THE AUSTRALIAN NAVAL ARCHITECT

Volume 7 Number 3
August 2003

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THE AUSTRALIAN NAVAL ARCHITECT

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(Australian Division)

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Cover Photo:

The 41.3 m catamarans *Salten* and *Steigtind* during trials off Western Australia. The catamarans were recently completed by Image Marine for a Norwegian customer. (Photo Courtesy Austal Ships)

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RINA Australian Division
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From the Division President

In his penultimate column in this space last November, Bryan Chapman wrote of the "gathering storm" following the loss of the Bahamas-registered oil tanker *Prestige* off the coast of Spain following hull damage in heavy weather.

And what a storm it's been — it looks like going on forever!

First we had the European reaction, not only with Spain contentiously re-routing shipping well offshore, but following up with implications of unilateral action if its proposals to IMO regarding the following were rejected:

- accelerated phase-out of single-hull tankers so that the last large pre-MARPOL tankers will disappear in 2005 and all remaining single-hull vessels by 2010;
- extension of the existing Condition Assessment Scheme (CAS) to most remaining single-hull vessels and development of a new scheme for double-hull vessels;
- banning the carriage of "heavy grades of oil" in single-hull tankers; and
- declaring a Particularly Sensitive Sea Area (PSSA) off western Europe to divert traffic away from the coasts of Belgium, France, United Kingdom, Ireland, Spain and Portugal.

In considering these proposals, IMO had before it an expert group's assessment predicting that the new construction and scrapping workload in 2010 would be more than double previous record annual throughput. Implicit in this assessment was a shortfall in available tonnage in 2010 together with a collapse in the scrap market — such disruption of supply and demand would have potential for a widespread and major effect on the international economy. On the other hand, unilateral action by the European countries would have re-directed the superseded tonnage to trades not affected by that action.

Thankfully, it appears that unilateral action will be avoided through the outcomes achieved when these proposals were considered in July, namely:

- while the 2005 date will be applied to pre-MARPOL tankers, the 2010 date may be stretched up to perhaps 2015 to give a longer life to tankers that would otherwise have had to be scrapped before reaching 20 years of age;
- CAS will be extended to cover the single-hull tankers for their "teenage" years and a new system for double-hulled tankers initiated;
- a less disruptive regime for restricting carriage of heavy grades of oil in single-hull vessels will be developed; and
- the PSSA for western Europe appears likely to be approved.

Those of you who agree with my views on double-hulled tankers (*The ANA*, August 2000) will perhaps question whether the accelerated phase-out of single hulls is such a good thing; however, the fact is that it has been sold to the people that count and must be made to work.

Going back to Bryan's initial coverage of the *Prestige* aftermath, a certain amount of finger-pointing was mentioned. And what finger-pointing it has become, with claim and counterclaim being made in the prelude to court cases between Spain as coastal state and one of the leading international classification societies! I'm prompted to wonder, not only what the outcome will be, but how long these cases will keep the legal fraternity busy and how many professional lifetimes they will cover.

What does seem certain is that the international shipping business will never be the same. While a shipping-generated economic crunch seems to have been avoided, all elements of the transport chain will be held increasingly accountable for their role. Changes towards openness recently made by some of the classification societies may or may not provide a sufficient level of transparency to satisfy society at large. More openness will be demanded in relation to ship-owning. As professionals, we need to be aware of our responsibilities to and within this changing society.

We live in interesting times!

Rob Gehling

Editorial

Each time we assemble another edition of *The Australian Naval Architect*, I am struck by the inventiveness of Australian naval architects and engineers, and the increasing impact they are having throughout the world. It is immensely pleasing to see international awards to Australian shipbuilders, continued exports to destinations that would have seemed, twenty years ago, most improbable and Australian designs setting the way for others to follow.

Of course, there have been plenty of earlier examples of such inventiveness. Australia led the world with the carriage of refrigerated cargo by ship. An Australian shipyard built the world's first purpose-designed cellular container ship and another led the world with the introduction of industrial gas turbines to ship propulsion. In this edition I reminisce about *Empress of Australia*, designed and built in Australia and, at the time, the largest roll-on/roll-off passenger vehicle ship of her type in the world, with the longest ocean voyage route.

When we built *Empress of Australia* the industry was highly protected and inward looking. An industry that could export ships to the world was a dream. In recent decades Australia has largely removed protection, floated the dollar and restructured industrial awards. The process has been painful at times, but today manufacturing earns a higher proportion of Australia's export income than most Australians realise. As Bryan Chapman points out in his letter about the Whyalla shipyard, if our reforms had come sooner, then the Australian shipbuilding industry might have survived in a different form.

Not only did we need to reform our economic and industrial environment, but we needed an injection of confidence into management to tackle new markets and adopt new ideas. Today's industry has benefited from just such an injection. It is no longer unimaginable that Australian built ships can introduce new technology to the world's largest navy, or that Australian design can be at the centre of US industry proposals for a major US Navy combat ship acquisition programme.

There are, of course, plenty of challenges still to be tackled, not least to convince Australians at large to recognise and share in the dreams and successes.

John Jeremy

Letters to the Editor

Dear Sir,

As somebody who trained under the auspices of the Whyalla Shipbuilding and Engineering Works, and worked there until he was retrenched in 1977, I was delighted to see the article on that shipyard in the May edition of *The Australian Naval Architect*. It sometimes disappoints me that today the very real achievements of Australian shipbuilding in its previous life are not recognised for what they are. Your article goes some way towards redressing this.

The challenges faced by large shipbuilding in Australia have always been considerable, not the least being the small throughput, the long supply chain, the restrictive steel supply and, certainly in the 1970s, a high Australian dollar.

From memory at the time the Australian dollar was worth about $US1.10 versus today's 67 cents or so. I thought that this might form the basis for an interesting comparison, along the following lines:

For a 15,000 dwt general purpose vessel:

Australian build price at $A1.00 = $1.10:	$US24 million in 1976
Estimated imported component:	$US8 million
Consequent local component:	$US16 million
Cost of local component at $A1.00 = $US0.67	$US9.75 million
Australian build price at $A1.00 = $US0.67	$US17.8 million

This compares with quoted Japanese prices for the same vessel in 1976 ranging from $US15 million to $US18 million.

So if today's exchange rate had applied in the 1970s then large ship construction might yet have survived in Australia.

Yes; I know that this is a rough and ready comparison, and there are a lot of other factors which should be taken into account. Nevertheless it does give some food for thought.

We also have to remember that the Korean price for the same vessel was $US10 million, which was less than the cost of the materials in Australia. And they tried to tell us at the time that the Korean industry was not subsidised!

By the way, the figures used in this comparison are real, not something I dreamed up.

Thank you for a trip down memory lane, and the inspiration to reflect on what might have been.

Bryan Chapman

Dear Sir,

Thank you very much for sending me a copy of the May edition of *The ANA*. I read you article on the Whyalla shipyard with interest. Full marks — I couldn't find any errors.

I was also interested in the article by Martin Grimm, who recently visited Whyalla for the first time. Your readers may be interested to know that the Maritime Museum redevelopment is due to be relaunched on 5 July — I have just received an invitation to attend the ceremony on that date.

The 150 ton outfitting crane was still standing when we were in Whyalla about five weeks ago — although I have been told subsequently that it is for the scrap yard. Grimm also mentioned the hammerhead crane at Garden Island Dockyard. Both of these cranes were designed by Sir William Arrol (I think) and erected at about the same time. I have some interest in the Garden Island crane because my father was a design engineer at Sydney Steel Co. during the war years and he had some responsibility for construction of the crane and the caissons for the graving dock.

Sorry to read of the passing of Jack Coleman — a good friend of mine in our later shipbuilding days.

Congratulations to you and Phil Helmore on the excellence of your publication — I will miss it.

I can't let the opportunity slip to say how proud I am to read of the accomplishments of three of my old (young) proteges from the Whyalla shipyard — namely Bryan Chapman, Rob Gehling and Graham Taylor. Please convey my best wishes to them. I am also amazed to see that Don Gillies is still a member of the committee of the NSW Section — my regards to him and any others of the old brigade.

Ross Hawke

Dear Sir,

Originally ships were built with sheer and camber to the decks so that seawater ran off into the scuppers. The practice today with prefabrication and large panels is to use flat decks with perhaps a slope from the centre line outwards but no sheer.

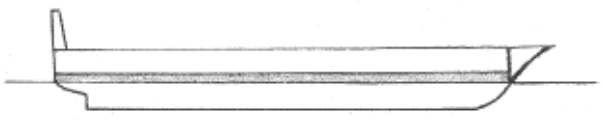
I would like to promote a discussion on the stability and prevention of the loss of ferries by suggesting reverse sheer be incorporated on the car deck. Any ingress of seawater — via the bow or stern doors is therefore kept at the ends of the vessel and does not allow a large free surface area which might result in the vessel becoming unstable.

Another feature could be a longitudinal centre line bulkhead.

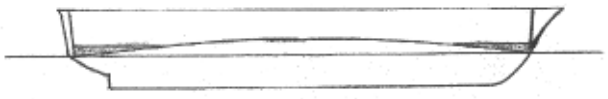
The sketches below are, perhaps, an oversimplification of the idea but it might promote a talking point.

I would be interested to hear if other readers have any ideas. I know that there was a complicated portable type of transverse bulkhead designed at one time.

Andy Tait



SHIP WITH FLAT CAR DECK



SHIP WITH CURVED CAR DECK

Dear Sir,

I am currently studying Naval Architecture at UNSW, having moved to Sydney last year from Brisbane. As you would well know, the only institutions in Australia where you can study Naval Architecture are UNSW and the AMC. In my particular year, there are only six students enrolled in the naval architecture program. With employment throughout the world becoming increasingly competitive, it amazes me that so few people study the course in Australia.

It makes me wonder where the problem lies. Is it due to the lack of information on the course, which is given to students at a school or university level? Is it the location and number of institutions being offered in Australia? It is my understanding that UNSW currently has a brochure that is sent out to universities Australia-wide. In my view, this simply isn't enough.

I strongly believe that if Australia is to keep ahead in our growing industry, we seriously need to look at the advertising process of naval architecture, starting at the school level. Being such an interesting course, with more public awareness of what it actually is, I'm sure our graduate numbers would increase, ensuring the future of naval architects in Australia.

Peter Holmes
UNSW Student

NEW AIRCRAFT CARRIER FOR US NAVY

The US Navy's newest nuclear-powered aircraft carrier *Ronald Reagan* (CVN 76) was commissioned on 12 July 2003. The ninth Nimitz-class ship was built at Northrop Grumman, Newport News, Va. The ship's keel was laid on 12 February 1998, and she was launched on 4 March 2001. *Ronald Reagan* displaces approximately 95 000 t, is 331 m long overall and has a flight-deck width of 76.36 m. *Reagan's* two nuclear reactors are capable of more than 20 years of continuous service without refuelling, providing virtually unlimited range and endurance. The ship is propelled by steam turbines developing 194 MW with four shafts for a top speed in excess of 30 kn.

The ship's complement will be some 5 930 people including about 2 500 aircrew.

The US Navy's newest Nimitz-class aircraft carrier *Ronald Reagan* tests its counter-measure wash-down systems (CMWDS) during builder's sea trials off the coast of Virginia. CMWDS includes a series of sprinklers in vital areas throughout the ship to help contain the spread of fire or chemical, biological or radiological attacks.

(US Navy photograph)

NEWS FROM THE SECTIONS

Queensland

The Queensland Section met on 18 July at the premises of Sea Transport Solutions, Runaway Bay, Southport. After a very short committee meeting a technical presentation, *A Showcase of Recent Designs by Sea Transport Solutions*, was given by Dion Alston. The presentation was very well received by an audience of fifteen members and guests. A write up of the presentation with PowerPoint slides can be obtained from the Section Hon. Secretary/Treasurer.

It should also be noted that the section committee and section members are becoming increasingly involved in assisting the Yeronga Institute of TAFE in developing a draft syllabus for the Diploma/Advanced Diploma of Engineering (Ship and Boat Design). It is anticipated that details of this course should be available for the next issue of *The Australian Naval Architect*.

Section involvement in organising the Ausmarine East Conference and Exhibition in Brisbane on 28 to 30 October 2003 is also progressing well.

Brian Robson

Tasmania

AMC/RINA Seminars

The AMC Department of Maritime Engineering and the Tasmanian Section of RINA, have agreed to jointly run a regular series of technical seminars.

On 16 July Dr Tim Finnegan, Manager of Research and Development with the Sydney-based company Energetech Australia Pty Ltd, presented a very interesting talk *The Development of a Commercial Wave Energy System*. Energetech was established in the late 1990s with the aim of developing and commercialising new ocean wave energy conversion technology. Tim gave an overview of the technical developments to date, and information on the global resource and potential market. The company is undertaking a comprehensive series of hydrodynamic model tests within AMC's Model Test Basin.

On 22 July Frank Bethwaite gave a wonderfully-detailed presentation on the history of high-performance sailing and recent research and development work on apparent-wind sailing. Frank spent nearly two weeks based at AMC working on the latest generation of the Virtual Sailing Simulator (see *The ANA*, February 2003, p.23 for further details)

On 23 July Dr Paul Brandner, Manager of the AMC Tom Fink Cavitation Tunnel gave an overview of the upgrade of this facility.

On 30 July Dr Jinzhu Xia presented *The International Ship Structures Conference (ISSC) Loads Committee Report on Loads on Ocean Structures*.

On 4 August Professor Lawry Doctors of UNSW presented some of his work on the influence of viscosity on the wave-making of a model catamaran. This work was based on some model tests conducted at AMC last year.

