CDs to store data because you'll archive it on the Internet, securely and indestructibly.

For further information, visit www.sname.org/newsletter/newinternet.pdf.

MIT Open Course Ware

Massachusetts Institute of Technology undertook in 2001 to make all of the courses offered available on the Internet.

Charles M. Vest, President of MIT, said recently: "With the publication of 500 courses, MIT is delivering on the promise of OpenCourseWare that we made in 2001. We are thrilled that educators, students, and self-learners from all parts of the globe tell us that MIT OCW is having an impact on education and learning. We hope that in sharing MIT's course materials, and our experience thus far with MIT OCW, we will inspire other institutions to openly share their course materials, creating a worldwide web of knowledge that will benefit mankind."

Visit http://ocw.mit.edu, and click on the link to Ocean Engineering. Currently thirteen courses will show up, some in the naval architecture area. Clicking on one will take you to a page showing a course description, with sidebar links to syllabus, calendar, reading list, all lecture notes (in PDF format), labs, assignments, study materials, etc.

US NPS Lectures and Software

The US Naval Postgraduate School at Monterey in California has available on the web lectures on various topics and some software for download. Try the main site http://web.nps.navy.mil to find out about the school, or http://web.nps.navy.mil/~me/tsse for Total Ship Systems Engineering, and follow the links to TS3001 or TS4001 for various lectures and software.

Macquarie Innovation

In 1993, an Australian team, with their yacht *Yellow Pages Endeavour*, broke the World Sailing Speed Record. The new mark was set at 46.52 knots (86.52 km/h) in only 19–20 knots of wind. The World Sailing Speed Record is governed by a body of the International Sailing Federation (ISAF). Claiming a world record requires the sailing craft to average the highest speed over a 500 m course.

The initial design concept was brought to the team by its designer, Lindsay Cunningham. The team was between defences of the Little America's Cup in International C-class catamarans (the fastest course-racing yachts in the world) and Lindsay's proposal sparked the interest in making an attempt at the World Sailing Speed Record.

The World Record was previously held by a French sailboarder, and Lindsay was confident that the new concept would be successful. As a testament to the design talent of this world-recognised Australian yacht designer, *Yellow Pages Endeavour* set the new world mark in October 1993, a benchmark that still remains.

After setting the World Record, the *Yellow Pages* team decided to continue to push the limits of speed sailing. A new craft, *Macquarie Innovation*, was designed and constructed in an attempt to be the first ever to break the 50 knot barrier. Based on the same concept as *Yellow Pages Endeavour*, *Macquarie Innovation* is the culmination of all the design lessons learnt from the *Yellow Pages* campaign as well as some new ideas. The total concept has been extensively tested both in computer simulations as well as in the towing tank at the Australian Maritime College facility in Tasmania, and the design team is confident that the 50 knot target is achievable.

Full-scale testing has been performed at Sandy Point with some stunning results. After returning late last year from their 2002 campaign, the team now has evidence that they are on the right track. *Macquarie Innovation* was recorded at speeds of at least one knot higher than the existing record and it was only the fickle weather that prevented higher and more

sustainable speeds. The team is currently in the final planning stages for the next attempt and it is expected that Macquarie Innovation will back at Sandy Point later this year.

For further information, visit www.macquarie.com.au/speedsailing.htm.

Dingbat

Lots of attempts have been made to break *Yellow Pages Endeavour*'s 1993 world record of 46.52 knots. However, after 10 years, 50 knots is still a dream, and sailing technology is ready for a breakthrough.

In all "conventional" craft there is a heeling moment that is produced by the driving and drag forces. In particular, the wind-generated driving forces, which may be visualised as acting part-way up the mainsail, are opposed by drag forces acting just below the waterline.

The effect of this moment is to heel the craft to leeward or, in a following breeze, cause it to pitch-pole. All measures used to oppose or balance this moment have a negative impact on speed.

However, what about a craft that has all driving and drag forces acting through a single point? Surely it would be stable at any speed. Furthermore, if some way could be found to make drag an inverse function of speed, then such a craft would have to go quite fast. Engineer Bill Rayner in Sydney posed these questions and, together with Clif Barker, addressed these design challenges in 1997. The name came easily: surely *Dingbat* would describe both the craft and the crazies prepared to challenge yachting's conventions!

Their solution looks like a cross between a hang glider and a sailboard. It has:

- A single-surface wing designed on advanced hang glider technology, and an adjustable tailplane provides lift = power.
- A carbon-fibre boom which directs the force generated by the wing to the centre of drag which is located on the fin. This is the centre of buoyancy *and* the centre of gravity. The horizonal component of the wing force induces speed. The vertical component lifts the hull. This reduces the wetted area and hence the drag. At top speed only the fin is in the water.
- The hull employs high-performance catamaran technology.
- The "pilot", seated at one end of a beam, balances the weight of the wing. A rotating turret enables variation of the sailing angle.
- The direction of travel, the relationship between the wing and the boom and the power developed by the wing are controlled by a joystick.
- Being a symmetrical design, *Dingbat* does not have the "one-tack-only" characteristic that limits the practicality of speed-optimised proas.

Towing trials on a full-size wing showed it to be stable and controllable, and the technique for dealing with the destabilising effects of wind shear proved OK. Patent applications for principal design elements were taken out in 2000. Construction of *Dingbat* using sailboards to provide flotation and wet trials on Botany Bay demonstrated the validity of the technology and identified areas for further development. *Dingbat 2* hit the water in December 2003, and provided some surprises for boaties on Botany Bay over the summer.

For further information and photographs visit www.dingbat.com.au

Speed Sailing

World Speed Sailing Records can be established in the following classes, apart from the outright record:

- 10 m^2 (up to and including 10 m^2)
- A Class (from 10 m^2 up to and including 150 ft^2 (13.93 m^2))
- B Class (from 150 ft^2 up to and including 235 ft^2 (21.84 m^2))
- C Class (from 235 ft^2 up to and including 300 ft^2 (27.88 m^2))
- D Class (over 300 ft^2 (27.88 m^2))

Want to know who holds the current records? Want to know more about speed sailing in general? Visit www.speedsailing.com.

Phil Helmore

INDUSTRY NEWS

Wärtsilä to start propeller manufacture in China

Wärtsilä will begin manufacturing propellers in China. Wärtsilä's wholly-owned company, Wärtsilä Propulsion, and Zhenjiang CME Co. Ltd (CME), wholly owned by the China State Shipbuilding Corporation (CSSC), signed a contract in December 2003 to establish a joint-venture company. The company will be 55%-owned by Wärtsilä and 45%-owned by CME, and its name will be Wärtsilä-CME Zhenjiang Propeller Co. Ltd.

"China's shipbuilding industry is growing rapidly and 15% of new ships are currently built in the country. China also is developing into a significant production country for ship equipment. Propeller manufacturing in China is Wärtsilä's first step in developing its production in this growing market", says Wärtsilä's President and CEO, Ole Johansson.

CSSC is the leading shipbuilding corporation in China. For CSSC it is important to create a network of competitive component suppliers for increasingly demanding ships. With Wärtsilä's design and expertise and CME's manufacturing skills the companies will create a competitive propeller supplier which has great growth opportunities in the global market.

The company will produce Lips and Kaida brand propellers. The joint venture's market area will the whole world. The joint venture will commence operations in CME's premises in Zhenjiang, some 220 km west of Shanghai. The Chinese party will provide the plant's production equipment and personnel, while Wärtsilä's contribution will be the design and manufacturing expertise. Operation is expected to be started early next year after the requisite business licenses are received.

Further Sulzer Common-rail Engines in China

It was announced in January that eight 1574 TEU container ships contracted by the German owner Peter Döhle Schiffahrtsgesellschaft at the Jiangsu Yangzijiang shipyard in the People's Republic of China are to be propelled by Sulzer RT-flex common-rail engines.

Each ship will be equipped with a single 7-cylinder Sulzer RT-flex 60C low-speed engine with a maximum continuous power output of 16 520 kW at 114 rpm. The engines will be built under licence from Wärtsilä Corporation by Hudong Heavy Machinery Co Ltd in Shanghai.

The ships, due for delivery in 2005 and 2006, will be employed on the North Atlantic trades. The key reason for choosing Sulzer RT-flex engines for these ships is the engines' capability for running at lower, steady speeds than traditional camshaft-controlled engines. This will allow better control of the ship while manoeuvring and during the long port approaches and river passages experienced on the trades for which the ships are intended.

Very-low-speed running is just one of the benefits of the Sulzer RT-flex engines developed by Wärtsilä Corporation. They are the first low-speed engines to have electronically-controlled common-rail systems for fuel injection and valve actuation. This gives unrivalled flexibility in the way the engines operate, to deliver benefits such as smokeless operation at all operating speeds, lower fuel consumption and reduced maintenance costs, as well as the lower steady operating speeds already mentioned.

These will be the first Sulzer RT-flex engines from Hudong, which joins five other licensed engine builders in Japan, Korea and China, as well as Wärtsilä's own factory in Trieste, Italy, in building these advanced marine prime movers.

The first series-built RT-flex production engine has already accumulated more than 12 000 running hours since it entered service in the bulk carrier *Gypsum Centennial* in September 2001. Three further ships with Sulzer RT-flex engines have entered service in 2003. Overall, the grand total of RT-flex engines delivered and on order is 61 with an aggregate power of 2.26 million kW.

Wärtsilä Dual-fuel Engines for 153 000 m^3 LNG Carrier

Wärtsilä Corporation was awarded a contract in December 2003 by the French shipbuilder Chantiers de l'Atlantique to supply dual-fuel main engines for a new 153 000m^3 LNG carrier. The LNG carrier has been ordered by the French gas distributor Gaz de France for delivery in October 2005. It will be employed in the shipment of liquefied natural gas (LNG) from Norway or Egypt, but is also designed for the alternative of trading on the spot market.

The vessel will have gas-electric propulsion, with four dual-fuel engines driving generators to supply electricity for the single propeller plant. The engines will burn boil-off cargo gas with a small quantity of liquid fuel for ignition. They will mainly run on gas, with liquid fuel as back-up, and can be switched over automatically as the need arises.