Gregor Macfarlane

ACT

Annual General Meeting

In his report to the AGM of the ACT Section on 30 April the Chair, Bert Thomson, started on a positive note, outlining the section's ability to survive over the past year. The problems of attracting new members are not as pressing this year, as a number of graduate naval architects are keen to get involved. Bert was pleased to see some new blood in the organisation and hoped that there is more to follow in the coming year. He outlined the technical meetings of the previous year, which had unfortunately been poorly attended, and noted that many technical meetings have already been arranged for the coming year. Bert expressed concern that the latest technical meeting was cancelled due to lack of attendance. Hopefully, improved means of advising members of meeting details will achieve better results in the future.

The meeting discussed the proposed visit by Mr Trevor Blakeley, the Chief Executive of RINA. Discussion continued on how to determine/maintain competencies in an engineering organisation as well as on RINA affairs within the section.

Bert Thomson thanked everyone who has contributed to keeping the section functioning. Particular thanks went to Martin Grimm, in absentia, for all the work he has done over a number of years. Congratulations went to Rob Gehling on his election as the Divisional president.

Election of Office Bearers

The incoming committee was elected unopposed:

Chair	Gordon Macdonald
Deputy Chair	Dave Magill
Secretary	Michael O'Connor
Treasurer	Nick Whyatt

Committee members

Rob Gehling
Levi Catton
Roger Duffield
Bert Thomson
Wade Limpus
Ian Laverock

Nominee to Australian Division Council

Rob Gehling

Technical Meetings

On Wednesday 14 May Graham Watson gave a presentation at the Australian Federal Police College on *The University College London (UCL) Submarine Design Course*. The course is broken up into a two-month module comprising 3 weeks of lectures and 6 weeks for a design project. There was a range of students from around the world who participated in the course, and design projects were aligned with the interests of the nationalities of the students. Graham noted the major advantages of the course in gaining an appreciation of what other countries are doing regarding submarines, exchanging ideas and gaining contacts.

A combined Annual Dinner for IMarEST and RINA was held at the Embassy Motel on Friday 23 May. The guest

speaker was Professor Graham Durant of Questacon who spoke on *The History and Future Prospects of the Naval Shipbuilding Industry in Glasgow*. The talk was most interesting and especially sparked interest from a few senior RINA members who have crossed paths in Glasgow over the years.

Captain Chris Frost gave a technical presentation on Tuesday 22 July on *Capability Changes and Associated Operational Experience of the Landing Platform Amphibious (LPA)*. Captain Frost outlined the major modifications to the ships during the conversion from landing ships (LST).

The new Chair, Gordon Macdonald, is keen to inject new life into the ACT Section. He has proposed monthly committee and technical meetings. A list of technical meetings will soon be posted on the RINA website. Gordon has placed a lot of emphasis on the RINA website as a focal point for involvement by members of the ACT Section. A discussion has been started on the website forum to try and create some feedback as to how the ACT Section can better serve its members and how to encourage new members. This has had limited response and I would encourage all to participate in the discussion.

Michael O'Connor

New South Wales

The NSW Section Committee met on 11 June and, other than routine matters, discussed:

- SMIX Bash 2003: *James Craig* has been booked for Thursday 4 December; Committee to meet and contact sponsors.
- Technical Meeting Program: Most presentations organised for 2003 (see *Coming Events* elsewhere in this issue). One presentation still to be arranged for August; hot ideas include carbon-fibre technology, and legal issues in marine design and construction.
- Ship Visit: Reply received from London that members and guests on ship visits are not covered by RINA insurance; this to be raised with Australian Division. Possible visits to *SuperStar Leo* and an FFG to be investigated.
- Short-form Addressing of Branch Websites: Reply received from London that short-form addressing had been implemented for all division/branch/section websites as a result of our request. Including the web address in letterheads is now easy for all.

The NSW Section Committee also met on 6 August and, other than routine matters, discussed:

- SMIX Bash 2003: Contacts have been made with some potential sponsors for 2003, and the first sponsorships have been received. Sub-committee to progress.
- Ship Visit: Visit to *SuperStar Leo* found possible, but no convenient date before end of scheduled visits; postponed to next cruise season. Visit to FFG in refit at ADI for a date in October to be progressed.
- Technical Meeting Program: Program for 2003 completed with IMarEST booking of meeting on podded propulsors for August. Program for 2004 to be commenced at next meeting, with RINA to organise five of the nine meetings.
- Report on AD Council Meeting: A summary of the AD Council meeting held on 18 June was tabled and discussed (see *Membership* column elsewhere in this issue).
- Finance: We have paid the deposit on *James Craig* for this year's SMIX Bash, and have paid IMarEST for venue hire up to May, and have $104 remaining in the bank.
- Ex-MARENSA Members: With the passing of MARENSA, we have received a letter from IEAust, requesting that ex-members be made welcome at our technical presentations. This will be done.
- Chief Executive's Visit: The Chief Executive will be visiting Sydney for Pacific 2004, and we will hold a Committee meeting and dinner to coincide with his visit. These will be scheduled to avoid clashes with Pacific 2004 and other functions.

The next NSW Section Committee meeting is scheduled for 11 September.

Shipping Accidents

Nick Rutherford of the Australian Safety Transport bureau gave a presentation on *There, but for the Grace of God, go I — a Review of Some Recent Shipping Accidents* to a joint meeting with the IMarEST attended by thirty-seven on 28 May in the Harricks Auditorium at the Institution of Engineers, Australia, Milsons Point. Nick began his presentation by attributing the title to John Bradford who, while watching prisoners on their way to the scaffold in the 1500s, said "There, but for the grace of God, go I". Looking back at hundreds of accidents, no-one sees them coming, and they could easily happen to anyone.

The Australian Transport Safety Bureau (ATSB) is entirely independent of the Australian Maritime Safety Authority (AMSA). AMSA is the regulator, and makes the rules and enforces them. The ATSB is an independent investigator. They provide assistance to coroners, but have no other legal function. The object of their investigations is not to punish anyone, but to prevent further occurrences of any of the same incidents.

Types of Accidents

Some of the types of accidents which have occurred and which the ATSB has investigated include:

Grounding: The vessel *Binja Teratai Satu* grounded on the Great Barrier Reef on 2 November 2000. The officer-of-the-watch had his wife on board and, coming within mobile phone range, phoned one of her friends for her to talk to from the bridge. Simple excitement of the contact meant that the next waypoint was missed, and the vessel ran aground.

Structural Failure The whole bow section fell off the tanker *Kirki* off the Western Australian coast on 21 July 1991.

Collisions: There is a large number of collisions between merchant vessels and fishing vessels around the Australian coast, and there are contributory actions from both sides.

Engine Room Fire: The Antarctic supply vessel *Aurora Australis* suffered an engine room fire in the Antarctic, and many engine room fires are started similarly. Typically, fuel or lube oil escapes under pressure from any sort of leak,

giving an atomised cloud of vapour which then ignites on the hot exhaust manifold. Also typically, there is extensive damage to electrical cable runs. Power, control, communications, and instrumentation cabling are all run together, and fire damage shorts them all out, and it is very labour intensive to repair.

In another incident, *Iron Flinders* had a hydrogen ion fire in her waste heat unit. The dangerous property of a hydrogen ion fire is that it burns without oxygen, and the usual methods of extinguishing cannot be used. Fortunately, the vessel was in port, and a road tanker was called and pumped in 5 t of liquid CO_2, which removed the heat and extinguished the fire.

Accommodation Fire: The Taiwanese bulk carrier *Ming Mercy* caught fire off Port Kembla on 7 August 1997. She had plywood bulkheads, no smoke detectors and no sprinkler system. How come? Taiwan is not a signatory to SOLAS, and therefore Taiwanese-registered ships do not have to comply with the rules. A Chinese cook discovered the fire, but the Philippino officer-of-the-watch on the bridge could not understand what the cook was trying to tell him! So much for STCW'95. The fire was caused by home-made electrical connections. Third-world crews, earning three times what they would earn at home, tend to buy up big on electronic equipment, e.g. hi-fi equipment, TV, etc. However, there is usually only one AC power point in each cabin. No problem: a few extra pieces of wire and you are in business! Until something happens.

Cargo Fire: Fortunately, cargo fires are rare. Nick was aware of only one in the last ten years. The Dutch vessel *Marion Green* was coming down the Western Australian coast when a fire started in the cargo of 6000 t of cocoa beans. She pulled into Albany as a port of refuge, and they flooded the hold with CO_2, but that did not stop the fire. Understandably, AQIS did not want 6000 t of cocoa beans landed on the doorstep, but the only way to extinguish the fire was to remove the cargo. The vessel discharged using her own grabs, and AQIS insisted that the whole cargo be buried and covered with several metres of earth.

Another potential source of fire is undeclared hazardous goods. *Hanjin Pennsylvania* was carrying an undeclared cargo of calcium hypochlorite in November 2002. When mixed with carbonaceous compounds (like charcoal), this gives an explosive mixture.

Ships which Disappear: Six bulk carriers have disappeared without trace after sailing from Dampier in WA. There have been no distress calls; the vessels have simply failed to arrive. In only one case has there been any subsequent evidence: two dead bodies were found in a life raft from one of the bulk carriers. The losses of bulk carriers around the world has led to the adoption of Formal Safety Assessment for bulk carriers.

Why do Accidents Occur?

There are always human factors, and people make errors. It is said that 90% of all errors are caused by humans. The word "error" itself comes from the Latin *errare*, meaning "to wander".

There are three levels of performance:

	Control Modes		
Situations	Mainly Conscious	Conscious and automatic	Mainly automatic
Routine or expected	Disruptive attention		Skill-based performance
Familiar or trained for problems		Rule-based performance	
Novel, difficult or dangerous	Knowledge-based performance		Impulse, panic

There are various stages in the learning process:

- Unconsciously incompetent
- Consciously incompetent
- Consciously competent
- Unconsciously competent

Some people say that there is one further stage: unconsciously incompetent, born of familiarity and leading us to make unwarranted assumptions, landing us right back where we started!

Principal Error Types

Errors can be classified broadly as due to intended actions or unintended actions. Unintended actions can be further subdivided into slips in attention or lapses of memory. Intended actions can be further subdivided into rule-based mistakes or knowledge-based mistakes/violations.

To illustrate, Nick showed some humorous slides of land-based errors. One was of a car driving down a busy road trailing a petrol-bowser hose, where the driver had forgotten to remove the nozzle before driving off, and had ripped out the hose from the bowser. Another was a man leaning out of a moving bus, watching a pretty girl, about to be clobbered by a stone archway!

A simple slip, however, led to a fatality. On board *Australian Achiever*, a tanker en route from the Persian Gulf to WA, the 2nd Engineer showed the Cadet Engineer a fresh water pump which required repair. He isolated the pump at the starter box, removed the drive belts, and asked the cadet to begin work after smoko. Half-way through smoko, there was a 24 V earth-fault alarm, which the 5th Engineer accepted, as the vessel had a history of these alarms. After smoko they all went back to work. Soon afterwards, there was another alarm, which the 5th Engineer accepted, thinking it was another 24 V earth-fault alarm. But it wasn't; it was a 440 V earth fault alarm, situated right next to the 24 V, but actually indicating the 440 V current flowing through the cadet. Immediate attention may have saved him, but it was some time before the simple error was discovered, by which time it was too late.

Violations can be broadly classified into three types:

- Routine (common);
- Optimising (to save time); and
- Necessary (the only way to get the job done,

Errors are things which happen as a consequence of *doing* something; failures are things which happen as a consequence of *not doing* something.

Errors may also be classified as active or latent. Active errors occur at the sharp end, whereas latent errors occur at different levels in the system, but are usually the product of management decisions. They have different consequences: active errors have immediate consequences; latent errors have delayed consequences. They also have different durations: active errors have short duration; latent errors may continue for many years. They may require very different remedial solutions.

Organisational Accidents

Every system has its hazards, which no-one wants to encounter. On-site conditions may promote errors (e.g. fatigue) or violations. All systems should have inbuilt defences against the hazard; e.g. rosters for management of fatigue. A well-trained crew is a most effective defence against most hazards. However, each time the defences are tested, the results should be fed back into the system.

The Accident Trajectory

James Reason, in his book *Human Error*, gives a good insight into how accidents occur. He likens the defences against accidents to a series of cards, each under different control. Imagine several cards, labelled Decision Makers, Line Management, Conditions (Task/Environment), Team Actions, etc. Each of these cards has holes in it, like a Swiss cheese, and these are the loopholes in the defences. Now line the cards up, and shine a light (representing the accident waiting to happen) through. The rays of light which pass through holes in the first card are usually stopped somewhere along the path by holes in one card not lining up with all holes in all other cards. However, occasionally, *all* the holes line up, and the accident occurs.

Explosion on board *Nego Kim*

The 26 000 t bulk carrier *Nego Kim* arrived at Dampier, WA, to load iron ore. Not having a berth, she anchored offshore to await berthing instructions and tug assistance. The mate gave the crew instructions to paint the inside of the No. 1 Port Topside Ballast Tank. This was aft of the collision bulkhead, and there were two access holes open. Power cables led into the tank through the aft access hole for a cargo light and for a compressed air line. A 240 V fan blew air into the forward access hole. The tank had been cleaned, and the mate tested for oxygen before the start of spray painting. They had completed two hours of spray painting by 1640, and were getting ready to take the equipment out and go and have tea. One crew member was in the tank, another on deck tending the light suspended on a lanyard through the access hole, four on deck near the compressor, and three further aft on the deck. There was a massive explosion in the tank, and all the nearby crew were killed when the deck blew upwards. The crew member who had been in the tank walked out, but collapsed soon after and died two weeks later from burns received. The group of four men was blown over the side, and only one body was found. One of the group of three was blown 48 m down the deck.