There will be three Wärtsilä 12V50DF engines and a single Wärtsilä 6L50DF engine. They have a combined output of 38.5 MW, with the 12-cylinder engines each developing 11 400 kW at 514 rpm and the six-cylinder engine 5 700 kW at the same speed.

This is the second LNG carrier to have dual-fuel engines and electric propulsion, and it shows a consistent and continued confidence of both the shipyard and the shipowner for this new propulsion technology. The pioneering vessel is a 75 000 m^3 vessel being built at the same shipyard for the same owner. It was ordered in early 2002 and will have four Wärtsilä 6L50DF dual-fuel engines in a 22 MW electric propulsion plant.

Gas-electric propulsion plant was chosen because it is more compact than the traditional steam turbine plant used for LNG carriers. This allows the carriage of more LNG within the same sized hull and thereby increases the vessel's annual earnings. The Wärtsilä 50DF engines also have clear benefits in terms of fuel efficiency and environmental impact, while multiple engines give a valuable safety and flexibility in operation, with the optimum number of engines running to suit the required service speed.

Whilst making maximum use of the gas fuel (boil-off from the cargo of liquefied natural gas) to develop useful power, Wärtsilä 50DF engines have a much lower fuel consumption overall and thus lower operating costs than the conventional steam turbine plant. The Wärtsilä 50DF engines also have much lower stack emissions than a steam plant. Their low NOx emissions are about one-tenth those of the equivalent diesel engines. The combination of the engines' low fuel consumption and their maximum use of natural gas means the Wärtsilä 50DF engines also have low CO_2 emissions.

Developed from Wärtsilä's very successful Type 46 diesel engines, the Wärtsilä 50DF engines have cylinder dimensions of 500 mm bore by 580 mm piston stroke. Available in configurations with six, eight and nine cylinders in line, and 12, 16 and 18 cylinders Vee-form, the Wärtsilä 50DF engines develop 950 kW per cylinder MCR at 500 or 514 rpm for 50Hz and 60Hz electricity generation respectively.

The Wärtsilä 50DF engines can be run alternatively in gas mode or liquid-fuel mode. The engines are also fully capable of switching over from gas to liquid fuel (marine diesel oil) automatically should the gas supply be interrupted, while continuing to deliver full power.

Gas fuel is supplied at a low pressure (less than five bar) to the engines. In gas mode, the Wärtsilä 50DF engines operate according to the lean-burn Otto process. Gas is admitted into the air-inlet channels of the individual cylinders during the intake stroke to give a lean, premixed air-gas mixture in the engine combustion chambers. Reliable ignition is obtained by injecting a small quantity of diesel oil directly into the combustion chambers as pilot fuel, which ignites by compression ignition as in a conventional diesel engine.

The Wärtsilä 50DF engines use a "micro-pilot" injection with less than one percent of the fuel energy being required as liquid fuel at nominal load. Electronic control closely regulates the "micro-pilot" injection system and air-gas ratio to keep each cylinder at its correct operating point between the knock and misfiring limits.

THE SAFETY GAP

Mori Flapan
National Marine Safety Committee Secretariat

The safety gap is the difference between adequate safety and mandated safety levels that are actually achieved. It comprises the sum of the standards safety gap and the compliance safety gap. The standards safety gap is the difference between adequate safety and a required standard. The compliance safety gap is the difference between the required standard and the standard actually achieved.

This paper looks at the meaning of adequate safety and minimum required standards. The different types of safety gap are described and discussed. Occupational Health and Safety, and Pro-active Certification of Vessels are considered within a framework that promotes complementary function and avoids duplication. Specific issues pertaining to the standards and compliance safety gaps are discussed, highlighting the work of the NMSC where relevant.

INTRODUCTION

As part of their right to peace and happiness, most people believe that they have a right to be safe within society. To this end, society empowers governments to set and enforce rules that promote and enforce safety within society.

While the concept sounds simple, there are many issues to be considered in its execution. Perhaps one of the most important is the issue of balance. A balance needs to be achieved between the benefits of safety and the costs of achieving that level of safety to the society. Those costs may be economic, or they may be losses of personal freedom, or some other cost.

This balance between conflicting needs of stakeholders and the costs and benefits of safety is the starting point for our discussion on the safety gap.

THE CONCEPT OF ADEQUATE SAFETY

Safety is defined in the Macquarie Dictionary[1] as

1. the state of being safe; freedom from injury or danger.
2. the quality of insuring against hurt, injury, danger or risk.

From the definition, one can see that safety is not absolute. Safety is something that is relative. One state or quality is more or less safe relative to another. No state or quality should be considered to provide absolute safety.

Recognizing that safety is relative, one must still differentiate between when the level of safety is acceptable and when it is unacceptable. Acceptable safety is safety that meets certain specified criteria, normally measured in terms of relative freedom from specific risks.

The criteria for acceptable safety may differ, depending upon the perspective of different stakeholders. Consider the following examples:

Acceptable safety under legislation is effectively compliance with the law and depends upon the content of that law. Under Occupational Health and Safety law, there is a broad obligation to identify hazards, assess risks, control unacceptable risks, confer with employees, etc. Under marine safety law, there is frequently a requirement to meet certain specified prescriptive standards, as well as broad obligations not to operate an unsafe vessel and not to operate a vessel in a manner that would be unsafe.

Acceptable safety for an owner/operator finds a balance between the risks associated with operating a vessel and the other risks associated with operating a business, including trading disruptions and insolvency.

Acceptable safety for an insurer focuses on the risks that are to be insured, which may include loss of life, injury, damage to property and economic loss.

Acceptable safety within the common law takes into account issues pertaining to liability. To avoid liability for negligence, for example, a stakeholder must identify any relevant duty of care and take appropriate steps to discharge that duty of care to a relevant standard.

It is clear that the scope and level of safety required to achieve acceptable safety will differ depending upon the point of view of the particular stakeholder. Given the potential variations in what is considered acceptable safety, which are the criteria that take precedence?

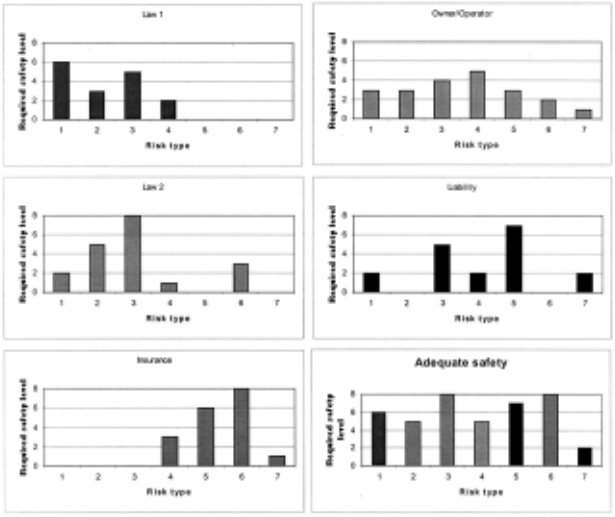


Figure 1—Notional example of adequate safety being a composite of highest mandatory acceptable safety criteria from key stakeholders

As a rule, the criteria that determine whether the overall level of safety is "adequate" are a composite of the highest criteria from each of the various stakeholder interpretations for "acceptable safety" that are considered mandatory. Figure 1 illustrates the concept. Thus, clearly, the criteria for acceptable safety contained within legislation must be met. Where there are different laws applicable to a vessel having differing levels of safety, the highest level applies in every case. Similarly, safety criteria set for insurance must be met. If those insurance criteria are higher than those for legislation, then they set the standard for adequate safety. For example, an owner/operator may have special safety needs due to contractual obligations that impose significant economic loss on disruption. Likewise, the risks associated with potential accident claims may drive the levels of safety that determine "adequate safety".

MINIMUM REQUIRED STANDARDS

The above analysis gives an insight into one reason why it is very difficult to prescribe standards that will provide adequate safety in every circumstance. Circumstances differ; the types and needs of stakeholders differ and the options for potential solutions differ. Some risks may be insured against, others may be eliminated or controlled in various ways, while still others may be accepted. To attempt to devise a standard that takes into account all possible permutations would be far too cumbersome, would place an intolerable burden on any user and, at the end of the day, would probably not give a workable result.

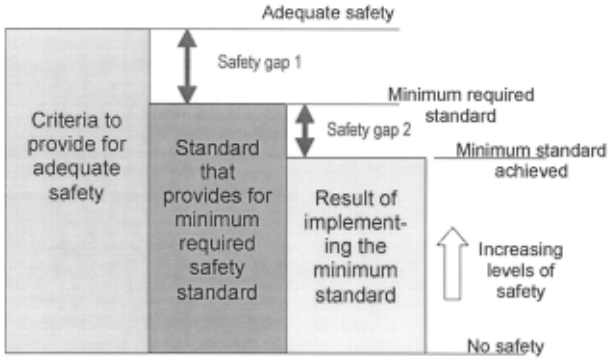


Figure 2 — The standards safety gap

A better way of looking at a standard is that it provides a safety net below which the level of safety becomes unacceptable for the purposes of the application of that standard. In effect, it is a minimum required standard that aims to provide for compliance to a level of safety prescribed by the standard, see Figure 2. As we shall see later, the standard alone cannot ensure that safety does not fall below the minimum required level. That depends on a will and ability to implement the standard.

As already indicated, the level of safety within a standard does not provide adequate safety in every circumstance. The level of safety at which a standard is pitched is a compromise between conflicting constraints. On one hand, there is the cost of implementing safety controls. On the other hand, there is the cost of losses that may be incurred from *not* implementing safety controls. Factors that influence the balance include the nature and frequency of past accidents, perceptions of the value of life at a given time in history, the intended method of implementation, constraints on government expenditure, the economic viability of the industry and other political considerations.

A useful concept is the Paredo principle which states that 80% of the benefit is usually achieved by the first 20% of effort. This principle provides a clue as to a cost-effective approach to the setting of minimum required standards. A significant result can be provided at relatively modest cost by pitching the standard at a level that captures about 80% of relevant risks, those risks being of the most major and generic types.

Thus, there is usually a gap between the minimum required standard and adequate safety. This is marked as Safety Gap 1 in Figure 2. For the purposes of this paper, we shall refer to this safety gap as the standards safety gap.

As already indicated, there is more to safety than just a standard. Implementation is also a vital factor. Implementation determines the minimum safety standard that is actually achieved. In a perfect world, that would lie at the same level as the minimum required safety standard. However, in reality it may lie significantly below that of the minimum required, depending upon the method of implementation, see Figure 2.

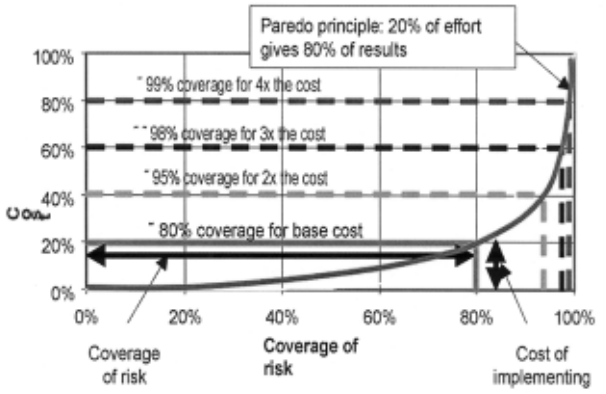


Figure 3 — Paredo principle

The gap between the minimum achieved safety standard and the minimum required safety standard (marked as Safety gap 2 in Figure 2) is another form of safety gap. This safety gap is referred to as the compliance safety gap.

The method of implementation may be reactive or pro-active or a combination of both. Reactive implementation is where the threat of sanctions for non-compliance is the main incentive for compliance. Compliance with the standard is only verified in response to a random event, be it an audit, accident or a complaint. The main incentive for achieving the standard is fear of the potential consequences should an audit, incidents or complaints occur. Pro-active implementation is where there are positive incentives for compliance including the issue of licenses to operate. Pro-active implementation either promotes or mandates solutions be put in place. The incentive for achieving the standard may include a licence to operate as a prerequisite to lawful operation. Generally, standards that are pro-actively verified have a better chance of being achieved than standards that are not pro-actively verified. At the same time, standards that are pro-actively verified tend to have comparatively higher implementation costs, firstly because a third party is sometimes involved and, secondly, because the measures are in fact being implemented by all.

In between the two extremes of reactive and pro-active implementation are other implementation regimes using various combinations of both types of implementation in lesser and larger amounts. Relying on reactive or pro-active measures alone is usually not enough. A composite sanctions-push solutions-pull approach tends to provide a more balanced and cost-effective approach. The composite approach is applied to the safety of commercial vessels and will be discussed further later in this paper.

OCCUPATIONAL HEALTH AND SAFETY

Modern OH&S law tends to be performance-based in nature. It arose out of a realization that it was impracticable and economically inefficient to attempt to establish a regime that provides prescriptive solutions to address every hazard and risk that might be in the workplace; i.e., to provide for something close to adequate safety. Instead, the legislation places a general obligation for safety on persons who have

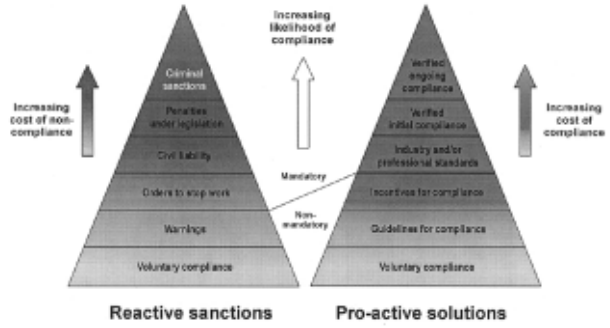


Figure 4 — Elements of regimes for implementation

control over safety in a workplace. That general obligation requires such persons to identify hazards, analyse the risk of these hazards and control the risks to ensure that they don't exceed acceptable levels, at least to the extent of their control. Persons who have control over the safety of a commercial vessel not only include operators, but also the designers, builders, equipment suppliers and owners.

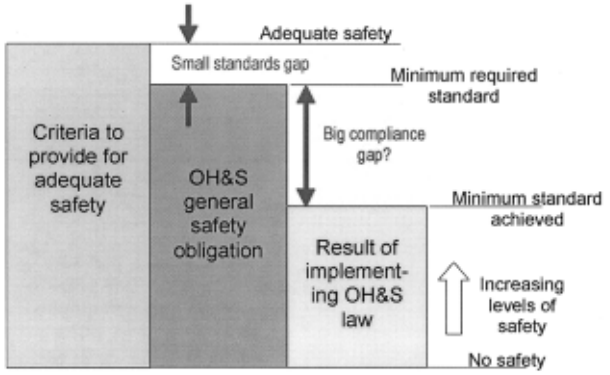


Figure 5 — Occupational Health and Safety model

OH&S law requires that risks are managed, i.e. hazards are identified, risks arising from those hazards are assessed, and measures implemented to eliminate or control risks that would otherwise be unacceptable. There are provisions requiring appropriate training, instruction and supervision of personel and consultation between employers and employees on matters of safety. Proof of compliance includes a documented risk assessment. Inspectors have the power to view the documentation. Apart from certain higher-risk activities that require pro-active certification, the legislation is generally administered reactively by means of post-incident or post-complaint inspections. There is also a system of audit.

Figure 5 illustrates the author's view of the Occupational Health and Safety model. The general safety obligation reduces the standards safety gap between adequate safety and minimum required standard. This gap can be reduced as the cost of implementation is kept under control by the standard being performance-based and the fact that it is largely applied reactively. However, in the reactive approach, there is considerable potential for a large safety gap in compliance. Without pro-active measures to promote or mandate compliance, the extent and nature of compliance is effectively left to the designer, builder, supplier, owner or operator, to be balanced as one of a number of risks of the relevant stakeholder's business. Inevitably, compliance will depend to some extent on the stakeholder's perception of the likelihood of being caught out for non-compliance and the consequences of non-compliance.

The above discussion helps explain why in theory, performance-based OH&S legislation should be the only legislation required for safety but, in practice, this is not the case. There is a community expectation that government will have a more pro-active role in ensuring safety in certain potentially higher-risk activities including, notably, the safety of transport. That pro-active role normally involves requiring specific activities to be pro-actively certified to specified prescriptive minimum required standards prior to commissioning and on a periodic basis.

REVIEW OF STANDARDS FOR THE CERTIFICATION OF VESSELS

The Uniform Shipping Laws Code was originally formulated in the 1970s, before the introduction of modern Occupational Health and Safety Law. While the concepts of performance-based occupational health and safety law have been on the agenda since the 1980s, it is only since the 1990s that they have been incorporated into the law of the States and Territories of Australia. In NSW, the legislation was promulgated in September 2000. After a two-year implementation period, the law will be fully enforced for small businesses from September 2003. How does the new legislation impact on the revision of standards for domestic commercial vessels in Australia?

In 1997, the Australian Transport Council approved a National Marine Safety Strategy to shape the reform of marine safety administration in Australia. That strategy identified a series of strategic actions to be followed in revising standards applicable to commercial vessels, which included:

- incorporate recognized and relevant national and international standards;
- encourage professional competence;
- incorporate a performance-based approach;
- facilitate approval of new technologies;
- incorporate OH&S principles; and
- encourage recognition of duty of care.

The incorporation of Occupational Health and Safety principles is specifically listed. A number of the other actions also have relevance to the OH&S regime, including the adoption of performance-based approaches, recognition of duty of care and the encouragement of professional competence.

The approach adopted by the National Marine Safety Committee has not been to duplicate OH&S law in the marine safety legislation and standards of the jurisdictions. Rather, it has been to modify marine safety standards to complement the new OH&S law. The new standards have been written to focus on the safety outcomes, rather than specific solutions. Specific deemed-to-satisfy solutions are specified in the standard which represent a consensus on good practice for meeting safety outcomes. Guidance is given on applicable hazards and risks that are being addressed by the standard. Most importantly, the presence of modern OH&S legislation has allowed a crystallisation of the role and limitations of the framework for the issue of certificates of compliance.

To illustrate this last point, consider Figure 6 which shows the relative functions of the pro-active certification of vessels and OH&S within the overall concept of adequate safety. In

the past, the meaning of a certificate of compliance for vessels was unclear. Some believed that it meant a vessel was "safe" or "seaworthy", others that the vessel met specified standards. This uncertainty was reflected in differing requirements for the issue of a Certificate of Survey within the legislation of the various jurisdictions. There is now agreement that a Certificate of Survey will be issued when a vessel meets certain minimum required standards specified within the legislation, that standard for new vessels being the new National Standard for Commercial Vessels (NSCV). The NSCV contains prescriptive deemed-to-satisfy solutions to control major and generic risks against which compliance is measured. To the extent of the matters covered by the standard as required by legislation for the issue of a certificate of compliance, compliance will be pro-actively verified. For those aspects of safety that fall outside pro-active verification (i.e., within the safety gap), some will fall within the application of general OH&S obligations that apply to the vessel as a workplace under the OH&S legislation. Thus, the administration of commercial vessel safety is by means of a composite approach, using pro-active minimum required standards and reactively-applied general safety obligations.

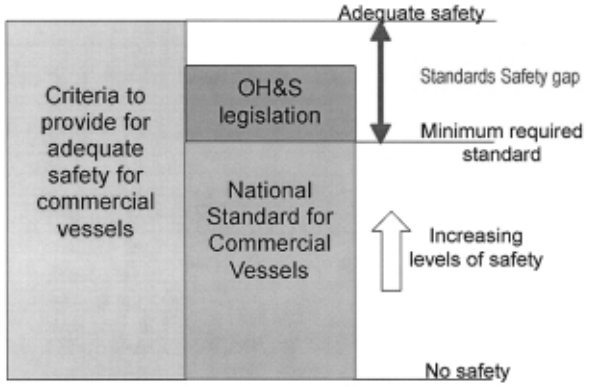


Figure 6 — Combined approach to the safety of commercial vessels

In the past, many in the maritime industry had the perception that once the vessel acquired a Certificate of Survey, a relevant stakeholder (be it designer, builder, owner, etc) had discharged their full obligation for safety. The new composite framework clearly shows that this is not the case. OH&S legislation fills part of the safety gap not covered by the Certificate of Compliance. Likewise, the Certificate of Compliance goes a long way towards fulfilling safety obligations under OH&S legislation.