In reconstructing the incident, the ATSB found that the fan, nominally capable of 60 m^3/min, was probably capable of no more than 30–40 m^3/min, and there was no trunking, further depleting its efficiency. The paint being used was a two-part epoxy and, because the mixture "goes off" very quickly at 38°C, they were using somewhere between 30% and 50% thinners. DSTO tested the paint and thinners being used, and found that in the proportions being used and the dimensions of the tank, the vapour was in very high concentration and well above the explosive limit. The cargo light used a 300 or 400 W bulb, with a metal shade and grid protector. The remains of the metal shade were found outside the tank, and the remains of the grid on the deck of the tank, so it is likely that the light caused the ignition for the explosion.

The proximate cause *may* have been the ship's crew, dropping the light on the lanyard and shattering the bulb. But what were the conditions at the time? The tank had a concentration of vapour, and there was a high ambient temperature (any protective clothing would have been very hot). There was no explosimeter on board, having been sent ashore for repairs and never returned or replaced. There was no proper equipment for spray painting in this environment. The spray painter had a mask, but no gear for protection from the toluene and isobutanol vapours. A thong was subsequently retrieved from the deck of the tank!

Safe Operations

There are six tests to pass for a safe operation:

- Were the risk factors identifiued/identifiable?
- Was the equipment fit for the purpose?
- Were the systems and procedures effective for safe operation?
- Were the individuals fit and effective?
- Were the defences and emergency procedures effective?
- Was there a management system in place to monitor the performance?

Reactions to Disaster

The traditional reactions to a disaster are these:

- Sack and prosecute.
- Blame and train.
- Introduce new procedures.
- Write new regulations.
- Promote to where they can do no harm.

All, of course, have their advantages, depending on your viewpoint. In the wake of the *Herald of Free Enterprise* disaster when exiting Zeebrugge Harbour on 6 March 1987, the Court of Enquiry found that the company management practices were so flawed that a charge of corporate manslaughter was brought.

Conclusion

Accidents do not happen because people gamble and lose; they happen because people do not believe that the accident that is about to occur is at all possible.

Questions

Question time elicited some further interesting examples.

The investigation of the oil spill from the tanker *Laura di Amato* at Gore Bay in Sydney Harbour quickly traced the proximate cause to sabotage! Two cargo oil valves had been

closed and had a piece of timber lashed between them with a large warning sign to prevent opening. However, the lashing had been removed, the valves opened, and then the timber and lashing replaced. It was known that the pumpman on the ship had been sacked three weeks earlier in Singapore, and had vowed to take his revenge on the company. However, on looking deeper into the design of the cargo oil system, the ATSB queried why it was possible to achieve the spill by opening only two valves.

The ATSB does not find it difficult to remain independent, as they have a different function to the other authorities which are usually involved. AMSA and the ATSB answer to the same minister, but it is unusual for there to be any conflict of interest due to the different functions.

Port State Control has had a by-effect in Australia. The ATSB has submitted to IMO that there are major shortcomings in the implementation of the ISM Code. The on-board manuals nearly always have pristine pages. There is onus on the ship to produce their own documentation; however, minimum manning at sea, and the pressure for fast turnarounds means that the crew simply don't have the time to sit and think about what to do and how to do it, let alone how to do it best.

The NMSC is currently revising the USL Code, and is looking at the basis for the regulations and why they are there in the first place. The conclusion is that they are there as defences. However, no matter what defences are in place, you cannot stop human error.

Vote of Thanks

The vote of thanks was proposed by Stuart Ridland, and carried with acclamation.

Website

The ATSB website carries summaries of all their reports, and the full reports are downloadable in PDF format. Visit www.atsb.gov.au and click on Marine.

Hydrofoils on High-Speed Catamarans

Michael Andrewartha, a PhD candidate at The University of New South Wales, gave a presentation on *Applications of Hydrofoils to Improve the Performance of High-Speed Catamarans* to a joint meeting with the IMarEST attended by twenty-eight on 25 June in the Harricks Auditorium at the Institution of Engineers, Australia, Milsons Point. Michael has obtained good agreement between experimental results and theoretical predictions. He has written up the presentation, and it is expected that this will be published in the November issue of *The ANA*.

Developments in Salvage

Stephen White of Norton White Lawyers gave a presentation on *Developments in Salvage — Recent Case Studies* to a joint meeting with the IMarEST attended by twenty-nine on 23 July in the Harricks Auditorium at the Institution of Engineers, Australia, Milsons Point. Stephen began his presentation by describing the changes in salvage law which have taken place in the last fifteen years and the reasons for them. Under Article 13 of the Salvage Convention of 1910 (which governed for a considerable period), salvage awards were paid by property interests in proportion to respective salved values on a "no cure, no pay" basis, and Protection and Indemnity (P&I) Clubs were not involved.

Salvage Convention 1989

The Salvage Convention of 1989 changed that by introducing Article 14, whereby salvors were financially encouraged to render assistance in all casualties which may involve a threat to the environment, but the main salvage award was still based on Article 13. Where any award under Article 13 would not cover expenses, the salvor could claim for the excess under Article 14. Hull, machinery and cargo underwriters continued to be responsible for Article 13 awards, but the P&I Clubs became responsible for Article 14 awards. This convention entered into force in 1996, but led to a series of legal challenges in the late 1990s which were long and expensive, and caused much dissatisfaction to salvors, shipowners and the P&I clubs.

The SCOPIC Clause

The Special Compensation P&I Club (SCOPIC) Clause was devised to overcome the difficulties encountered in the operation of Article 14. The principal features of the clause are:

- A salvor can invoke the SCOPIC Clause at any time during the performance of salvage services under a Lloyd's Open Form (LOF) Contract, and is not required to prove a threat to the environment. Remuneration under SCOPIC is determined on a daily basis under agreed tariff rates.
- Within two days after a salvor has invoked the SCOPIC Clause, the shipowner must provide security in the amount of $3 million to the salvors.
- The SCOPIC Clause does not affect the operation of Article 13 during the course of salvage services. Remuneration under the SCOPIC Clause is paid to the extent that costs and expenses incurred under the SCOPIC tariff exceeded any Article 13 award, However, there is a downside! If the Article 13 award is greater than the remuneration earned by the salvor under the SCOPIC Clause, then the Article 13 award is discounted by 25% of the difference between the two.
- The shipowner has a right to send on board a Special Casualty Representative (SCR), and hull and cargo underwrites also have the right to send on board their Special Hull Representative and Special Cargo Representative respectively (all of whom must be technical personnel and not lawyers) to witness operations.

Under Lloyd's Open Form 2000, the SCOPIC Clause is now part of the Salvage Contract, and can be invoked by the salvor at any time. Due to the downside mentioned, it is not likely to be invoked in every case, but provides a workable framework for the operation of Article 14.

***World Discoverer* Grounding**

World Discoverer is a 3724 GRT cruise vessel, built in 1974 and classed with ABS ✠AE ✠AMS Ice Class A for unrestricted service, and claimed that she went where other cruises did not. In May 2000 the vessel hit a submerged

rock in the northern entrance to Sandfly Passage in Solomon Islands. She was later deliberately grounded on a reef in a small bay within the passage to prevent sinking. United Salvage undertook the salvage operation and encountered numerous difficulties from the start, including unreliability of local vessels chartered to transport personnel and equipment from Honiara across Iron Bottom Sound to the site, unreliability of the local telephone system, and attacks, occupation and destruction on board by local armed pirates. Despite these difficulties, the salvage proceeded well and they patched the vessel and pumped out 4000 t of water, and were within days of refloating. However, a coup took place in Honiara on 5 June 2000, which resulted in the loss of effective government, legal system, police, security and law. Direct threats were made against the salvage operation, and the salvors withdrew from the operation. The vessel remains there to this day, but the salvors were paid under the SCOPIC Clause which had been invoked earlier in the contract.

Jodie F. Millennium Grounding

Jodie F. Millennium was a new 20 000 t log carrier which was loading logs in Tauranga, New Zealand, when a storm at sea caused a 7 m swell outside and 3 m swell inside the harbour limits. The swell caused the vessel to surge at her berth and she began damaging the wharf structure, whereupon she was ordered to sea by the harbourmaster. When exiting the harbour, the 7 m swell caused her to deviate from the channel, and she grounded on the inshore side and ended up spilling heavy fuel oil. An interesting aspect of the salvage was that the cargo logs were removed by three helicopters lifting one log at a time, as that was cheaper than using tugs and barges for log loads. The vessel was refloated and sailed to a port of refuge for temporary repairs. This included the transfer of heavy fuel oil on the vessel from the double bottom to the topside tanks. Another aspect of the operation was the provision of air escapes 10 m in height above the deck to meet NZ MSA requirements, and their subsequent approval by the classification society for the voyage to Japan for permanent repairs to the vessel.

Vote of Thanks

The vote of thanks was proposed by Peter Dalley.

Phil Helmore

The LPAs

CDRE Nigel Perry RAN, Deputy Maritime Commander Australia, gave a presentation on *The LPAs — The RAN's Ships of Choice* to a joint meeting of the Australian Society for Defence Engineering (formerly the Society of Military Engineering) with RINA and the IMarEST attended by thirty-five on 28 July in the Harricks Auditorium at the Institution of Engineers, Australia, Milsons Point. The occasion was the presentation of the McDonough Oration, which commemorates the work of John McDonough in setting up the Society of Military Engineers eleven years ago. John is still on the ASDE Committee, and was present in the audience.

Introduction

We are seeing Australian forces increasingly deployed offshore [*This was highly topical, as Australian forces had left Townsville for Solomon Islands on board HMAS Manoora during the previous week* — Ed.] During the mid to late 1980s the RAN looked at Australia's internal operations and defence, and the navy we now have reflects the decisions which were made then. Increasingly the operations are peacemaking and peacekeeping, and the LPAs have done, and continue to do, a magnificent job.

Background

The LPAs were the result of looking for a replacement for HMAS *Jervis Bay*, the helo support ship. We ended up with some significant differences, but these have turned out to be better for ADF requirements.

At the time, there was no policy on amphibious warfare in the Australian Defence Force. HMAS *Tobruk* was based on the Royal Navy's *Sir Galahad* for landing troops on the beach. The US Navy had about a thousand Landing Ship Tank (LST) which were built at the end of WWII, and some Newport Class vessels, which were larger and faster developments of the LSTs. The bow door on the LST had been replaced by a destroyer-type bow, a derrick had been added over the bow, and a helo and flight deck added on the Newport design. The new vessels could do 20 kn, and took 29 tanks and 350 troops. Some though that the LSTs would provide a versatile amphibious warfare platform, and a proposal went to budget in 1993–94, but it was considered too expensive, and the RAN was sent back to the drawing board. Options that were considered included new design and build, and conversion. A study by ADI showed that the most cost-effective option was conversion of the USN's Newport-class vessels. A team of three, including Nigel Perry, visited Pearl Harbour, San Diego, and Newport in the USA to inspect nine Newport-class vessels which had begun decommissioning from the USN and were available for a bargain-basement price of $10 million each. As a result, Australia purchased *Seymour* and *Fairfax County* which became HMAS *Manoora* and *Kanimbla* respectively.

HMAS *Kanimbla* departing Sydney for the Gulf to participate in Operation Falconer (Photograph John Jeremy)

Conversion

A joint definition of operational requirements was developed, and this resulted in a list of 18 major requirements, including the transport of 2 LCMs (landing craft medium), 21 MBTs (main battle tanks) or 40 APCs (armoured personnel carriers), with accommodation for 450 and a Level 3 medical facility. Forgacs in Newcastle was awarded the contract for the conversion. There were many difficulties in the course of the contract, but there were also many opportunities. Items of interest included:

- No beaching facility was required, so the bow derrick (horns) were removed.
- There were issues with power generation, by demands

for new (additional) equipment placed on old plant.

- An aircraft deck spot was added forward, in addition to the two aft, and hangar space created for 4 Blackhawk helos. There were issues with the deck structure and, in the redesign for the hangar and air control, one funnel had to be resited.
- The extension of the aft flight deck impacted on the stern, and the stern door had to be redesigned, but this also allowed integration of the LCMs into the design.
- A 70-tonne crane (for which the vessel was not originally designed) was added on the foredeck.
- A primary casualty reception facility was added.
- A joint command and control system, providing integration of naval, air and land forces was added, requiring complex communication facilities.
- The stability was investigated for the changed operations, and bilge keels added to damp the rolling motions.

The conversion has brought new life to old ships. Of course, the design and serviceability problems were brought along too: some equipment is no longer around, and some suppliers are no longer around. Other changes included OH&S (removal of asbestos lagging, for example, and the phase-out of halon fire suppressants and CFC refrigerants), changes to the Marpol regulations, etc. and provision for all of these had to be incorporated.

Lessons Learned

There have been many lessons learned in this acquisition project. These include:

- A whole-of-capability approach was required. The acquisition was conceived as an affordable (cheap) option. However, there was no definition of amphibious warfare capability for the ADF at the time, and this capability was developed as the project evolved. This meant that effective concept-driven capability was not there.
- There are significant risks associated with purchasing ships of this age. The equipment fit bore some resemblance to that of the DDGs, and some parts were able to be borrowed from them.
- The vessels were at the bottom of the food chain in the USN, and they had not been well maintained, so we inherited some problems which needed fixing to get back to square one.
- The cost of the conversion did blow out; there is no question. However, the RAN has acquired two great ships which are now admirably fulfilling the roles which are now required of them.

The LPA Capability

The LPAs are now the largest ships in the RAN, and they are flexible, versatile ships. They have a joint command and control centre from which sea, land and air forces can be coordinated, they can provide logistic support, they have three helo platforms, they have shallow draft and can go close to shore when required, they can operate as the home plate for troops with full kit, the boats mean that they can operate as a mother ship, and they can even carry bulldozers in lieu of the LCMs.

HMAS *Kanimbla* proved her worth in the recent (2003) Gulf war. The US military wanted to use her for the joint command and control centre in close to the operations on shore (she could go where their aircraft carriers could not), and wondered why they had not come up with the modifications we had made!