The remainder of this paper makes some observations about the safety gaps, both the standards safety gap and the compliance safety gap.

STANDARDS SAFETY GAP

Occupational Health and Safety

As already indicated, occupational health and safety matters not addressed or sufficiently covered by the minimum standards contained in the NSCV fall within the standards safety gap. Part A of the NSCV contains guidance on safety obligations, expressed in terms relevant to the marine industry to assist stakeholders in understanding their obligations under OH&S legislation. Part A is not mandatory and does not replace OH&S legislation. However, it alerts the user to these obligations that exist over and above compliance with the minimum standards contained in the NSCV. In particular, it is important for stakeholders to note that OH&S obligations apply to designers, builders and suppliers as well as owners and operators.

Protection of property or against economic loss

The objectives of the NSCV include the protection of life and the protection of the environment, but do not include the protection of property or control of economic loss. While the latter two may be afforded by the provisions of the NSCV, that is only incidental to the provisions intended for the protection of life and the environment. Circumstances may arise where additional criteria for the protection of property or against economic loss are specified by key stakeholders as part of the standards safety gap. These key stakeholders may be the owners of cargoes or the insurers of cargoes or the vessel itself. It is interesting to note that, on land, certain cored materials accepted for building construction under the Building Code of Australia are not permitted by some insurers [2]. The reason is apparently that, while the materials meet fire safety standards for the protection of life, they result in considerable property damage after exposure to the fire.

Protection of the environment

While the objectives of the NSCV include the protection of the environment, this aspect of the standard is relatively minor. The main source of criteria for environmental protection is the relevant environmental legislation of the States and Territories. Hence, these requirements fall into the safety gap. At this stage, the environmental requirements applicable to domestic commercial vessels may differ significantly between jurisdictions, particularly with respect to the holding and treatment of sewage.

Liability

A significant component of the safety gap concerns the issue of liability. For many years the courts have recognized that compliance with a minimum standard is not necessarily a sufficient defence to avoid liability.

In an Australian case[3], the owner of a charter vessel was held to be potentially liable for having stairs on the vessel that were too steep. The defence that the stairs met the requirements of the Uniform Shipping Laws Code was rejected on the basis that the Code was a minimum standard and not necessarily an adequate standard, taking into account the demographic characteristics of persons likely to use the stairs. A stairway constructed to the minimum standard for commercial vessels would not have been permitted under building standards ashore.

It is important to understand that compliance with minimum standards does not necessarily absolve persons from their duty of care under the tort of negligence. Potential liability issues must be considered for each vessel in the context of its intended operation.

Grandfathering

One of the more surprising matters in the standards safety gap is the issue of "grandfathering" of vessels. When a safety standard is changed, a vexing question that often arises is whether the new standard should be applied retrospectively to the existing fleet. On one hand, there may be a good safety reason why the standard has been changed. On the other hand, there is the possibility that altering an existing vessel to comply with a new standard may be expensive, if not

impossible. The frequent response by Marine Authorities has been to "grandfather" old vessels on the basis that they met the applicable standards that were in force at the time of their construction; i.e., to allow continued operation under a certificate of survey that attests to compliance with standards that were in force at the time of initial survey. There are many domestic vessels operating in Australian waters under such arrangements.

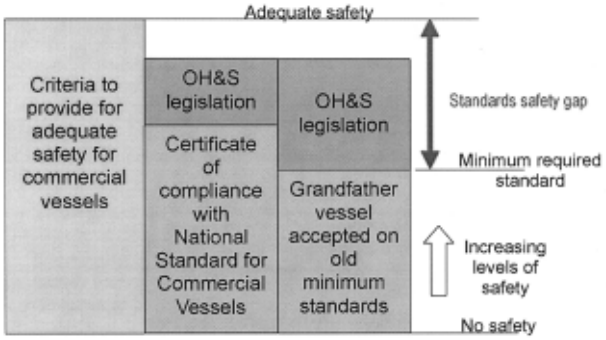


Figure 7 — Grandfathering of vessels

How does grandfathering find its way as an issue in the safety gap? This can be illustrated by the case of a schoolboy who fell through a plate-glass door in his school cafeteria[4]. The student sued the school for negligence. The school defended the action, saying that the building pre-dated standards for safety-glass doors and that the ACT building code only required buildings to comply with standards applicable at the time of construction. Judgement went against the school on the basis that the school had been negligent. Whatever the standard had been in 1966 when the building had been erected, since 1972 when the new standard had been introduced into the ACT, it was both "practicable and affordable" for the glass to be replaced. As well as being found negligent for not replacing the glass, the school was held to have failed in its duty for not removing a tripping hazard.

If the same logic is applied to commercial vessels, then the owner of a vessel that predates, say, the current USL Code fire-safety requirements, may be liable should the vessel be consumed by a fire with attendant loss of life or injury or other loss.

Referring to Figure 7, the case of the school shows that, where a vessel is grandfathered, the requirements for adequate safety do not necessarily change. Grandfathering merely increases the safety gap that must be met above the minimum required standard. Moreover, it should be noted that the general safety obligation under OH&S law has no provision for grandfathering and so does not diminish, irrespective of the marine authority's policy on grandfathered vessels.

Company Directors and Managers

The standards safety gap is an issue of importance for senior management of a company, be it a company of designers, builders, suppliers, owners or operators. There have been a number of reforms in OH&S legislation in Australia to lift the corporate veil that helps protect the senior management of a company from being personnally held accountable for the safety breaches of the company. Furthermore, there have been recent attempts to introduce corporate manslaughter as a specfic crime in the criminal code[5].

To date, convictions of company directors and managers under criminal law for failure to take appropriate steps to protect the health and safety of persons have been difficult. For instance, consider the capsize of the ferry *Herald of Free Enterprise* in 1987 which caused the death of 192 persons. An attempt to prosecute two directors of P&O Ferries for manslaughter failed. The problem lay in establishing within the corporate structure, who was the 'controlling mind' in the company responsible for the act or failure. Subsequent cases indicate that, the smaller the company, the easier it is to prove direct responsibility of individual directors or managers[6].

However, changes to OH&S legislation and continued pressure for changes to the criminal code are putting senior management on notice as to their responsibilities for managing the standards safety gap. For example, Section 26 of the NSW OH&S Act states—

26 Offences by corporations—liability of directors and managers

(1) If a corporation contravenes, whether by act or omission, any provision of this Act or regulations, each director of the corporation, and each person concerned in the management of the corporation, is taken to have contravened the same provision unless the director or person satisfies the court that:

(a) he or she was not in a position to influence the conduct of the corporation in relation to its contravention of the provisions, or

(b) he or she, being in such a position, used all due diligence to prevent the contravention by the corporation.

In relation to these defences, the Chief Industrial Magistrate in NSW has commented that it will be extremely difficult for an employer to establish a defence where it has not in place a comprehensive occupational health and safety program and risk-management program which is applied to the given task[7].

Guidance for Navigating the Standards Safety Gap

In addition to any applicable legislation, there are a number of publications which can assist stakeholders which have duties to provide for adequate safety that are not mandatory under the NSCV.

Firstly, there is the NSCV itself. As previously mentioned, Part A of the NSCV provides guidance on safety obligations within the context of the maritime industry. Annexures in Part B of the NSCV provide guidance on risk analysis and acceptable risk. The required outcomes listed in the NSCV indicate the types of hazards that are being addressed by the NSCV. Some of the notes within the various Parts and Sections of the NSCV contain non-mandatory information on hazards, risks and recommendations regarding solutions.

Under OH&S legislation, an industry code of practice is a formal document that provides practical guidance to employers and others who have duties under OH&S legislation for occupational health, safety and welfare. An industry code of practice has been developed for the offshore industry that could have relevance for other sectors of the maritime industry. Other sectors of the industry may consider developing industry codes of practice with the relevant Workcover Authorities.

THE COMPLIANCE SAFETY GAP

A certificate of compliance attests to the fact that a vessel complies with specified minimum required standards. To that extent, it contains an underlying promise to those who might rely upon it. As a general rule, the compliance safety gap is the responsibility of the authority that issues the certificate of compliance.

In theory, a vessel that is issued a certificate of compliance should have no compliance safety gap. However, the reality is that human and other factors may result in a vessel being declared as meeting standards, when that is not actually the case. An audit of almost any certified vessel would likely find at least one, if not more, features that fail to meet specified safety requirements. Why should this be so? The following matters consider the nature and extent of the compliance safety gap.

Form and Content of Standards and Legislation

Different individuals will often interpret standards or legislation differently from one another. Even within the same authority, the same requirement may be interpreted differently by individuals, let alone persons outside the organization having differing knowledge, competencies, objectives and responsibilities. The current standards and legislation applicable to commercial vessels contain many inconsistencies, discretionary clauses, and vague criteria that cannot be quantified. The standards and legislation provide the benchmark against which compliance is verified. Unless the criteria for compliance are in a form that is clear, quantifiable and unambiguous, there can be no consistent interpretation of what is compliance.

The National Standard for Commercial Vessels is being revised in a style that, it is hoped, will improve its clarity to users. For the first time, the standard specifies safety objectives. Discretionary clauses are being removed from the standard and vague "motherhood" type clauses are being rewritten to provide quantifiable criteria. However, the transformation of the standard cannot happen all at once. Rather, it is an evolutionary process that needs continuing input by all stakeholders.

The relevant legislation applicable to commercial vessels varies significantly between jurisdictions. The differences in legislation are so significant that there is not even a common benchmark for the minimum required standard accepted by all jurisdictions for the issue of a Certificate of Survey. Clearly, variations in the minimum required standard can have a profound effect on the existence or otherwise of a compliance safety gap. A project is currently underway to reduce variations between applicable legislation by inserting model clauses for key clauses having a consistent interpretation across all jurisdictions. Not only should this improve the reliability of outcomes, but it will also significantly enhance national consistency and mutual recognition between jurisdictions.