The role of the ship needs to be planned. The role is different to anything we have known in the past. Naval, land and air forces have to work together, more now than ever before. There is a need to be able to move rapidly, and this is provided by the helos. Personnel need to be exposed to minimal risks.

HMAS *Manoora* as Flagship of the 2003 Australia Day Regatta on Sydney Harbour (Photograph John Jeremy)

Conclusion

Could we have done better? Possibly; but the LPAs are unique, and we could not have obtained the quality of vessel for the price that we did in any other way. They have been unquestionably good value for money.

In the USN, when there is a job to be done, they ask "Where are the aircraft carriers?" Now, in the RAN, when there is a job to be done, they ask "Where are the LPAs?" The platform works, and it does a sterling job.

HMAS *Manoora* and *Kanimbla* are the RAN's ships of choice.

Vote of Thanks

The vote of thanks was proposed by John McDonough (after whom the oration was named), and carried with acclamation.

Phil Helmore

NEW TALL SHIP PROJECT FOR WESTERN AUSTRALIA

Traditional Sailing Foundation Inc. is a local community group seeking to build a "tall ship" for the City of Cockburn through industry, government, community and local enterprise support. They are seeking a Naval Architect with an affinity for heritage and wooden boats to assist in containing costs through project management skills and good planning, etc. Any other volunteers are welcome.

If you are interested in participating in this project, please contact Bart Houwen on 0412 352 699 or via email bart@austindo.com.au

COMING EVENTS

NSW Technical Meetings

Technical meetings are generally combined with the Sydney Branch of the IMarEST and held on the fourth Wednesday of each month in the Harricks Auditorium at the Institution of Engineers, Australia, 118 Alfred St, Milson's Point, starting at 5:30 pm for 6:00 pm and finishing by 8:00 pm. The program of meetings remaining for 2003 (with exceptions noted) is as follows:

27 Aug	Ken Grieg, Siemens Ltd *The SSP Pod Propulsion System*
24 Sep	Noel Riley, Commercial Marine Design *The Evolution of Australian Tug Design*
22 Oct	David Gosling and Lina Diaz, Waterways Authority of NSW *Stability Requirements for the New Millennium*
4 Dec	SMIX Bash 2003

Marine Safety 2003

The National Marine Safety Committee will host another major marine safety conference, Marine Safety 2003, at Stadium Australia at Sydney's Olympic Park on Tuesday 23 and Wednesday 24 September, and registrations are now open. The NMSC expects the conference to equal the success of the inaugural Marine Safety 2002 conference, when around 400 marine industry leaders joined together in Brisbane. The aims of the conference are to accelerate the exchange of ideas and knowledge between people involved in Australia's coastal marine industries, promote national marine safety, and assess NMSC's work on the introduction of uniform national commercial and recreational marine safety standards. Streamed sessions on Recreational Boating Safety, Training and Operations, and Technology will keep delegates with similar interests together. Social activities include an opening cocktail party and tour of Stadium Australia on Monday 22 September, a show 'n' tell (demonstrations of new products and systems) happy hour and conference dinner on Tuesday, and concluding drinks on the evening of Wednesday 23 September. For further information, or to register, contact Marlene Glenister on (02) 9555 2879, email mglenister@nmsc.gov.au, or visit their website www.nmsc.gov.au.

Ausmarine East

The two-yearly Ausmarine East Conference and Exhibition will be held in Brisbane, at the Brisbane Convention and Exhibition Centre, from 28 to 30 October 2003. Ausmarine is one of Australia's leading international commercial and government marine events. It is aimed at owners and operators of fishing boats, tugs, ferries, offshore support vessels, pilot and rescue craft, aquaculture vessels, cargo ships and naval craft.

Several organizations are holding conferences in association with Ausmarine Eas, including RINA and Formation Design Systems (see below), IMarEST, Australian Shipbuilders Association, Australian Ship Repairers Group, Company of Master Mariners, and the Nautical Institute, among others.

For further information or to register for Ausmarine East contact Coreena d'Souza on (03) 9645 0411, fax 9645 0475, email marinfo@baird.com.au, or visit their website www.baird.com.au.

RINA Conference at Ausmarine East

The Queensland Section of RINA will hold a conference of their own in association with Ausmarine East in October in Brisbane. Details will be forthcoming. For further information contact Brian Hutchison on telephone/fax (07) 3269 4913 or email brghutchison@hotmail.com.

Maxsurf Users Conference at Ausmarine East

Formation Design Systems, authors of the widely-used Maxsurf and Multiframe software, will hold a Maxsurf and Multiframe users conference in association with Ausmarine East on Friday 31 October in Brisbane. These user conferences are targeted at all users (from beginners to advanced) with presentations by FDS staff and plenty of time for questions and answers. There is generally lots of interaction between FDS staff and attendees in the breaks.

The presenters will be Mr Philip Christiansen and Dr Dougal Harris of FDS. The program is as follows;

0845	Registration
0900–1030	Introduction; Maxsurf modelling and fitting
1030–1100	Morning tea
1100–1230	Hydromax analysis; Hydromax criteria
1230–1330	Lunch
1330–1500	Workshop; Multiframe
1500–1530	Afternoon tea
1530–1700	Seakeeper; Hullspeed; Data Exchange

The cost to attend the meeting is $95 (including GST). For further information or to register, contact Carolyn Hawley on (08) 9335 1522, fax 9335 1526 or email carolynh@formsys.com.

Pacific 2004 International Maritime Conference

The Pacific 2004 International Maritime Conference will be held at the Sydney Convention and Exhibition Centre, Darling Harbour, Sydney, from 3 to 5 February 2004. It will be presented in association with the Pacific 2004 RAN Sea Power Conference as part of the Pacific 2004 Maritime Congress.

The conference, which is being organised by the Royal Institution of Naval Architects, The Institute of Marine Engineering, Science and Technology and the Institution of Engineers, Australia, follows the success of the Pacific 2002 event which was held in January 2002. The theme of the conference is Maritime Engineering — Challenges and Opportunities, and a comprehensive programme of some 87 papers has been organised.

This Congress and the associated Pacific 2004 International

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More information can be found on the website www.tourhosts.com.au/pacific2004congress, or by emailing pacific2004congress@tourhosts.com.au.

Tasmanian Technical Meetings

Details of upcoming seminars and technical meetings are available at the RINA website under the Tasmanian Section pages. They include:

20 Aug	Laurie Goldsworthy *CFD Modelling of Heavy Fuel Oil Spray Combustion*
27 Aug	Giles Thomas *Wave Slam Response of Large High Speed Catamarans*
3 Sept	Ju Fan *Theoretical and Experimental Study on Hydrodynamics of Heave Damping Plates*
10 Sept	Hung Nguyen *Overview of Ship Control and Its Current Challenging Problems*
17 Sept	Jonathan Binns *Numerical Prediction of Extreme Motions of Sailing Yachts*
24 Sept	Jonathan Duffy *Berthed Vessel — Passing Vessel Interaction*
8 Oct	Bryce Pearce *2D Interceptor Flow Investigations*
17 Oct	Kishore Kantimahanthi *The Use of Hydrofoils for the Dynamic Lift of High-speed Catamarans*
22 Oct	Tim Lilienthal *Dynamic Stability of Ships in Following Seas*

15th International Ship and Offshore Structures Congress

The 15th International Ship and Offshore Structures Congress will be held in San Diego, USA, from 11 to 15 August 2003. The ISSC is a major triennial event for all those associated with ship and offshore structural analysis and design. The activities of the Congress are conducted by the Standing Committee comprising representatives of the major maritime countries. Other countries with significant maritime activities are represented by the Correspondents.

The Congress reviews all research activities in this field over a three-year term by appointing a number of committees. There are three types of such committees: Technical Committees, Specialist Committees and Special Task Committees. The membership of these committees is based on research publications in the respective specialisation. Each of these committees prepares a report which is published in the Proceedings of the Congress. During the meeting these reports are discussed and the recommendations for future research areas made.

The 1st ISSC was held in Glasgow, UK, in 1961. The current ISSC has eight Technical Committees, six specialist Committees and two Special Task Committees. The Australian team members are:

- Dr Mac Chowdhury — Correspondent; The University of New South Wales
- Professor Paul Grundy — Member, Technical Committee III.1: Ultimate Strength; Monash University
- Dr Jinzhu Xia — Member, Technical Committee I.2: Loads; Australian Maritime College
- Mr Tauhid Rahman — Observer; American Bureau of Shipping.

Professor Rob Melchers of Newcastle University and Dr Stuart Cannon of DSTO have been requested to attend as Observers.

Participation in the Congress is strictly by invitation. As Correspondent for Australia for twelve years, I have tried to encourage my colleagues, both in industry and in academia, to participate but with limited success. Please contact me if you would like to know more about the ISSC.

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GENERAL NEWS

New 30 m Super-maxi Yacht

The largest ocean racing yacht ever built in Australia, a 30 m super maxi for Victorian yachtsman Grant Wharington, will contest this year's Rolex Sydney – Hobart Yacht Race. This most innovative of Wharington's line of fast boats, named *Wild Thing* is under construction at Mornington, Victoria, and is due to be launched in late August.

At 30 m length overall, the new *Wild Thing* will have a state-of-the-art canting keel and will just fit within the maximum LOA and IRC upper handicap limit imposed by the Cruising Yacht Club of Australia for the Rolex Sydney – Hobart Yacht Race.

"Line honours in the 2003 Rolex Sydney Hobart Yacht Race is our goal," Wharington said. "I believe this race is the ultimate challenge in Australian yachting today and, as an Australian and a patriot, the winning would be even sweeter," added Wharington who, with his previous *Wild Thing*s has had a second, a third and a fourth over the line.

"Our maxi is a truly 'Australian made' product. We have ordered our D4 sails from Doyle Fraser sails, we have an Australian rig and, of course, an Australian builder in Mal Hart and designer in Don Jones," he said.

The hull is moulded in unidirectional carbon/aramid over an end-grain balsa core. The boat will have a 15/16 fractional rig with non-overlapping headsails, and an optional sloop/cutter rig. The mast is being built by Applied Composites in Melbourne.

Explaining the canting keel, Jones said the rules of the Australian Yachting Federation (and the CYCA) limited the angle of static heel with full ballast movement to 10 degrees for the Rolex Sydney – Hobart Yacht Race.

After launching and rigging the new *Wild Thing* in Melbourne in late August, Wharington and his crew plan to extensively test the boat and sails in Bass Strait and southern Tasmanian waters before bring the super maxi to Sydney in December.

Peter Campbell

Armidale-class Patrol Boat Source Selection

Defence has evaluated the proposals for the Replacement Patrol Boats from the three short-listed tenderers.

It was announced on 25 June that Tenix Defence and DMS, partnering with Austal, remain in the competition for the contract, following the setting aside of ADI's bid as not sufficiently competitive in value-for-money terms.

A contract with the successful supplier is expected to be signed later this year.

The Armidale-class patrol boats are to enter service with the Royal Australian Navy from financial year 2004/2005, in accordance with the Defence White Paper.

Advanced Radar for RAN

The Defence Minister Robert Hill announced on 10 June that the Government will invest $7 million to develop Australian-designed leading-edge radar technology which could be installed on the Royal Australian Navy's new air-warfare destroyers.

The high-powered phased-array radar has been designed by Australian Capital Territory-based company CEA Technologies.

Senator Hill said the investment would allow further development of the radar so that it could be used in medium-to-long-range air warfare and may be capable of meeting theatre ballistic missile defence requirements.

"The Navy's new air warfare destroyers will rely on the technological edge of the active phased-array radars to search and detect potential air and surface threats," Senator Hill said.

"The technology can also be applied to smaller ships and has the potential to significantly enhance the capability of our Anzac frigates.

"Navy is currently testing a lower-powered production version of this Australian-designed radar which promises to be significantly more capable than comparable radars in providing anti-ship missile defence for the Anzac frigates and similar sized vessels.

"The technology is leading edge, making it a sound investment in Australian industry and a significant export opportunity."

New Wing for Australian Catamaran Challenge

Australian Catamaran Challenge have successfully erected their radical wing sail as part of their preparations for an assault on The Little America's Cup. Construction of the wing commenced late in 2002. "We are very pleased with the progress so far" says Damien Smith, syndicate designer and naval architect. "The design combines the flexibility of a conventional soft sail with the extraordinary efficiency of the an aircraft wing."

Australia's challenger for the Little America's Cup
(Photo courtesy Damien Smith)

"I'm thrilled," said syndicate coordinator Ian Jenkins. "The team have done an amazing job building the wing. It is as much a piece of sculpture as sailing machine."

The race known as The Little America's Cup will be sailed off Rhode Island, USA, in September 2004. The Australian Catamaran Challenge syndicate will come up against previous winner Steve Clark's *Cogito* and the British *Invictus* team to decide who can build the fastest boat on the planet.

Contact: Damien Smith
Australian Catamaran Challenge
Project Naval Architect
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Email: pugwash@eisa.net.au
Website: www.lacaustralia.com

Toowoomba launched

The ninth Anzac-class frigate built by Tenix Defence Pty Ltd was launched on 16 May 2003 at Williamstown, Victoria.

Ms Judy Blight named the ship *Toowoomba* in honour of the original Bathurst-class minesweeper which served with distinction in World War II. Ms Blight is the daughter of Lieutenant-Commander Howard Goodwin, the last commanding officer of the original vessel.

Toowoomba will now be fitted out for delivery to the RAN in 2005.

Toowoomba on the way to the sea
(Photo courtesy Mary Shelley Clark)

Tenix's Last Anzac Ship Takes Shape

The keel of the tenth Tenix-built Anzac-class frigate, *Perth*, was laid at a ceremony held at Tenix's Williamstown dockyard in Victoria on 24 July 2003.

In a tradition dating back to the Vikings, a gold coin was placed under the keel as a good luck charm for the ship's future crews. Prior to the ship's scheduled launch in 2004, the coin will be removed, mounted and hung in the ship's wardroom.