Quality of Verification Processes

As with any other field of human endeavour, the quality of the verification process will depend upon the quality of the inputs and processes that were used to achieve the outcome. While a vessel may have a certificate of compliance that says it meets the required minimum standards, there is a chance that the vessel may contain non-conformities that may have been missed during the verification process. The quality of the verification process is a matter largely under the control of the authorities. It is a function of the commitment of management, the resources available for carrying out verification, the competence and independence of assessors, the establishment of appropriate verification systems and processess, the monitoring of outputs and the willingness of management to improve systems on the results of feedback.

There are significant variations in the resources made available by the different jurisdictions for verification processes. This is not surprising given that, for example, NSW has a population of more than 30 times that of the Northern Territory. However, as well as differences in resources, the authorities of the various jurisdictions within Australia have varying degrees of commitment to the quality of their processes. While the benefits and costs of uniform processes across jurisdictions can be argued, there can be no such argument regarding outcomes. The outcome of the various verification systems must have reasonable uniformity if the compliance safety gap is to be kept under control and national consistency achieved. All too often, individuals in one authority have identified anecdotal evidence of problems in the quality of verification by other authorities. However, to date there has been no systematic study of the quality of verification processes for comparison between Authorities. The feedback component of quality management is still frequently missing from the process.

To help address the differences in the quality of verification outcomes between jurisdictions, the NMSC is currently considering a draft National Standard for the Administration of Marine Safety.

Compliance may Change over Time

An assumption that the safety characteristics of a vessel cannot change over time is unrealistic. A number of factors may reduce the level of safety of a vessel after it has been issued with a certificate of compliance. These include:

- wear and tear;
- in service damage; and
- unauthorized modification.

An authority discharges responsibility for changes in the vessel's compliance after the date of issue of a certificate by clearly specifying within relevant legislation (and probably on the certificate of compliance) the time and other limitations on the validity of the certificate, and the procedures that need to be followed in the event of potential changes to the vessel's level of safety after issue of the certificate.

Exemptions

Enabling legislation normally contains provisions that give the authority the discretion to vary the minimum required standard for the issue of a certificate of compliance, both for vessels individually and for vessels as a class. Thus, an authority may accept a lesser standard than that provided in the statutory standard, subject to any limitions on that discretion contained in the legislation. It is important that any person relying on the Certificate of Compliance can readily ascertain that the vessel has been exempted from aspects of compliance with the statutory standard.

Equivalents

Current standards and legislation permit the substitution of equivalent arrangements at the discretion of the Authority. Equivalent arrangements have been a significant potential contributer to the compliance safety gap. There are a number of reasons why this is so including:

- A failure to identify appropriate criteria upon which to determine equivalence.
- A failure to properly verify compliance with the relevant criteria
- The taking into account of factors that are local, and

which are no longer relevant when a vessel moves to another locality or is used in another operation.

The National Standard for Commercial Vessels incorporates a structure that facilitates the consideration and verification of so-called "equivalent solutions". Safety outcomes are expressed as "required outcomes" within the standard. Prescriptive "deemed-to-satisfy" solutions within the standard provide a benchmark against which the equivalence of equivalent solutions can be measured. Assessment techniques for equivalent solutions are specified in the standard and guidance is given on techniques for risk analysis and risk management.

The proposal of an equivalent solution places an increased burden on both the proponent and the authority to avoid creating a compliance safety gap. A key requirement of the process is that equivalents should be based on objective data rather than subjective opinion.

The NSCV differentiates between generic and local equivalent solutions so that any local factors that went into the decision-making process are revisited should the vessel move or change operation.

Liability

A certificate of compliance is, in effect, a declaration of compliance. Where a person relying on that declaration incurs loss due to a failure of the vessel to meet the promise implicit in the declaration, an issuing authority may be liable for the loss under the tort of negligence. The loss may be as a result of an incident, a failure by another jurisdiction to mutually recognise the vessel or it may be as a result of liabilities arising under a breach of contract. In relation to the last-named, the majority of contracts for the building of commerical vessels contain the expressed condition that the vessel shall meet the requirements for, say, USL Code Class 1D and have a valid survey certificate issued by such and such an authority. Other possible causes of action that may result from the compliance safety gap include breach of contract (if it can be shown that the Authority has been contracted to provide survey services) and breach of statutory duty. The position of a certifying authority under OH&S law is not clear and deserves further investigation.

The potential for liability of issuing authorities can be reduced if the certificate of compliance contains information relevant to the nature and extent of the underlying promise. Matters such as the applicable standards, generic equivalence, local equivalence, exemptions and non-conformities need to be explicitly listed. Where non-conformities become apparent after the issue of a certificate of compliance, the issuing authority should either issue a formal declaration of exemption or it should list the non-conformities on the certificate of compliance. By doing so, the issuing authority may become exposed to claims for losses arising from the error and any measures needed to correct the error. However, it effectively alerts the owner and operator to review any safety issues by effectively transferring the issue to the standards safety gap, thus reducing the potential liability and exposure in the event of an incident.

CONCLUSION

The safety gap is not a new phenomenon. It is a reality that has been a part of the management and administration of safety for well over a century. Perhaps the best known example occurred with the loss of *Titanic* in 1912. Though fitted with lifeboats that met minimum required standards of the British Board of Trade at that time, those involved in the design, construction, equipment supply, ownership and operation of the vessel soon realized that their obligations for safety went well beyond mere compliance with a minimum standard.

Much has happened since that fateful day in April 1912. Minimum required standards for the safety of ships have been progressively expanded and raised and the system of pro-active administration of safety strengthened. However, over the same period, the value that society places on life has increased enormously, at least in countries like Australia. Because of the finite resources available for administering safety, it is unlikely that pro-active standards will ever be formulated and implemented which completely achieve adequate safety and eliminate the standards safety gap. Likewise, even with the best will, it is difficult to eliminate entirely the compliance safety gap.

Thus, the safety gap will continue to be a reality. All stakeholders that have control over the safety of a commerical vessel have individual obligations that lie within the safety gap that cannot be ignored or abrogated. However, it is suggested that there are significant advantages to be gained by stakeholders collectively and pro-actively dealing with issues in the safety gap. An integrated approach needs to be taken with persons at each stage of the creation and operation of a commerical vessel, from design to operation, identifying and discharging their specific roles and responsibilities and passing on the relevant information to others that may depend upon it.

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MEMBERSHIP NOTES

Fees Amnesty for Lapsed Members

Lapsed members, whose names have been removed from the membership roll because their fees were not paid, are normally required to pay all outstanding fees due from when their membership lapsed before they can be reinstated.

It is always a matter of regret when the Institution loses a member in this way, particularly if that person is still active in the maritime industry and would therefore benefit from membership of the Institution, whether from the internationally-recognised professional qualification which membership confers, or the access to up-to-date technical information which the Institution's journals provide. However, I do appreciate that sometimes the cost of reinstating membership presents a problem, particularly when considerable arrears have built up.

As a one-off exercise, the Institution is declaring an amnesty for all lapsed members. Such members will be re-instated on payment of the 2004 Membership Fee, in the class of membership which they previously held. Where we still hold current addresses, such lapsed members have been informed, but in many cases, contact has been lost. I would be grateful if members of the Division would make known this waiver to any of their colleagues or employees to whom it might apply. They should contact me at RINA Headquarters by email on hq@rina.org.uk, fax +0011-44-20-7245 6959, or mail to RINA, 10 Upper Belgrave St, London SW1X 8BQ, UK, for further information.

None are more welcome than a lost lamb returned to the fold. However, members who have not yet paid their 2004 fees should be aware that this offer will not be repeated in 2005!

Trevor Blakeley
Chief Executive

AD Council Meeting

The Australian Division Council met on 4 December, with teleconference links to all members and the President, Rob Gehling in the chair. Matters, other than routine, which were discussed included:

- Insurance: Confirmation from the Division's insurance broker that the public-risk insurance cover held by the Division covered members involved in all authorised activities of Sections and Council.
- RINA/IEAust Joint Board: Mr Bryan Chapman, Chairman of the IEAust/RINA Joint Board, reported on ongoing matters. Professor Jackson had accepted the invitation to visit Australia and it was hoped his visit would include as many sites as possible. Sponsorship for his visit is being sought and it was hoped that attendance at his lectures would be without cost. Details of the proposed visit were given in the November issue of *The ANA*.

  The Joint Board had been informed by IEAust that it had decided that it was unable to grant membership fee reductions to those holding joint membership of IEAust and RINA.

  As Mr Riley was no longer a member of Council he felt he should no longer be a member of the Joint Board. Council was appreciative of Mr Riley's past contribution to the Joint Board, accepted his invitation to stand down, and agreed to the appointment of our President, Mr Rob Gehling, to the Joint Board.
- Web Forum: Mr Macdonald of the ACT Section had proposed a forum on matters of relevance to RINA members to be conducted on a website. The proposal had been discussed widely by the ACT Section. Council considered the proposal at length and believed access should be through the RINA website as a world-wide event. Mr Gehling offered to develop the proposal with a view to taking it up with London.
- Sydney Container Berths: A statement by the NSW Premier proposing the removal of container berths from the Port of Sydney was discussed, and Council looks forward to having a paper on the subject before it at the next meeting of Council.

The next meeting of the AD Council is scheduled for 23 March 2004.

Keith Adams
Secretary

Walter Atkinson Award 2003 — Call for Nominations

At its meeting on 19 June 2002, Council resolved to change the conditions of the Walter Atkinson Award. The revised conditions now apply and are reproduced here.

Selection Criteria

- The nomination may be for a presentation which includes a written technical paper, or for a technical published paper, and it must be more than just 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.

Nominations

Nominations for the Walter Atkinson Award are made by members in writing to the Secretary of the local Section (or, for NT or SA residents, the Division Secretary). 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.

Assessment

Sections then consider the papers nominated to them in the light of the assessment criteria and each make one or more recommendations to the Australian Division. A sub-committee of the Australian Division Council considers the nominations in the light of the assessment criteria and decides the award, which is then announced in *The ANA*. The following are considered:

- 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?

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

Call for Nominations for 2003

Nominations for the Walter Atkinson Award for papers presented in 2003 are therefore requested. If you wish to nominate a paper for the award, your nomination should be in writing (which includes email or fax) and should be received by the Secretary of your local Section (or, for NT or SA residents, the Division Secretary) by Friday 16 April 2004.