The Tenix-built frigate is the third Royal Australian Navy ship to bear the name *Perth*. The original *Perth* was commissioned into the RAN in 1939 and sank in battle during World War II. The second served with the RAN for 34 years, from 1965 to 1999.

At the ceremony attended by Parliamentary Secretary to the Minister of Defence, the Hon. Fran Bailey MP, Tenix welcomed former crewmen from the original HMAS *Perth*, who were captured as prisoners of war when the ship sank in the Sunda Strait in 1942.

The new *Perth* will be to be delivered to the RAN in 2006 and will be the first Anzac-class frigate to undergo a significant Command and Control (C^2) System upgrade.

Tenix Patrol Boat Progress

The first of a new class of patrol boats being built at Tenix's Henderson (WA) shipyard for the Philippine Coast Guard has topped speed specifications in its final sea trials.
The vessel, BRP *Ilocos Norte*, is the first 35 m search-and-rescue vessel to be built under a follow-on contract with the Philippine Government.

CEO of Tenix Defence, Mr Robert Salteri, said the vessel had achieved more than 23 knots on main engines in the sea trials, compared with a specification requirement of 21 knots.

It reached 25 knots with its auxiliary water jet in operation, and the trial captain described the vessel's seakeeping ability as amongst the best he had seen.

"We are extremely pleased that our design predictions have been fully achieved in the first ship of a new class — and in the case of vessel speed, even exceeded," Mr Salteri said.

"With our Henderson facility being traditionally a steel shipyard, the vessel is the first example of all-aluminium construction and validates the company's flexible design skills.

"Tenix has a long history in the construction of world-class patrol boats and is the only Australian company building them and supporting them," Mr Salteri said.

"Our contract with the Philippines comprises the design, construction and support of two 56 m vessels with steel hulls and aluminium superstructures, and four all-aluminium 35 m vessels. The contract includes an option for a further ten 35 m vessels.

"The 35 m vessels have diesel main engines driving fixed-pitch propellers, with an additional centreline diesel driving a water jet for loiter capability," Mr Salteri said.

A workforce of almost 600 people, including local subcontractors, has been involved in the design and construction of the vessels at Henderson.

The two 56 m search and rescue vessels BRP *Batangas* and BRP *Nueva Vizcaya* were handed over to the Commandant of the Phillipine Coast Guard after a naming ceremony in early August.

Support Contract Short List

The Request for Tender, released on 21 July 2003, for the logistic support management of four of the Navy's current Amphibious and Afloat Support Ships has been short-listed to three companies.

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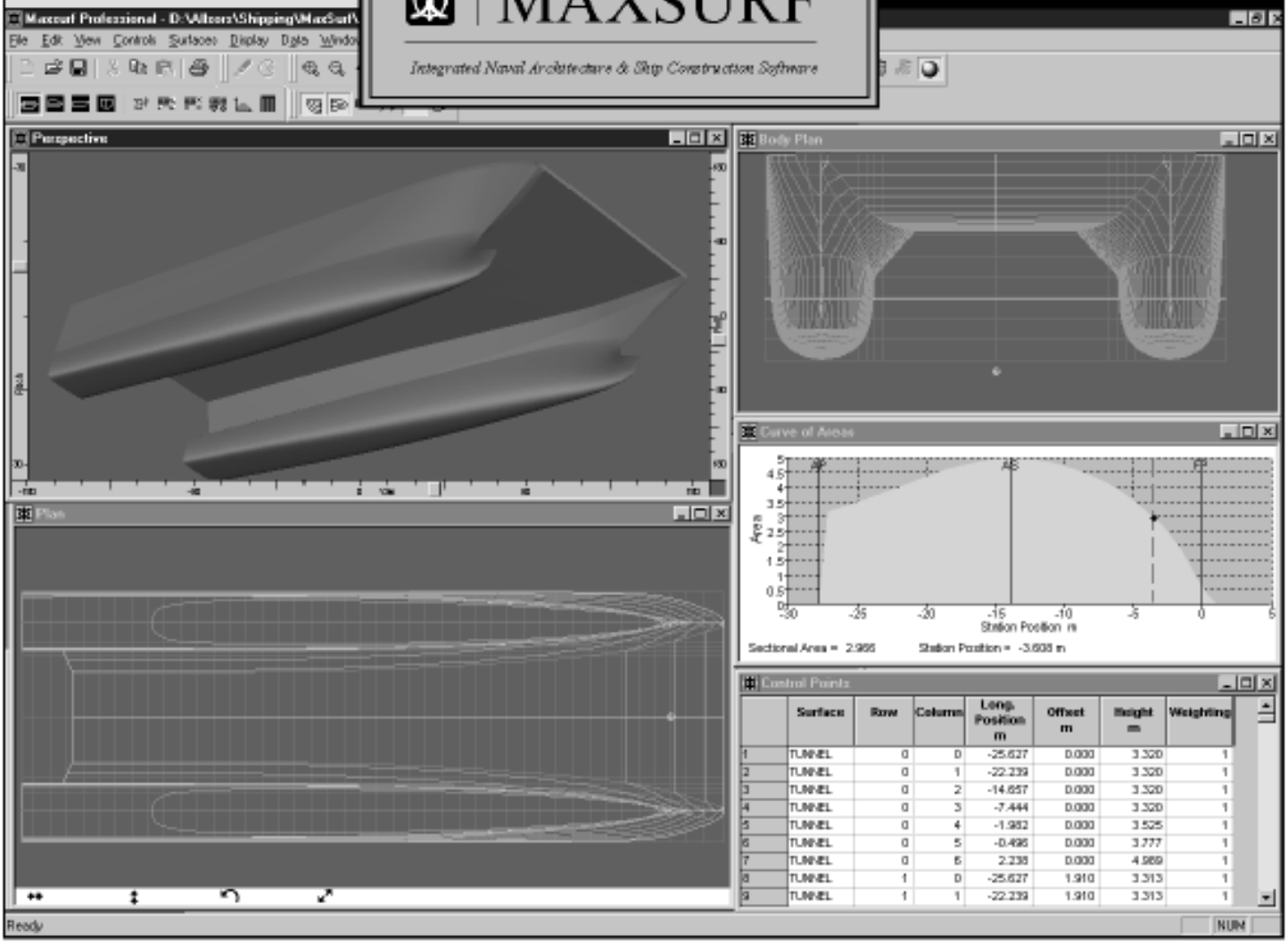

The successful companies short-listed, as a result of an Invitation to Register Interest in early 2002 are: KBR (previously Halliburton KBR); Kvaerner Facilities Management; and Rolls-Royce Australia Pty Ltd.

Following evaluation and the announcement of a preferred tenderer, a contract will be negotiated. The contract to support HMA Ships *Tobruk*, *Manoora*, *Kanimbla* and *Success* is expected to be for a minimum period of 7 years.

Two important factors in this tender are the need to closely manage the configuration of the ships and to reduce the overall cost of support and maintenance. Actual maintenance of the ships will be conducted separately, but to the requirements identified by the logistic support contractor.

First of Four Major Contracts Signed for Replacement Combat System for the Collins Class

The Head of the Defence Maritime Systems Division, Rear Admiral Kev Scarce, announced on 1 July that a contract has been signed with the Australian firm Sonartech Atlas for selected sonar capabilities in the replacement combat system for the Collins-class submarines.

RADM Scarce said that the contract with Sonartech Atlas — valued at $22.5 million — is the first of four major contracts to be finalised over coming months.

"The contract with Sonartech Atlas represents a small but critical part of the new system.

"They will provide the Submarine Acoustic Transitory Event Processing System (SATEPS) — a unique Australian invention which provides unparalleled capabilities in detecting other submarines and pinpointing their location," he said.

The $400 million dollar replacement combat system project was agreed by Government last year. It provides for a significant capability enhancement on the existing combat system, identified in 1999 as the principal technical challenge for the Collins Class. It also provides for further improvements in the sonar-processing solution currently installed, until the replacement system is introduced.

The replacement combat system will be sourced through the United States Navy. It is based on the Raytheon CCS Mark II tactical command and control system that is currently being used by the United States Navy.

A foreign military sales case to supply the CCS Mark II has been agreed with the United States Government.

A further three major contracts — covering other sonar, servers and hardware and installation — will be signed over coming months.

This schedule provides for the replacement combat system to be introduced progressively as part of the submarines' routine docking program from 2006.

HMAS *Parramatta* Delivered

The Royal Australian Navy welcomed the newest recruit to its modern fleet of Tenix-built Anzac-class frigates on 20 June 2003 at the Williamstown dockyard in Melbourne.

CEO of Tenix Defence, Mr Robert Salteri, said the new *Parramatta* is the fourth in a distinguished line of Australian naval vessels to bear the name associated with the first ship built for the fledgling Australian Navy in the early years of Federation.

"*Parramatta* follows HMAS *Stuart*, commissioned into the Navy on 17 August 2002, with a range of upgrades to its communications systems, missile deployment technology and commissary areas," Mr Salteri said.

"Hats off to the dedicated Anzac Ship Project team of Tenix for their hard work and tenacity in delivering this ship to the Navy ten days ahead of the contracted deadline.

"With the 10th and final vessel due to be delivered in 2006, we all hope that the world-class capability of the Williamstown shipyard, built up over the life of the Anzac Ship Project, is taken advantage of with further naval shipbuilding work," he said.

Mr Salteri said that the Tenix-built *Parramatta* showcases a range of enhancements unique to Australian vessels, and is the first of the class delivered to RAN complete with the new MILSATCOM system that allows for better communications between RAN units and allied forces at sea. An additional capability is the MU90 lightweight torpedo system.

Merger off

The proposed merger of the shipbuilding and ship repair capabilities of Tenix and ADI will not proceed. The decision follows detailed discussions since February this year between the two companies and with stakeholders.

The parties now believe the merger proposal would not meet the objectives they originally sought. Tenix and ADI will continue to explore other ways in which they might work together in the future.

Oceanfast Innovation Series Concept Design

As opposed to the tradition of offering a 'production' or 'semi-production' design to the market, the designers at Oceanfast have created a new mid-size motor yacht concept to be known as the *Innovation Series*.

Created for a discerning owner wanting the comforts of a larger yacht without compromise, the *Innovation Series* is designed to give maximum accommodation volume whilst still measuring below the critical 500 GRT applicable to the Code of Practice requirement for yachts operating commercially. Complying with all the applicable rules, ease of charter and resale are assured. The *Innovation Series* is thus able to combine world's best practice in safety features and, at the same time, delivering maximum performance and usable space to the owner.

Embodying an advanced full-displacement hull, the signature feature of the *Innovation Series* yacht is individually-designed FRP external styling features, allowing each owner the character of a custom yacht based on a proven and comprehensively-designed primary structure. The benefits are improved delivery, proven performance, and construction efficiency, whilst retaining the flair and desirability of a custom-designed yacht.

The yacht is offered internally in a bare format allowing individual owners the flexibility to customise the interior design and furnishing to their taste and budget. Several internal-styling concepts are available from the Oceanfast

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Outline Particulars

Length OA	43.8 m
Beam	8.5 m
Draft	2.5 m
Materials	Aluminium hull and superstructure, FRP components
Hull type	Round-bilge displacement
Accommodation	8 guests, 2 owners, 2 crew
Main engines	Two Caterpillar 3508B each 716 kW at 1600 rpm
Speed	15 kn

An impression of Oceanfast's new Innovation series
(Image courtesy Oceanfast)

The quality manner in which Oceanfast designs and builds motor yachts has been recognised with certification to the latest ISO quality standard. On 4 June 2003, Lloyd's Register Quality Assurance (LRQA) certified Oceanfast to the ISO 9001:2000 standard for quality management systems. The certification was granted after the manufacturing division was assessed during May, and complements the certification achieved by the design section in October 2002.

Perfect Prescription Launched

Oceanfast has launched another innovative and stylish luxury motor yacht named *Perfect Prescription*. It is the second yacht built by Oceanfast for the owner. The launch comes just four months after the handover of *Aussie Rules* to golfer Greg Norman.

Oceanfast General Manager, Mr Brad Draper, said the launch represented another milestone for the company, particularly as it is the yard's first full-displacement steel-hulled yacht and also the first collaboration with London-based designer Tim Heywood.

"Launching *Perfect Prescription* signifies another high point in the evolution of Oceanfast as a world leader in the construction of large super yachts," Mr Draper said.

"We are tremendously proud to have been given the opportunity to build a second luxury motor yacht for this client. It is a testament to the customer service we provide and our continual quest for improvement in everything we do."

The interior of the 54.0 m vessel features the stunning use of birds-eye maple and madrona-burl tiles throughout and provides luxurious accommodation for 10 guests and 12 crew.

Also fitted are a spa, two theatres, indoor and outdoor dining, a gourmet galley, a large wine store and 12 plasma screens (including two for *al fresco* viewing). Other high-tech equipment includes a sophisticated communications package for voice and data and a fully integrated electronics package, which incorporates audio/video, lighting control, blind control, as well as access to the ship's navigation information.

Incorporating a highly-developed hull form, *Perfect Prescription* has a draft of just 2.74 m to enable extended shallow-water cruising and a top speed in excess of 17 kn.

Brad Draper praised the fine finish and attention to detail onboard the world-class yacht.

"*Perfect Prescription* is an absolute tribute to the team who have contributed to its design and construction," he said.

Tim Heywood, who has designed the interior and exterior of *Perfect Prescription* for a client with a great deal of yachting experience, said "I am extremely pleased with the Oceanfast team's enthusiasm for the project. They have understood the finer details of the design and, with dedicated craftsmanship, have produced a first-class and unique yacht".

Oceanfast currently has another three luxury motor yachts under construction.

Perfect Prescription
(Image courtesy Oceanfast)

Austal to build World's Largest High-speed Multihull

Australian shipbuilder Austal Ships and European ferry operator Fred. Olsen S.A. announced in June 2003 the signing of a contract for the world's largest high-speed multihull vessel which will be based on a new hull form.