Sections then consider the papers nominated to them and each make their recommendation to the Australian Division by 31 May. The Division will then consider the recommendations from the Sections and decide the award by 31 July, and the award will be announced in the August issue of *The ANA*.

So, think which was your favourite paper you read or saw presented in 2003 and don't delay, nominate today!

Vale Frank Bartlett

It is with sadness that *The ANA* records the passing of Frank Bartlett on 14 January 2004 in Tacoma, USA.

Frank was appointed as a lecturer in naval architecture at The University of New South Wales when John Tuft retired in 1977. Owen Hughes then took over as the head of the (then) Department of Naval Architecture. Frank struck up an immediate friendship with Don Dickson, Head Teacher in Naval Architecture at the (then) Sydney Technical College. Together, they accompanied the students from UNSW and STC to shipyards in Newcastle for annual site visits and to explain the building of ships and associated activities. Frank was a keen yachtsman and regularly crewed with Don on the 48 ft (14.6 m) sloop, *Salacia II*.

Frank had suffered war injuries, and returned to the USA for treatment in 1980. However, he and Don maintained their friendship, and frequently visited each other here and in the USA.

Frank Bartlett was a direct descendant of Josiah Bartlett, whose signature appears on the American Declaration of Independence document.

A service was held on Saturday 24 January at the Tacoma Lutheran Home where he and Norma lived very happily in their twilight years. He was one of nature's gentlemen and is sadly missed.

Don Dickson

THE PROFESSION

NMSC Guidelines for Auditing Registered Training Organisations

The goals of the National Marine Safety Committee include the development of common standards for operators of vessels, and creating systems to ensure that vessels are appropriately crewed for their intended operational activity by competent and suitably-qualified personnel.

To meet these requirements, Sections 2 and 3 of the Uniform Shipping Laws Code were reviewed in entirety and replaced by Part D, Crew Competencies, of the new National Standard for Commercial Vessels (NSCV).

In May 2001 the Australian Transport Council (ATC) endorsed Part D of the NSCV for adoption by each of Australia's marine safety agencies.

In order to support consistency of application throughout Australia, there is a requirement in Part D that all training programs, registered training organisations (RTOs) and assessors are approved by an authority.

For such approvals to be granted it is necessary for the authority to carry out an initial compliance audit of the systems and procedures employed by an RTO to verify that the requirements of Part D are fully satisfied. Additionally, to ensure that standards continue to be maintained, it will be necessary for an authority to carry out regular periodic compliance audits on the RTO as a requisite for continuing approval status.

These guidelines have been prepared to provide assistance to authorities in the creation and maintenance of systems that will achieve a uniform approach to the auditing of RTOs. Once finalised and endorsed by the ATC they will be published and become part of the National Guidance Manual.

The guidelines have now been released for public comment and are available on the website at www.nmsc.gov.au. The NMSC would appreciate any comments and feedback that you or your organisation wish to provide before the guidelines are presented for national adoption. The closing date for submissions to the NMSC Secretariat is 15 March 2004.

Maurene Horder

A NOTE TO CONTRIBUTORS

Whilst all contributions to *The Australian Naval Architect* are very welcome, the Editors' hearts warm to those contributors who provide material in a format that requires little work to prepare for layout. *The ANA* is built (once a shipbuilder, always a shipbuilder) in Pagemaker v.6.5 running under Windows. Articles should be sent as Word documents or text files with a minimum of formatting. Illustrations should never be sent in Word files, but as separate attachments in JPG, TIF, EPS or WMF format. A resolution of 200-300 dpi is preferred. If in any doubt, an email to the Editor will sort out potential problems.

NAVAL ARCHITECTS ON THE MOVE

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

Alistair Allan, a graduand of the Australian Maritime College, has taken up a position with the Department of Defence, Navy Systems Command, Directorate of Navy Platform Systems (Concepts and Costings) in Canberra.

Nick Barratt has moved on from WaveMaster International and has taken up a position as a naval architect with Image Marine in Fremantle.

Greg Chivers, soon after graduating from UNSW many moons ago, bought a yacht together with Ben Harvey to go and sail the high seas, and did a big refit. They sailed away in September 1999 with $1000 in their pockets and had lots of fun, sailing throughout Asia, across the Indian Ocean and working in strange parts of the globe. He is currently working on a 30 m private luxury yacht in Europe, still exploring the world. He is recovering from an accident in which a rescue-line thrower (containing a small explosive charge to propel a rescue line several hundred metres) blew up in his hand during maintenance.

Lina Diaz has moved on from the Waterways Authority of NSW and is now consulting as Lina Diaz. She has already landed her first contract, to prepare the stability book for a crane barge in Darwin. She continues as Secretary of the NSW Section of RINA, and encourages Amy's chatter and the patter of her little feet.

Luke Dodds, a graduand of the Australian Maritime College, has taken up a position with Lawson and Treloar in Melbourne.

Tony Elms has moved on from Seastate and is now consulting as Elms Australia in East Fremantle, generally in naval architecture but has more to do with waves and their effects than straight design. He continues his interest in Seastate as a non-executive director.

Jon Gould has moved on from London Offshore Consultants Australia and has taken up a position as a naval architect with Frontier Engineering Solutions (Asia Pacific) in Perth.

Kristoffer Grande, who completed his master's degree at Curtin University in 2002 on the slamming of multihulls, is planning to return to Australia from Norway (it is too cold!) Anyone looking for a naval architect can contact Kristoffer on email post@grande-design.no.

Ben Harvey, on graduating from UNSW many moons ago, did his boatbuilding apprenticeship at tech, and became a boatbuilder. He enjoyed the hands-on experience, and ended up running his own business. That culminated with a commission to design and build a traditional gaff-rigged yacht, *Vanity*, which ended up being not only beautiful but also successful, winning many of her races in the Ranger class on Sydney Harbour since launch in 1999. Meanwhile, he and another one of the naval architecture graduates, Greg Chivers, had bought a yacht together to go and sail the high seas, and did a big refit. They sailed away in September 1999 with $1000 in their pockets and had lots of fun, sailing throughout Asia, across the Indian Ocean and working in strange parts of the globe. He and his wife, Jen, then decided to head for Europe to try their hand in the mega-yacht industry, which they have been doing for the last few years. They have just finished overseeing the building and trials of a 32 m modern classic sloop, *Christoffel's Lighthouse*, built in the Netherlands and written up in many of the yachting magazines. They then delivered her personally to the Caribbean, and are now looking for another boat to build. Jen's experienced sea-going female input is a voice that seems to be often overlooked in the design-and-build process. Together with Ben's experience as a naval architect, boatbuilder, marine engineer (MED1) and ocean-going master (Yachtmaster and Master Class 5 — soon to be 4), they have a lot to offer any project.

Peter Holmes, a graduand of The University of New South Wales, has taken up a position as the deckhand/cook on *Tongarra*, a 12 m motor-sailing charter catamaran for 23 passengers with a crew of three, in the Whitsunday Islands. He says that he earns less than he would as a naval architect, but it is good experience and he is working towards his coxswain's ticket. As well as the deck duties, he prepares all the meals, and serves with the help of the host, so that is hard work. It is *always* stinking hot, but once the meal is done, it's back on deck to take in the scenery, and *that* work is not so hard!

Nick Hutchins moved on from Team New Zealand after the America's Cup defence, and spent a couple of months in the middle of last year working at Stanford University and NASA Ames in the USA. A friend who was doing a PhD in conjunction with the NZ sail-design program invited him to go over and work on wind-tunnel experiments validating his CFD. Nick was employed to help build the models and testing rig, and they did some good flow visualisation and a lot of testing using pressure-sensitive paint, all of which he found really interesting. He has now moved back to Team New Zealand in Auckland, NZ, where they are working on the next America's Cup challenger.

Graham Jacob has taken up a position with Saipem (part of the ENI Group) in Hull, UK.

Daal Jaffers has returned from a two-and-a-half year tour of Europe. He worked at Nigel Gee and Associates in Southampton for a while, and he and Michelle spent about eight months travelling around eastern and western Europe and Scandinavia in a Ford Transit van. France was the best; very easy travelling and a diversity of things to see. They are now sick of living out of suitcases and they have moved into a place on the Gold Coast. Daal has taken up a position as a naval architect with Sea Transport Solutions in Runaway Bay, Qld, and is quite excited as STS do a wide variety of work compared to the fast-ferry business.

Jake Law has moved on from McAlpine Marine Design and has taken up a position with Clough Engineering in Perth. Clough are major project contractors, manly in the civil and offshore fields.

John Lembke, after moving on from Austal Ships some time ago, backpacked around the west and east coasts of the USA before heading to the UK, Greece (where he picked up a job as a windsurfing instructor for a while), and then through western Europe. Back in Australia, he worked for Seastate

in Fremantle for a year, before moving on to London Offshore Consultants Australia in Perth. He has now moved on from there, and has taken up a position as a naval architect with Frontier Engineering Solutions (Asia Pacific) in Perth. Frontier and J.P. Kenny are both part of the Wood Group, based in Aberdeen, UK, and are involved in processing in offshore and onshore engineering.

Blair Lewis, a graduand of the Australian Maritime College, has taken up a position as a naval architect with McAlpine Marine Design in Fremantle.

Daniel Lewis, a graduand of the Australian Maritime College, has taken up a position with Covus (Dive Support) in Perth.

Stuart McDonnell, a graduand of the Australian Maritime College, has taken up a position with the Australian Maritime Hydrodynamics Research Centre/AMC Ship Hydrodynamics Centre in Launceston.

Bruce McNeice has moved on within the Department of Defence from Hydrodynamics Technology Manager and has taken up the position of Navy Systems Project Liaison Officer — Amphibious and Afloat Support (AAS). The position is the point of contact for AAS projects between the Chief Naval Engineer's Branch (Navy Systems) and the DMO, and Maritime Development. The role includes managing the inclusion of Navy Systems technical requirements into Operational Concept Documents (OCD) and Functional Performance Specifications (FPS), facilitating technical evaluation of tenders and assisting in the establishment of the certification basis for these projects.

Martin Mok, a graduand of the Australian Maritime College, has taken up a position with Roc Oil Limited in Sydney.

Robert Ochtman-Corfe, a graduand of the Australian Maritime College, has taken up a position with the Royal New Zealand Navy.