When delivered in the second half of 2004, the 126.7 m cargo-vehicle-passenger fast ferry will also be larger than any existing diesel-powered fast ferry — catamaran or monohull. It is also believed to be the world's largest all-aluminium ship.

"This is the largest fast ferry ordered anywhere in the world since the late 1990s, and arguably the most significant single order placed in that time as well," said Austal's Managing Director, Mr Bob McKinnon.

"We expect this breakthrough project to generate considerable interest among ferry operators, and it clearly demonstrates Austal's ability to produce high-speed ships of the size currently being sought by the US military."

For Austal Ships, the new 126 m ferry is a significant, but

carefully-planned and evaluated, progression in high-speed ship design, and draws on the track record Austal has established through the design and construction of 24 vehicle-passenger ferries since 1994.

Fred. Olsen S.A. pioneered the use of large high-speed ferries in the Canary Islands and currently operates three fast ferries and two conventional vessels. The company carries almost three million passengers, half a million cars and a quarter of a million cargo vehicles per year in the five services that it offers in the Canary Islands.

One of the conventional vessels will be replaced in September by a new 66 m Auto Express catamaran on order at Austal Ships.

"We are delighted that an extremely experienced and successful operator like Fred. Olsen S.A. has so quickly demonstrated its satisfaction with Austal and its products by becoming a repeat customer," Mr McKinnon said.

The Spanish company's second larger Austal ferry will, once again, see it set new standards not only within the local market but throughout the global industry.

Mr Fred Olsen Jnr., Executive Chairman of Fred. Olsen S.A. said, "We have already gathered a great deal of experience in the fast ferry business through operating three large ships since 1999, and we are very happy with the results of our three 96 m catamarans.

"However, it was quite clear from the beginning that the catamarans had some limitations, in terms of capacity and especially passenger comfort, when operating in rough seas such as we have around the Canary Islands.

"This led us to the conclusion that further research was needed in order to develop a new concept for high-speed vessels. We wanted to combine the good comfort provided by the soft movement of monohulls, with the low resistance and very good stability and carrying capacity of catamarans.

"Maintaining high speed was also important to us, so we were looking for increased engine power without entering into gas turbines technology, which would have led to unacceptably higher operating costs."

With these objectives in mind, Fred. Olsen S.A. and Austal Ships cooperated on an extensive programme of research, tank testing and other analysis to, firstly, develop a new design and then ensure it would meet Fred. Olsen S.A.'s requirements in an efficient and cost-effective manner.

"Austal's research and development team worked with us to optimise the hull form, size and capacity of the vessel, structural design, construction materials and propulsion plant," explained Fred Olsen Jnr.

The result is a slender, stabilised monohull — a trimaran.

"While we believe there will always be a significant role for

catamarans in the fast ferry market, this vessel has the potential to provide enhanced passenger comfort in a wide range of sea conditions, thereby increasing the opportunities for their application. It really is a major breakthrough, and a logical progression from many years of development and experience with multi-hulled vessels," Mr McKinnon said.

With power provided by four diesel engines driving waterjets, the Auto Express 126 trimaran will be able to maintain Fred. Olsen S.A's projected service speed in excess of 40 kn and provides the capacity to carry 1350 passengers, over 340 cars and a substantial number of trucks.

The superior seakeeping performance of the trimaran will provide Fred. Olsen, S.A.'s passengers with significantly enhanced levels of comfort compared to the company's existing fast ferries and is also expected to result in noticeably higher levels of operability.

"The characteristics of this new vessel, with a length of 126.7 m and beam of 30 m, will improve overall efficiency in terms of passenger capacity, deadweight and freight lane-metres by more than 35%. At the same time, passenger comfort will increase by 25% to 40% depending on the routes we operate," said Fred Olsen Jnr.

While the Auto Express 126 trimaran will set new industry standards for vessel performance, its design and construction are both soundly based.

The speed and seakeeping performance of the hull form has been verified by extensive analysis, including multiple tank-testing sessions. Austal has also built and trialed an 11 m manned technology demonstrator and has modelled the vessel's structure in detail using sophisticated finite-element techniques.

A team led by General Dynamics and including Austal USA is offering a variant of the trimaran hull form for the US Navy's Littoral Combat Ship project, and Austal USA is also in the running to build a series of Theatre Support Vessels for the US Army.

The profile of the Auto Express 126 to be built for Fred. Olsen S. A. by Austal Ships in Western Australia
(Image courtesy Austal Ships)

Austal in LCS Premilinary Design Contract Team

On 18 July it was announced that a team which includes Austal Ships and Austal USA has been awarded one of three contracts for the preliminary design of the United States Navy's Littoral Combat Ships.

Austal, as an experienced designer and builder of high-speed aluminium vessels, is a major contributor to the team, which is led by General Dynamics. The team's proposal for the Littoral Combat Ship (LCS) is based on Austal's 126 m high-speed aluminium trimaran hull form.

Austal's Managing Director, Mr Bob McKinnon, said the contract was an important step forward along the path to an increased role in the global military-vessel market.

"The significance of moving into the next stage of the LCS project goes beyond the obvious of being a step closer to playing a major role in what is shaping as a multi-billion dollar, multi-year project," Mr McKinnon said.

"Selection of the trimaran for the next stage of this project confirms that aluminium is an appropriate choice for ships, even in combat roles. This is clearly important for other future defence contracts," he said.

Mr McKinnon said participation in the high-profile LCS project is increasing international awareness, not only of Austal's capabilities but also the great potential for high-speed vessels in a variety of defence applications.

Following completion of the seven-month LCS preliminary design stage, the Navy will select two builders to build two prototype ships. One vessel will commence construction in early 2005 and the other in early 2006.

It is anticipated that, in late 2007, one team will be selected to continue with the program, commencing construction of three ships in 2008 and four in 2009. The Navy predicts that up to 60 Littoral Combat Ships may eventually be required. In accordance with US law, all vessels will be built in the United States.

An impression of the General Dynamics LCS contender
(Image courtesy Austal Ships)

Image Marine delivers Catamarans for Norway

Designed and built specifically for harsh Norwegian weather conditions and to meet the service requirements of isolated communities, Image Marine's first vessels for the European market present a new benchmark for the Australian shipbuilder.

Built for leading ferry operator Ofotens og Vesteraalens Dampskibsselskab ASA (OVDS) and named *Salten* and *Steigtind*, the passenger-cargo catamarans will operate out of the far northern port of Bodø. Capable of 35 kn and with capacity for 214 passengers and 30 Euro pallets (12 t) of refrigerated cargo, the 41.3 m vessels provide not only a passenger service, but also the only transportation link for travel and supplies between many small islands and the mainland.

OVDS Technical Director, Mr Per Harald Ottestad, said the new vessels would enhance the company's existing high level of customer service.

"When designing the vessels, Image Marine worked closely with OVDS to ensure that the vessels successfully incorporated all the features that their critical community service function and the expected operating conditions demand," he said.

Onboard facilities, for example, include large luggage-storage areas and a specially-designed room that allows passengers to transport their pets. A kiosk provides refreshments throughout the round trip which can last up to six hours, and an adjacent television room with toys provides children with a play area separate from the main passenger cabin. Smokers are catered for with a protected outdoor smoking area on the upper deck.

The ferries' refrigerated cargo facilities enable OVDS to provide a valuable service delivering goods to and from the mainland, particularly for Norway's significant fishing industry. Cargo is lifted into the hold by cranes on the upper deck, which feature remote control capability for ease and swiftness of loading and unloading — a vital factor on this service due to the large number of different ports called at each day.

Located aft, the hold features a hydraulically-operated hatch cover, tie-down fasteners for rough weather and sealed floors which allow the hold to be hosed down. All aspects of the hold have been outfitted in accordance with the applicable hygiene requirements.

Designed to operate with a crew of four, the vessel's layout facilitates the easy flow of passengers. Hydraulically-operated boarding ramps are positioned both port and starboard and cater for the various wharf heights encountered on the route, while the central ticketing office allows passengers to purchase tickets after boarding. Boarding passengers move forward to the main seating area via luggage storage compartments where they can leave their belongings.

Sliding doors separate the main passenger cabin from the lobby and baggage areas, creating a quiet environment in which passengers can relax in climate-controlled comfort. Seating is arranged in a mixture of row and table-and-chair arrangements and the entire interior is fitted out to the typically high standards expected by Scandinavian passengers.

Passengers with disabilities are well catered for, with noticeable features being hearing-aid induction loops and interior colour schemes designed to clearly delineate walkways for those with poor eyesight.

Given the nature of the service, it is also important that the captain and crew are well looked after. Located on the upper deck aft of the bridge are the ship's office, a separate crew shower and toilet, and a dining/lounge area which features cooking facilities, television and comfortable seating around a large table.

Steigtind during trials
(Photo courtesy Austal Ships)

In addition to the valuable community service provided by *Salten* and *Steigtind*, the aluminium sister ships have been specifically designed for harsh weather conditions and sometimes difficult seas.

Since the vessels operate north of the Arctic Circle and throughout winter, specific attention was paid to ensuring year-round functioning of all aspects of the vessel in below-freezing conditions. This includes all engineering systems and is encompassed in features such as the covered mooring

decks aft, which protect the crew from the weather when docking, and a sloped forward bulkhead that is designed to prevent the build-up of snow and ice over the escape hatch.

While based on a successful existing Austal hull form, the hulls and tunnel height have been slightly modified for Norwegian sea conditions and to allow for expected variations in passenger and cargo loads. The catamarans use Seastate interceptors to modify running trim as well as providing significant motion damping.

Commenting on this aspect of the vessels, Per Harald Ottestad said, "We initially thought that we would require T-foils to limit motions to an acceptable level but we have been pleasantly surprised by the performance of the interceptor system. The ride is even better than we thought it would be."

Power for the vessels is provided by twin MTU 16V 4000 diesels, each driving a Kamewa waterjet via a ZF gearbox. This produced a speed of 33 kn in trials condition.

Image Marine Sales and Marketing Manager, Mr Mark Stothard, said delivering vessels to Norway, a traditional home for fast ferry design, construction and operation, was particularly satisfying.

"In placing the order for these two catamarans with us, OVDS provided a great vote of confidence in the skills, reputation and competitiveness of Image Marine," he said.

Per Harald Ottestad said the decision to build the vessels in Australia in preference to a yard in Norway or elsewhere had only been made after careful deliberation.

"When considering the various options, we had to take into account many different factors, including vessel performance, price, construction quality and the builder's level of expertise and experience. Image Marine provided the best overall package, and we look forward to introducing these new ferries to our service this summer," he said.

Salten and *Steigtind* showing their manoeuvrability on trials
(Photo courtesy Austal Ships)

Mark Stothard said the experience of building some of the very first fast ferries built to the High Speed Craft Code 2000 had provided the company with a unique opportunity to display its skills.

"Working with such a highly experienced customer, and the extremely diligent Norwegian Maritime Directorate as survey authority, and meeting their requirements has enabled us to show, once again, that Image Marine can produce vessels to the highest standards," he said.

"We are really proud of these ferries. Our ongoing goal is to improve on our previous build, and I believe these are the best boats we have ever produced," Mr Stothard said. "They are a tribute to the skills and hard work of the Image Marine design and construction team and I am sure that OVDS's passengers will be extremely pleased with their new, Australian-built transportation link."

Principal Particulars

Length OA	41.3 m
Length WL	36.1 m
Beam moulded	11.6 m
Hull depth moulded	4.3 m
Maximum draft	1.4 m
Maximum deadweight:	48 t
Passengers	214
Crew	4
Cargo	30 Euro pallets (12 tonnes)
Fuel (maximum)	16 000 L

Propulsion

Engines	Two MTU 16V4000 M70; 2320 kW at 2000rpm each
Gearboxes	Two ZF 7550
Waterjets	Two Kamewa 71 SII
Speed	33 kn at 85% MCR with 25.7 tonnes of deadweight

Survey

Classification	Det Norske Veritas ✠ 1A1 HSLC R2 (nor) Passenger EO

High-speed Military vessel on Offer from Austal

Reflecting the heightened military interest in the use of commercial fast-ferry technology, Austal Ships has released details of one of its advanced military ships. Developed in response to existing naval requirements and incorporating advanced hull and propulsion technology, the Austal High-speed Vessel — Multipurpose (HSV–M) is just one example of possible high-speed vessels for future naval and other military roles.

The surge in military interest in large high-speed craft is shown by United States defence organisations contracting four such vessels in the last 20 months, with a number of major projects in the pipeline. These includes the US Navy's Littoral Combat Ship (LCS) project, which may eventually produce 60 ships, and the US Army's upcoming Theatre Support Vessel program.

Austal is well-positioned to contribute, with the purpose-built Austal USA shipyard already well-established in Mobile, Alabama, providing Austal's world-leading high-speed vessel technology to the US market.

Austal's new HSV–M design is based on the company's proven 101 m catamaran which has proved to be a great success in both commercial and military roles, including the Theatre Support Vessel *WestPac Express* currently operating with the US Marines.

Although based on Austal's world-leading fast ferry design and construction technology, the Austal HSV–M has been designed from the keel up to meet military requirements for a highly capable and multi-purpose platform. For example, the military vessel incorporates a significant increase in structural strength in the bow and tunnel areas, enabling it to operate at higher speeds in more extreme sea conditions than a typical fast ferry.

It can undertake a variety of roles with a high degree of inter-operability, both with other vessels and port infrastructure. Possible roles for the Austal HSV–M include:

- Support of amphibious assault operations using small boats and amphibious vehicles;
- High-speed deployment of troops and military hardware including tanks;
- Deployment and support of helicopters for reconnaissance, combat search and rescue, vertical replenishment, special warfare support, airborne mine countermeasures and other military activities;
- Co-ordination and command of other military vessels; and
- Disaster and humanitarian relief operations including the provision of supplies and evacuation of personnel and equipment.