Michael O'Connor has moved on within the Department of Defence and has is on a six-month secondment to the FFG Upgrade Project at Australian Defence Industries, Garden Island, Sydney.

Pete Randhawa has moved on from consulting and has taken up a position as a naval architect with MacAlpine Marine Design in Fremantle.

Mervin Sagario has taken up a position with Stewart Marine Design in Cairns. Mervyn has a Bachelor of Science degree in Naval Architecture and Marine Engineering from the University of Cebu, Philippines, and emigrated from Cebu with wife Rochelle to take up the position. He is a licensed professional engineer in the Philippines, and was a design naval architect in the Philippines office of Stewart Marine Design.

Sophia Schmieman (nee Pierce), a recent graduate of the Australian Maritime College, has move on from Michael Page International to work for The WA Department of Planning and Infrastructure in Perth.

Greg Shannon has been living in Sweden for the last year with girlfriend Ylva. Greg says that he is seeing a bit of the world, is trying different foods, experiencing a new culture and, of course, learning a new language (which is taking a bit of time). He has recently taken up a position as a designer (konstruktör in Swedish) in the Technical Department at Jowa AB in Göteborg (visit www.jowa.se to find out more). They are a small but quickly-growing company, making environmentally-friendly ship water-handling equipment and are the world's leading supplier of oil-discharge monitoring systems, used primarily onboard oil tankers.

Mark Smallwood has moved on from consulting, and has taken up a position with Marine Safety Victoria in Melbourne.

Colin Spence, a recent graduate of the Australian Maritime College, has moved on from the Water Corporation of WA and has taken up a position as a naval architect with McAlpine Marine Design in Fremantle.

Evan Spong has submitted the final copies of his PhD dissertation on *A Numerical Simulation of Adaptive Electromagnetic Flow* Control to The University of New South Wales. He has moved on from North West Bay Ships in Sydney and has taken up a position with QinetiQ at the Haslar Technology Park in Gosport, UK, working for Martin Renilson on the manoeuvring and control of submarines.

Nick Stark moved on from ERG a couple of years ago, and continues consulting as Elan Design in Perth. He says that his major project in that time has been the design of a 73 m, 30 kn charter yacht which is due to commence construction soon. Other projects have been in the areas of finite-element analysis, stability, structural analysis, fibreglass design, and rendering of ship hull shapes. Visit www.elandesign.com.au to find out more.

Paul Steinman moved on from Seastate some time ago and worked for London Offshore Consultants Australia in Perth. He has now moved on from there to take up a position as a naval architect with Frontier Engineering Solutions (Asia Pacific) in Perth.

Guido van der Veen has moved on from London Offshore Consultants Australia and has taken up a position as a naval architect with Frontier Engineering Solutions (Asia Pacific) in Perth.

Carl Vlazny, a graduand of The University of New South Wales, has taken up a position as a naval architect with Seawind Catamarans at Bellambi (North Wollongong), NSW, where they have their offices and factory in the industrial estate. Most of the cats are in the 12–15 m range; some have sails, but most are motorised. Carl says that he likes it because, in addition to spending much of the week in the office, he also goes into the factory and gets on the tools as well.

Mark Wilson, a graduand of the Australian Maritime College, has taken up a position with Woodside Petroleum in Perth.

Dominic Worthington has moved on from *Spirit of Tasmania II* and has taken up a position on board *Scottish Bard*, a products tanker sailing from Australia to Singapore. He says that he is working his backside off but is having a ball!

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.

Phil Helmore
Gregor Macfarlane

FROM THE ARCHIVES

THE RINA IN AUSTRALIA — FIFTY YEARS

In 2004 we celebrate the fiftieth anniversary of the foundation of the first international branch of the Royal Institution of Naval Architects, the Australia Branch. To mark the twenty-fifth anniversary in 1979, the foundation president of the Australian Branch, Cecil Boden, spoke of the Branch's beginnings in his opening address to the Australian Symposium on Ship Technology held at the University of New South Wales in November that year. As many members will be unaware of the history of the RINA in Australia, Cecil Boden's address is reproduced below.

Cecil Boden started work as an apprentice ship's plater at Cockatoo Dockyard in Sydney in 1916. In 1917 he moved into the ship drawing office for the first time where he was to spend about half of his five-year apprenticeship. On completing his time, he studied at Sydney University, following which he left these shores for Scotland to study naval architecture at Glasgow University, where he graduated in 1927. On returning to Australia, he spent a short time at the New South Wales Government's Walsh Island Dockyard in Newcastle before he entered private practice. He was to return to Cockatoo on a part-time basis in 1933 and worked there full-time from 1934 during the period of resurrection of the Australian shipbuilding industry, just prior to the Second World War. He left Cockatoo for the last time in 1942 to establish the Green Point Shipyard in Sydney which was to play a sizeable role in the production of small ships for the Pacific War. He remained at Green Point until 1955 when he returned to private practice which he continued for the rest of his life.

I count it a privilege to be able to recall some of the events which made possible the establishment of the Australian Branch of the Royal Institution of Naval Architects. In setting out the history of the Australian Branch, it is necessary to return to the diploma courses at the Sydney Technical College about the year 1947. At that time, the College conducted a five-year course leading to the Diploma in Naval Architecture. Among the students who were graduating there were those who felt that there was a need to establish an association to promote their interests and to provide an opportunity for reading and discussion of theses.

Following some talks that took place during classes, it was decided that such an organisation should be established. For this purpose, a reunion of naval architecture diplomates and students was arranged on 15 May 1947. The circular announcing this gathering said: 'Arrangements for the Naval Architecture past and present students' reunion at Sue's Cafe, situated on the first floor of the building in George Street, adjacent to the entrance to Wynyard Railway Station, have now been finalised. Those attending are requested to arrive between 5:45 p.m. and 6:00 p.m. so that all may be seated not later than 6:00 p.m. The charge for the evening will be the cost of the meal as ordered from the menu. No extra charge would be made for the use of the premises after hours. During the evening Mr K. Brown will read his thesis prepared for his final examination. Anyone who has agreed to attend, finding it necessary to cancel the arrangement, is requested to advise Mr Paul by telephone during working hours'.

The Meeting at Sue's Cafe.

Records of the meeting show those present were Messrs Paton, Campbell, Nelson, Paul, Colquhoun, Harrison, Lawson, Brown and Boden. At this meeting it was decided that an Association of Naval Architects, Sydney Technical College should be formed. A small committee was appointed with Cecil Boden as President, David Carment Vice-President and Alan Colquhoun Secretary/Treasurer. It was decided that the membership fee should be 5 shillings per annum and that the first committee meeting would be held on Tuesday 26 August 1947 and the first annual general meeting should be held at Sue's Cafe on Thursday 10 February 1948. The paper that was read by Mr Ken Brown at that first reunion was entitled *Resistance and Propulsion.*

Subsequently, a constitution was prepared and agreed to at the second annual general meeting at Sue's Cafe on Tuesday 8 February 1949. Sue's Cafe thus became the historical birthplace of all the Associations of Naval Architects in Australia. The Association of Naval Architects, Sydney Technical College, continued to function with its interests primarily directed to college students and graduates.

With the increase in the number of diplomates working in the dockyards and shipyards it became apparent to members of the committee that there was a need to bring into the Association other naval architects who were not associated with the Sydney Technical College. This problem also resulted from the reorganisation of the structure of the diploma course when the course was transferred to the University of NSW from the Sydney Technical College.

At a committee meeting on 22 October 1951, attention was given to the possible alteration of the constitution to admit naval architects at present not eligible because of the definition of membership being exclusive to teachers, diplomates and students of the Sydney Technical College. Arising from decisions made at that committee, Messrs Mayson and Colquhoun were asked to prepare a draft of the modified constitution which would provide a wider scope for membership.

The draft was considered at the committee meeting held on 30 January 1952. The Chairman proposed the following motion: 'That the Association of Naval Architects, Sydney Technical College, should adopt proposals for a new constitution as prepared by the Executive Committee and submitted herewith, and that this constitution become effective from this date'. This motion was carried and the committee empowered to proceed to the inauguration of the Institution of Naval Architects, Australia.

The inauguration took the form of a dinner held on 4 June 1952, followed by an address by Mr C.W.J. Barker on ice-breakers. A number of naval architects on the staffs of shipyards, dockyards, etc. were invited to attend, and it was the writer's privilege to preside at this function. Thirty-two members and nine visitors attended. The attendance list is of considerable historic interest because it includes the names of a number of naval architects who have risen to the highest

positions in the profession in naval architecture in Australia, of whom most received their training in the original diploma course at the Sydney Technical College.

The constitution of this new Institution of Naval Architects, Australia, followed the basic ideas of the constitution of the Institution of Naval Architects in London, largely because it was felt that ultimately some affiliation or collaboration with that Institution would become possible.

Following the successful inauguration, it seemed important that the Council of the Institution in London should be advised of what had been done, and that the origins and intentions of the Australian Institution should be explained.

A letter was drafted by the President and submitted to the Council at its meeting on 23 July 1952 and approved with some modifications to be sent to London. This letter announced the formation of the Institution of Naval Architects, Australia and briefly outlined its development from the original association of Technical College students, and stressed the necessity and importance of a local body to provide for technical meetings and the fostering of the profession in Australia.

The Secretary of the INA, Mr Duckworth, replied expressing the concern of the London Council that there could be some confusion between the Institution and the local body in Australia because of the similarity of name and objects. He indicated that Dr S.F. Dorey, a member of the Council of INA, London, would be visiting Australia in February 1953. It was considered that discussions should be arranged between Dr Dorey and representatives of the Council of the Australian Institution. After discussing this correspondence, the local body decided that a letter should be sent to London noting the proposed visit of Dr Dorey and expressing willingness to confer with him during his visit.

In March 1953, a group consisting of Messrs Barker, Boden, Carment and Follan, met with Dr Dorey in the offices of Lloyd's Register of Shipping in Sydney.

First of all, Dr Dorey outlined the views of the Council of INA, London, with regard to the establishment in Australia of an Institution of Naval Architects. He said that while it was realised that a need existed for an association to develop the interest of naval architects and to foster the growth of their profession, it was felt that the use of the words 'Institution of Naval Architects', even though followed by the word, 'Aust.' or 'Australia', would sooner or later lead to confusion between two separate organisations, one having international recognition and the other existing locally in Australia.

The Council of the Institution of Naval Architects, he said, would be prepared to favourably consider a proposal for the formation of an Australian Branch of INA. So far no branch of the Institution had yet been formed, although a movement had been made to form a branch among members at Bath where the Admiralty had many technical officers. A junior joint branch existed in the Southampton/Portsmouth district, this group consisting principally of junior members of both the Institution of Naval Architects and the Institute of Marine Engineers. Its function was hardly comparable with that which might be formed to meet the present need in Australia. Dr Dorey expressed his opinion that, for an institution to function satisfactorily, it would require at least several thousand members. INA, London, had a membership between three and four thousand, yet it was amongst the smallest of the professional institutions. The possible maximum membership of an Australian institution would be no more than one hundred or so. If the Australian body were established as a branch of INA, then it would automatically be raised in standing — its members would be recognised the world over. It would receive the assistance and support of the leaders of the profession associated with INA overseas. It would be able to meet with equal status with other Australian branches of prominent overseas professional institutions, such as the Institute of Marine Engineers with whom it would have much in common.

With regard to the relationships between the branch and the parent body, Dr Dorey considered that a constitution could be formed which would give sufficient autonomy to the Australian branch to enable it to act freely in matters of local administration. In matters of overall policy, the constitution of the parent body would stand. With regard to finance he considered that a grant could be made to the Australian Branch from the fees paid in Australia to assist in the administrative costs. The election of members would rest ultimately in the hands of the parent Council, but this would be based upon reports and recommendations submitted by a membership committee of the Australian Council.

Dr Dorey indicated that he would be returning to Sydney on 25 April of that year. He would be available to meet representatives of the local institution on or about that date and he expected to return to Great Britain early in June and would be willing to take back with him any proposal which might be presented to him.

This report was considered at the Council meeting on 25 March 1953 and arrangements made for an extraordinary general meeting of its members at which approval was given for the Australian Council to negotiate with INA for the amalgamation of this Institution with the INA, London, as the Australian Branch. Following this decision, the President prepared proposals for the amalgamation. These were submitted for endorsement to the local Council and were passed to Dr Dorey when he returned to Sydney late in April. The representatives at that meeting were Messrs Barker, Boden, Carment, Follan and Tuft.

The following clauses were submitted as a possible basis for discussion in connection with the proposed amalgamation:

1. That the existing membership be accepted in its present grades,

2. That the constitution as accepted in Australia be modified in certain of its clauses to provide for the necessary autonomy in administering the affairs of the Institution in Australia while maintaining its affiliation with the parent Council in London. In regard to the election of members,

3. That provision be made for an Australian Committee to receive all applications for election to the various grades and for this membership committee to make recommendations to the parent Council for the acceptance or otherwise of the members proposed,

4. That provisions be made for the granting by the overseas Council of a sum of money to assist the finances and provide for the satisfactory operation of the Institution in Australia, and

5. That provision be made for the publication in the Transactions of the Institution of Naval Architects from time-to-time, papers prepared by Australian members and read in Australia.

At the meeting of the Australian Council on 22 July 1953, a letter was received back from London stating that Dr Dorey's report of his discussions in Australia was being considered by the Council of the Institution. Subsequently, a draft of the proposed rules for the establishment of an Australian Branch of INA was received from London and became the principal business of a meeting on 5 November 1953. A number of modifications were discussed and the President was requested to re-write the proposed draft for consideration at the next meeting. This was done and presented to the meeting on 11 November 1953.

The main discussion hinged upon the transfer of certain grades of membership. It was finally resolved to ask that persons who had the grade of member of INA, Aust. and who had been recommended by the Council of INA, Aust. should be considered by the Council of INA for full membership. This question of the transfer of membership was a vital matter affecting the establishment of the Branch. It is a matter for some degree of pleasure and satisfaction that the London Council were prepared to accept this recommendation and, as one looks back on those who were admitted one finds that there is a great deal of credit to the organisers of this initial move because those who were admitted have shown themselves to be outstanding members of their profession.

A re-draft of the proposed rules was endorsed by the Australian Council on 17 December 1953, and sent to London. The final revised Branch rules, with comments, were received back from London with a letter dated 9 February 1954 and accepted by the Australian Council at its meeting in February 1954. This decision having been made, it became necessary to take the formal action to modify the constitution of the Institution of Naval Architects, Australia, in a manner that would ensure the continuity of the existing membership within the framework of the approved Branch rules under the new constitution of the Branch.

The Formation of the Australian Branch

In the Annual Report of the Institution of Naval Architects for the year 1953 the following brief notice appeared:

Local Branches of the Institution: New By-Law 24 gives the Council power to form local branches of the Institution in areas where, in the opinion of the Council, local activities may be carried out satisfactorily. Institution of Naval Architects, Australian Branch: The Council has welcomed a proposal received from certain members of the INA resident in Australia to the affect that it would be advantageous to have an officially-constituted branch of the parent Institution in that country. Rules for the conduct of this Branch which is open to all members of the parent Institution resident in Australia, have accordingly been drawn up and the Institution of Naval Architects, Australian Branch, is now being formally established. The Council takes this opportunity of wishing the Australian Branch, the first branch of the parent Institution to be formed, every success in its activities.

The first council meeting was held on 14 July1954. In the minutes it is recorded that this complete Council is authorised to act as the Council of the Australian Branch until the holding of elections next year. The Foundation Council of the Branch was thus the terminating Council of the Institution of Naval Architects, Australia. The members of the Council were President C.E. Boden; Vice-Presidents D.S. Carment, J.J. Follan, K.M. Lawson, W.C. Miller and C.E. Sparrow; Honorary Secretary F.G.W. Westhorpe; Assistant Secretary R.J. Tuft; Treasurer E.K. Trivett; Members and Associate Members of Council W.F. Nichol, F.L. Harrison, C.R. Hutchins, J. Doherty and R.D. Grant; and Associates of Council L.W. Middleton and A.J. Hedger. The list of Foundation Members consisted of 53 names of which 42 are still (in 1979) active members of the Branch. The Inaugural Dinner was held in the Holme Room at the Sydney University Union on Thursday 28 October 1954.

This review of the evolution of the Australian Branch of the Royal Institution of Naval Architects reveals the contribution made first by the Association of Naval Architects, Sydney Technical College, from May 1947 until June 1952 and then by the Institution of Naval Architects, Australia, from June 1952 to October 1954, when the present Australian Branch became an established entity.

These three organisations have nurtured the post-war development of shipbuilding and naval construction in Australia, by providing the opportunity for naval architects to share their knowledge and experience, and by guiding, counseling and encouraging the training of young men both through the Technical College and the Universities.

The membership of the Australian Branch in 1979 is approximately 360. At the Inaugural Dinner in 1954, the President expressed the following wish: 'that this Branch should bear fruit like the banyan tree and set up its own roots to support itself and also throw back to the parent tree added nourishment and strength'.

Looking back over the work of the Australian Branch of RINA through the last 25 years, one can say with much satisfaction that this wish has been fulfilled.

THE FORMATION OF THE AUSTRALIAN DIVISION

At the Jubilee dinner at the University of New South Wales on 6 November 1979, the President of the Royal Institution of Naval Architects, Mr Derek Kimber OBE, announced the formation of the first Division of the RINA. In his speech he said:

In the 25 years of your existence as a Branch, membership has grown seven-fold to a figure today not far short of 400 — a remarkable achievement in a country where maritime affairs have had a rather chequered history of ups and downs.

I am aware that the Branch has always been held in high regard by Government departments concerned with ships and shipping throughout Australia, and that it participates in the work of various Marine Standards Committees of the Australian Standards Association.

It has received national recognition for its contributions towards the establishment of the Bachelor of Engineering (Na-

val Architecture) Degree course in this university and the Certificate courses in Naval Architecture in Newcastle and here in Sydney.

In addition to a programme of technical meetings each year, the Branch has organised three highly-successful national symposia in conjunction with the local Branch of the Australian/New Zealand Division of our friends the Institute of Marine Engineers in 1973, 1975 and 1977, as well as this present admirable Jubilee Symposium.

I firmly believe that one gains from membership of an Institution such as ours in direct proportion to the amount of effort one is prepared to contribute to its support. I can appreciate very clearly how much devoted service has been given by past and present officers of this lively unit of the Institution, and we in London are deeply grateful to them.

And why shouldn't we on this occasion name the people I'm referring to — the Presidents, Cecil Boden (who described so graphically on Monday how he "got the show on the road" in the early fifties), David Carment, John Follan, Rex Ellis, John Bell, John Tuft, Bob Campbell, Michael Pearson and last but by no means least, John Jeremy — and the Secretaries, who do all the work for the rest of us — Frank Westhorpe, Jim Eken, Eric Trivett and the evergreen Alan Mitchell.

In recognition of all this, and more, my Council in London has been very happy to accede to your wish to be upgraded to form the first Division of the RINA.

At this point, Mr. President, I feel I should have my naval sword to touch you on the shoulder, but you know how fussy airlines are about carrying offensive weapons! Instead, in the name of our Home Council, I warmly congratulate you and your predecessors and extend our thanks for your efforts and achievements over the past 25 years. We all wish the new Australian Division the same outstanding success enjoyed by the former Australian Branch.

As a small, tangible token of the esteem in which you are held, I will now ask the first President of the Australian Division of the RINA, John Jeremy, to accept this mounted brass Meeting Bell with best wishes from the Home Council.

Mr. Divisional President, Ladies and Gentlemen, I shall end as I began, by thanking you on behalf of all four of us for the opportunity to participate in this week's memorable events, for your hospitality tonight — and still to come! — and for your patience in listening to me.

Australian Division President John Jeremy and RINA President Derek Kimber seal the formation of RINA's first international division with a handshake at the Jubilee dinner on 6 November 1979
(Photo John Jeremy Collection)

At the Jubilee dinner (left to right) Alan Mitchell, Lawry Doctors, Ted Bell, Derek Kimber, John Jeremy, Cecil Boden, Robert Campbell, Don Gillies, Laurie Prandolini and Peter Ayling
(Photo John Jeremy Collection)

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