To ensure these capabilities are delivered in a cost-effective manner the Austal HSV–M would be produced to commercial construction standards and outfitted with commercial-off-the-shelf (COTS) equipment wherever possible.

Propelled by four steerable waterjets that deliver extreme manoeuvrability, and powered by four fuel-efficient medium-speed diesel engines, the Austal HSV–M can sustain speeds in excess of 38 kn in sea state 3 when loaded with 450 t of troops and equipment and carrying sufficient fuel for a range of 1100 n miles. It has a range of over 4 000 n miles at an average speed of 20 kn.

The HSV–M's layout features one vehicle deck with stern and side ramps, a main deck level with helicopter deck and hanger, accommodation and work spaces and the bridge deck.

The vehicle deck provides over 1765 m^2 of usable space and can carry a range of military hardware including M1 Abrams (M1A1) Main Battle Tanks, High Mobility Multipurpose Wheeled Vehicles (HMMWV), LARC and AAV amphibious vehicles, and semi-trailers. Helicopters and cargo can also be transported on the vehicle deck.

Stern and side ramps allow for rapid and efficient loading and offloading of vehicles, even in rudimentary ports, and the amphibious vehicles can be launched and retrieved directly to and from the water via the stern ramp. Boats up to 11 m in length and a variety of unmanned underwater and surface vehicles can be carried on the vehicle deck and

launched and retrieved in up to sea state 3.

The Austal HSV–M has been configured to carry and support a detachment of two multi-mission military helicopters such as the Sikorsky MH-60S. These can be stored and maintained in a weather-tight hangar space on the upper deck.

In addition to the MH-60S aircraft, the helo deck enables the HSV–M to operate with military helicopters including twin-rotor medium-lift assault helicopters and the latest attack helicopters.

This unique design provides permanent berthing for 100 ship's personnel, including toilet and shower facilities on the upper deck. In addition, 250 business-class quality reclining seats with armrests and tray tables are fitted forward for troops or survivors/evacuees. Part of this area can be quickly and easily re-configured to provide berthing space for 100 personnel. This allows the vessel to operate with a variety of crewing profiles, depending on operational requirements, including 200 berthed personnel or 100 berthed and 250 seated personnel.

An impression of Austal's HSV-M design
(Image courtesy Austal Ships)

With its eyes firmly on the US market for large military vessels, Austal is also increasing capacity at Austal USA, its modern shipyard in Mobile, Alabama. Established over two years ago, the US shipyard currently has a 110 m by 28 m assembly hall, with a second facility on the way. The yard has already successfully built three high-speed and one medium-speed aluminium vessels and has another two under construction. This has resulted in a very significant transfer of leading-edge production skills and technology from Australia to Austal USA.

Austal Wins Yemeni Patrol Boat Contract

Austal Ships was selected in June to supply a fleet of ten high-speed patrol boats to the Republic of Yemen, Ministry of Defence. Based on a proven hull form and built to the highest commercial standards using the latest construction techniques, the 37.5 m aluminium monohulls will provide the level of capability the Yemenis require in a reliable, simple-to-operate vessel that is easy to maintain. The total contract price for the ten vessels, spares, and a substantial package of training for 60 personnel is under $US55 million.

Fit-for-purpose vessels

The patrol boats that Austal Ships is supplying to Yemen provide a budget-conscious solution to a set of operational requirements that is common to many nations. These include:

- General police missions in coastal waters;
- Customs control and anti-terrorist operations at sea;
- Offshore protection and tracking;
- Surveillance of the Exclusive Economic Zone;
- Defence and protection of national sea areas; and
- Operations within integrated task forces.

The all-aluminium patrol boat design selected by Yemen is a slightly less complex version of Austal's 38 m Bay-class design, eight of which have been operating successfully with the Australian Customs Service since being delivered between February 1999 and August 2000.

Tank testing and subsequent operational use has proved the excellent seakeeping and low resistance of the deep-V, single-chine, semi-displacement hull form which, combined with the light but strong aluminium construction, will allow the vessels to achieve their contract speed of 29 knots with only moderate power.

The major propulsion system comprises Caterpillar marine diesel engines driving fixed-pitch propellers via Reintjes gearboxes. This twin-screw propulsion system blends mechanical reliability and simple, efficient operation with ease of maintenance and is backed by the suppliers' own well-established service and spares networks.

Other important equipment items are similarly based on widely-available commercial-off-the-shelf (COTS) equipment, contributing to both low initial cost and long-term product support from their respective suppliers. This includes the navigation, communication and control systems, many of which are fitted in the spacious wheelhouse. The bridge is arranged for three -person operations and located for around-the-horizon visibility and minimal motion, thus reducing fatigue.

Other principal onboard spaces include a dedicated operations room, ship's office, laundry, separate mess areas for officers and crew, a well-appointed galley and adjacent food storage allowing the vessels to spend at least 14 days at sea on patrol without replenishment. A fresh-water maker is fitted to supplement potable water supplies.

Based on an operating profile that foreshadows the vessels operating mostly at their cruising speed of 25 knots, the vessels have a range well in excess of 1000 n miles.

Each patrol boat will operate with a complement of 19, and will be equipped with a single-berth cabin for the captain, a twin-berth officers cabin, and four crew cabins (two 6-berth and two 2-berth).

The interior will be fitted to a high commercial standard, including the use of aluminium honeycomb panel, and has been arranged for maximum habitability taking into account vessel movement, noise, vibration and the flow of personnel when carrying out their shipboard duties. The onboard air conditioning will provide a comfortable working environment and has been designed taking the local climatic conditions, including extremely high air and sea temperatures, fully into account.

In order to enforce local and international laws within Yemen's territorial waters, the patrol boats are to be fitted with a 25 mm twin-barrelled naval gun and two heavy machine guns. Weapons lockers for the machine guns and small arms are fitted and ready-use ammunition lockers will be located adjacent to each gun mounting.

Training

The patrol boat contract includes a substantial package of training for Republic of Yemen Navy personnel, the aim of which is to ensure that crews can make the best use of the vessels' capabilities as soon as they enter service and for many years to come.

The training programme will involve six key crew-members of each vessel (60 persons in total) travelling to Western Australia where they will be given a combination of tuition and practical training. This will include familiarisation with the vessels while they are under construction so that crews are familiar with structural, engineering and systems design, as well as at-sea instruction covering the capabilities and operating procedures for the new patrol boats.

Importantly, a group of Yemeni personnel will be given instruction and practical training in aluminium welding techniques. This technology transfer will enable the Navy to be more self-reliant by being able to undertake or supervise vessel repair and maintenance tasks at local facilities, rather than requiring assistance from contractors outside Yemen, which is likely to be expensive and time consuming.

If the Republic of Yemen Navy requires, the expertise of the Austal Service organisation is also able to provide specialist assistance including the supply of spare parts and equipment, repairs and maintenance.

Winning the contract

The patrol-boat capabilities of Austal Ships were first highlighted to the Republic of Yemen Navy as part of an extensive worldwide market analysis carried out by Greenwich House, an international strategic consultancy firm, in 1998.

Greenwich House had already established trade links in the defence, maritime and aerospace sectors in Yemen and analysed 24 international shipyards, including builders from Asia and eastern and western Europe, as part of its study.

Greenwich House was impressed by Austal's naval design capability, value for money and short delivery times and Austal Ships was identified as the preferred supplier and continued to work with Greenwich House as the project progressed to contract stage.

Austal's Managing Director, Mr Bob McKinnon, said the contract was won with the support of the Australian Government, including the Defence Materiel Organisation.

"While Austal overcame the intense international competition to win this contract on merit and without any sort of financial support or political pressure from the Australian Government, its assistance in terms of logistical and diplomatic support was important, especially during the final stages of the contract negotiations in Yemen," Mr McKinnon said.

Australia's Ambassador to Yemen, Mr Bob Tyson, said the Austal patrol boats would assist the Yemeni Government in its efforts to combat terrorism and illegal trafficking.

"We recognise the challenges faced by the Yemeni Government in securing the country's borders, and have been impressed by its determination to meet those challenges," he said.

"We strongly support this project, and congratulate Austal Ships on its successful bid. Austal has an excellent and well-deserved worldwide reputation for design, quality, training and ongoing support."

Mr Tyson added that the Australian Government greatly valued its bilateral relationship with Yemen which, in two-way trade terms alone was worth around AUD$160 million per annum, and saw Austal's patrol boat project as an opportunity to expand into new areas of co-operation.

The initial batch of four vessels for Yemen will be finished within 12 months, with the remainder delivered in pairs at two-monthly intervals, giving a total time from contract to final delivery of just 18 months.

An impression of the Patrol Boats to be built by Austal Ships for Yemen (Image courtesy Austal Ships)

Principal Particulars

Length OA	37.5 m
Length WL	32.4 m
Beam moulded	7.2 m
Hull depth moulded	5.0 m
Hull draft	2.2 m
Fuel	27 000 L
Fresh water	10 000 L

Machinery

Engines	Two Caterpillar 3512
	1305 kW at 1800 rpm each
Gearboxes	Two Reintjes
Propellers	Two fixed pitch
Generators	Two Perkins Sabre
Maximum speed	>29 kn
Cruising speed	25 kn
Range	1000 n miles with 20% reserve

Armament

One 25 mm twin-barrelled naval gun
Two 12.7 mm heavy machine guns

Crewing

Officers:	3 (incl. captain)
Crew:	16
Total complement:	19

Survey

Hull structural survey:	Germanischer Lloyd ✠100 A5 OC3
Survey authority:	DoT WA in consultation with the Yemeni Marine Authority.

Swift delivered to US Navy

The 98 m wave-piercing catamaran HSV 2 *Swift*, Incat Hull 061, was handed over to the US Navy in Hobart on 12 August 2003.

Guests were welcomed on board HSV 2 *Swift* by His Excellency, The Honourable Sir Guy Green, AC KBE CVO, Governor of Tasmania.

With the Royal Australian Air Force band playing, flags flying and the usual pomp and ceremony associated with such events, the 80 or so US officers and crew were joined by representatives of the Australian Defence Force, invited guests and the entire Incat workforce.

During the ceremony Commander Clark Price, the Captain of the ship, assumed command, delivering his orders before the hoisting of colours, signifying that the US Navy had accepted US Navy Vessel HSV 2 *Swift*.

The High Speed Vessel (HSV) *Swift* will serve operationally as an interim Mine Warfare Command and Support Ship (MCS), and support transformational mine-warfare modular-mission payload initiatives. In support of Navy experimentation, the HSV will be used to explore concepts, capabilities and military utility associated with the advanced hull and propulsion technology integrated with advanced communications in support of the Littoral Combat Ship (LCS) program.

For the Marine Corps, *Swift* will conduct a series of limited-objective experiments, exercises, demonstrations and training events that develop interoperability potential of high-speed vessels with causeways, watercraft, amphibious ships and other shipping. Experimentation data will be used to access the military utility of HSVs and future joint and naval military operations or applications.

Swift is capable of maintaining an average speed of 35 kn or greater when loaded with 455 t, comprising 350 personnel and military equipment. A minimum operating range of 1100 n miles at 35 kn was required by the contract, as was a minimum transit range of 4000 n miles at an average speed of 20 kn. Swift is capable of 24-hour operations at slow speeds (3–10 kn) for experimentation with unmanned autonomous vehicles, and to support dedicated and emerging organic mine-warfare missions.

A stern ramp capable of on/off loading directly astern or to the starboard quarter is fitted. The ramp is capable of loading/unloading a multitude of military vehicles up to and including M1A1 main battle tanks of up to 64 t. *Swift* is also fitted with a load-compensating crane capable of launch and recovery of small boats and unmanned vehicles up to 12 t whilst underway. The crane is capable of lifting up to 10 t to and from the flight deck.

Perhaps one of the most impressive features of *Swift* is the NAVAIR-certified helicopter flight deck for operation of MH-60S, CH-46, UH-1 and AH-1 helicopters. An area protected from the weather for storage and maintenance of two MH-60S helicopters has also been provided to enhance aviation operations in day, night and instrument meteorological conditions.

With sea trials, Navy acceptance, and crew certification complete, *Swift* will now deploy and commence routine operations. The vessel will operate with crews stationed at Naval Station Ingleside, Texas, and Naval Amphibious Base Little Creek, Virginia.

Swift is the fourth Incat wave-piercing catamaran to enter military service. In 1999 the Royal Australian Navy chartered the 86 m wave-piercing catamaran HMAS *Jervis Bay* (Incat Hull 045) for use during the East Timor crisis.

In 2001, joint forces from the US Military awarded to Bollinger/Incat USA the charter for a high-speed craft to be used as an evaluation platform for various trials and demonstrations for the different forces involved. The 96 m wave-piercing catamaran HSV-X1 *Joint Venture* became the benchmark for future fast sealift acquisitions, thanks to her high operational speed and long-range deployment capabilities, combined with a high deadweight capacity. *Joint Venture* has excelled during her deployment in the Persian Gulf in support of Operation Iraqi Freedom. Just hours after

Swift on trials in Tasmania waters prior to her handover to the US Navy
(Richard Bennett photograph, courtesy Incat)

The aircraft carrier USS *Nimitz* (CVN 68) and *Joint Venture* (HSV X1) conducting a Vessel Boarding Search and Seizure (VBSS) training evolution in support of Operation Iraqi Freedom on 25 May 2003.
(US Navy photograph)

Operation Iraqi Freedom began, *Joint Venture* sped into the shallow Persian Gulf waters near the southern Iraqi port of Umm Qasr, acting as an afloat forward-staging base for Marine Fleet Anti-Terrorism Security Teams and Navy SEAL commandos.

On 14 November 2002, the US Army took acceptance of its first Theatre Support Vessel TSV-1X *Spearhead***.** The craft is part of the Advanced Concept Technology Demonstrator (ACTD) program, a joint effort by the acquisition and operational (war fighter) communities within the US Department of Defence. Typically ACTDs begin by identifying significant military needs and then matching them with current commercial technology or other programs ready to focus on military application.

Incat Starts Building Evolution One12

Incat Tasmania has announced the start of construction of the first Evolution One12 wave-piercing catamaran, ordered by Incat USA, with delivery programmed for 2004.

The Evolution One12 will be capable of carrying up to 1500 t deadweight and will be the largest diesel-powered fast craft in the world.

Incat has selected four 20RK280 MAN B&W engines to provide the 36 MW required to power the vessel at speeds of up to 50 kn. Each 20-cylinder RK280 engine is rated for continuous operation at 9 000 kW at 1000 rpm for this application.

Constructed as a base vessel or SeaFrame, as opposed to the aviation industry's AirFrame — the structure of an aircraft exclusive of its fittings, the craft can be fitted out for numerous purposes, including passenger/commercial and military deployment.

While providing operators with a host of different configurations designed for their individual needs, building to SeaFrame will enable lower production costs and, consequently, lower ownership costs of Incat-built wave-piercing catamarans.

The cargo deck of the Evolution One12 SeaFrame provides 589 truck lane metres (TLM) plus 50 cars, or 312 cars if required for a full tourist mode. With extra optional mezzanine decks fitted, the possibility for even greater car capacity exists. Other advantages of the Evolution One12 include an increased vehicle deck headroom of 6.3 m, centre lanes allowing the stowage of Mafi trailers and, with a beam of 30.2 m, heavy road vehicles can easily turn in the bow for quick disembarkation over stern ramps.

The 30.2 m beam of the craft also serves to increase onboard comfort by reducing transverse accelerations in the main cabin area. This, combined with a new wider trim-tab configuration, will minimise the time the optional forward T-foil is required, bringing further fuel and maintenance economies to the operator.

For the commercial market, the Evolution One12 SeaFrame can be fitted with luxurious, yet practical, accommodation for 1200 or more persons. Developed by Revolution Design, an interior well suited for the demands of an intensive passenger ferry service can be provided.

Alternatively, the SeaFrame can be completed as a pure ro-ro vessel dedicated for freight operators, or a car carrier for transportation of trade vehicles.

For the military sector there is a plethora of configurations in which the SeaFrame vessel can be completed, offering littoral combat, mine counter measures, UAV/STOL capacity, theatre support, helicopter operations and troop transport abilities, to name but a few.

Principal Particulars

Designer	Revolution Design Pty Ltd
Class Society	Det Norske Veritas
Certification	DNV ✠1A1 HSLC R1 Car Ferry "B" EO Certificate
Length OA	112.63 m
Length hulls	105.60 m
Beam moulded	30.20 m
Beam hulls	5.80 m
Draft	3.30 m approx. in salt water
Deadweight	1500 t
Cargo Deck Capacity	589 truck-lane metres at 3.5 m wide plus 50 cars at 2.3 m wide or 345 truck-lane metres plus 198 cars at 4.5 m long x 2.3 m wide utilising mezzanine decks or 321 cars at 4.5 m x 2.3 m wide utilising mezzanine decks
Vehicle Deck Height	6.30 m

Tasmanian Industry News

Revolution Design

Revolution Design was formed in May 2002 following a re-structuring at Incat Tasmania. As a working group, the staff of Revolution design have been together for almost ten years, designing wave-piercing catamarans for Incat. Their collective experience in lightweight aluminium marine structures is evident in the range of Incat-built vessels. In particular, they created the 96 m wave-piercer design, which became the only fast ferry in the world able to carry its own weight in payload.

This milestone was achieved through a careful appraisal of the vessel requirements, review of design and full-scale data from previous vessels, optimisation of powering of the ship and our rigorous approach to design of the structure. Revolution Design now apply the same innovative approach to assist a range of clients to achieve the best solution to their respective design problems in high-speed transport and lightweight structures. Recent projects include design of shore facilities, loading ramps, lightweight structures for work boats and high-speed vessel conversions for military use.

The latest conversion task carried out by Revolution Design is USAV TSV-1X *Spearhead.* This vessel has successfully operated in theatre during the recent Iraq conflict and will be returning to Hobart for fitting a cargo-handling system which has been jointly designed by Revolution Design and Boeing.

Revolution Design has successfully completed the design of the conversion of HSV-2 *Swift* to US Navy requirements, including helicopter flight deck and refueling systems.

A military configuration of Incat's Evolution One12 SeaFrame, designed by Revolution Design
(Image courtesy Incat)

Revolution Design's client base is gradually expanding to include companies such as P&O, Liferaft Systems Australia, CSIRO, Taylor Bros, Daeagosik and Bollinger/Incat. Services offered include design of high-speed vessels, marine drafting services, conceptual design, route feasibility studies and structural design, monitoring and life assessment

Gregor Macfarlane

Queensland Industry News

It would seem that Queensland is living up to its name as the "boatbuilding state" with most activity in the south-east.

In the Brisbane area, Aluminium Marine is building a 23 m catamaran passenger ferry, with a design speed of 28 kn carrying up to 160 passengers. The vessel has been designed by Stephen & Gravlev Pty Ltd.

At Brisbane Ship Constructions work is continuing on three 30 m river passenger ferries for export. These are an "in-house" high-speed low-wash design.

Brisbane Shipworks are still progressing the outfitting of a 44 m luxury yacht, which is due for launching in September. Pictures of the vessel under construction are available at www.brisbaneshipworks.com.

Commercial Marine Consulting Services have supplied the design of a 28 m passenger ferry which has been built in Hong Kong. The design is to Lloyds Rules and the vessel can carry 231 passengers at a cruise speed of 25 kn.

South Pacific Marine are progressing the construction of their two 47 m car ferries. These vessels have a cargo deadweight of 140 t and a service speed of 15 kn. The construction and outfitting of the aluminium superstructure has been subcontracted to Southern Hemisphere Shipyards. Southern Hemisphere Shipyards have delivered three 16 m oilrig crew boats for Indonesia. Also under construction are two 12 m catamaran vessels, comprising a "bay cruiser" version and a dive/fishing charter version.

Several Gold Coast boat builders have recently launched a number of brand-new models to the public. Sunrunner Sport Cruisers carried out sea trials of the new 4800 Sunrunner with impressive results. Fitted with twin 474 kW engines the boat exhibited good handling characteristics and reached a maximum speed of 35 kn. The in-house design team has been assisted by Oceanic Yacht Design to ensure the structure complies with survey standards. The vessel's first public appearance was at the Sydney Boat Show.

The new Southern Cross 46, built by Azzura Yachts, is designed and fitted out as a serious game fishing boat. The vessel has a speed of 33 kn with twin 474 kW QSM11s, with a fuel capacity of 3 300 L and fresh water capacity of 600 L plus a water maker. The boat is destined for Lae in Papua New Guinea. Azzura Yachts are currently also building a Scott Jutson 18.3 m sailing yacht. Designed as a cruising yacht the boat is of core cell construction and features a raising keel. Previous vessels built by the Gold Coast City Marina-based company are performing well on the world stage. The18.3 m racing yacht *Wild Oats* has just won the IRC class at the Admirals Cup, while Maritimo's Class 1 offshore power boat is currently coming third in the world championship standings.

The Riviera Group is very busy at the moment with a number of new projects in the research and development pipeline. One of these projects, the new Riviera 51, made its grand debut at the Sydney Boat Show.

Things seem very quiet in the north of the state at present, with very little additional activity over and above that reported in the last issue of *The ANA.*

Brian Robson

New Sydney to Tasmania Ferry Service

When *Spirit of Tasmania I* and *II* commenced service on Bass Strait between Port Melbourne and Devonport on 1 September 2002, much was said about the exciting opportunities they created to travel to Tasmania by sea.

Now that Spirit of Tasmania has announced it will operate a regular passenger and passenger vehicle service between New South Wales and Tasmania, those opportunities have been significantly enhanced.

National Manager Passenger Sales and Marketing, Melindy Green, said the decision to operate the vessel was made after extensive research revealed a New South Wales–Tasmania service was regarded as "overwhelmingly appealing".

"The research found that such a service would result in an additional 51 000 holiday visitors to Tasmania annually," she said.

Ms Green said the Sydney to Devonport journey would take the new *Spirit of Tasmania III* approximately 20½ hours to complete.

The vessel will depart Sydney on Tuesdays, Fridays and Sundays, and Devonport on Mondays, Thursdays and Saturdays at 3 pm, arriving at 11.30 am the following day.

Spirit of Tasmania III, the Attica Enterprise-owned *Superfast II*, was constructed in Germany in 1995.

The vessel, 173.7 m long and capable of speeds of 26 kn, can transport up to 1400 passengers and features 2 135 lane metres for the transportation of passenger vehicles and freight.

The vessel currently operates a passenger, passenger vehicle and freight service between Patras and Igoumenitsa in Greece and Bari in Italy.

As is the case with *Spirit of Tasmania I* and *II*, the new *Spirit* will offer a variety of accommodation options, including two-three- and four-berth cabins and hostel accommodation for the budget-conscious traveller.

Ship facilities will include a restaurant, bars (internal and external) and coffee shop, Tasmania information kiosk, poker machine room, children's playroom, and a reading/games room.

The vessel is expected to arrive in Australia in early October and commence service on 15 January 2004.

Spirit of Tasmania I alongside in Melbourne
(Photo courtesy Peter Clark)

New South Wales Industry News

New Design

Incat Designs is designing a 58 m catamaran ferry to operate on Moreton Bay, Qld. The vessel is being built by NQEA Australia for Hawkins Ferries Pty Ltd, to replace their existing steel barge, designed by Incat nearly twenty years ago. Powered by four Caterpillar 3412 main engines, the vessel will achieve an operating speed in excess of 16 knots when fully loaded. The accommodation decks can carry 413 passengers, whilst the vehicle deck can carry 49 4WD passenger vehicles, or a mixed load of 4WDs and the operator's own larger 6WD trucks. A major aspect of the vehicle deck arrangement is its pillarless design. This offers a 12 m wide structure-free vehicle parking area, enabling greater flexibility of payloads.

Structurally, the vessel is unique in combining elements of traditional steel landing barges with the modern day technology of aluminium catamaran design. The vessel's hulls are constructed of steel, as is the vehicle deck side and cross bracing. The superstructure is constructed of aluminium.

Operationally, the vessel is distinguished by its ability to land on the beach, with a hydraulically-operated bow ramp allowing all vehicles, including heavy freight trucks, to unload directly onto the beach. This avoids the need for infrastructure on Moreton Island, a sand island known for its unique environment.

An aluminium superstructure spans the vehicle deck, with access via four staircases. The expansive main passenger cabin accommodates 290 inside on the main deck and 60 outside on the upper deck, with all seats being supplied by Beurteaux. The main deck features a generous central bar, toilet facilities and children's play area. There are also forward-facing individual lounge seats allowing passengers a panoramic outlook forward. In addition to the undercover exterior seating, the upper deck features accommodation for the captain, including shower and toilet. There are also external bridge wings, which allow good visibility over the vessel side for landing and berthing. Standing passengers are catered for on both decks, taking the total passenger capacity to 413.

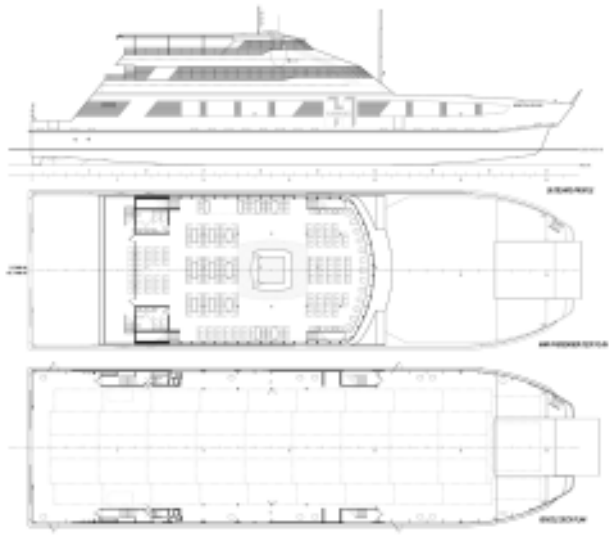
The vessel will operate on a 24 n mile route from the operator's depot in Lytton, Brisbane, to Moreton Island. It will operate 7 days per week. In peak seasons, such as Christmas and Easter, the operator will keep the vessel running 24 hours per day. Hawkins Ferries is constructing a new terminal at Lytton, which will be able to receive the vessel bow-in, although it will mostly berth stern-to. This complements the Moreton Island bow loading, giving passengers the ease of "in-line" roll-on/roll-off function. Combined with the pillarless design, the vessel will be extremely efficient to load and unload, reducing turn-around times considerably.

This project re-establishes ties between Incat Designs and NQEA Australia, an alliance that in the early 1980s re-defined the passenger vessel industry in Australia by pioneering the fast catamaran ferry, particularly on the Great Barrier Reef.

Principal particulars are as follows:

Length OA (ex sponsons)	57.6 m
Length WL	53.4 m
Beam OA (ex sponsons)	16.0 m
Beam demihull	5.0 m
Draft (max. dwt)	1.75 m (approx)
Deadweight (max.)	250 t
Passengers	
Tier 1 internal	313 (290 seated)
Tier 2 external	100 (60 seated)
Total	413 (350 seated)
Vehicles	
4WD vehicles	49
or	
6WD trucks	10
4WD vehicles	10
Main engines	4 x Caterpillar 3412E each 537 kw @ 1800 rpm
Gearboxes	4 x Twin Disc MG5202SC
Propellers	4 x Veem 4 bladed
Speed (max dwt 85% MCR)	16 kn

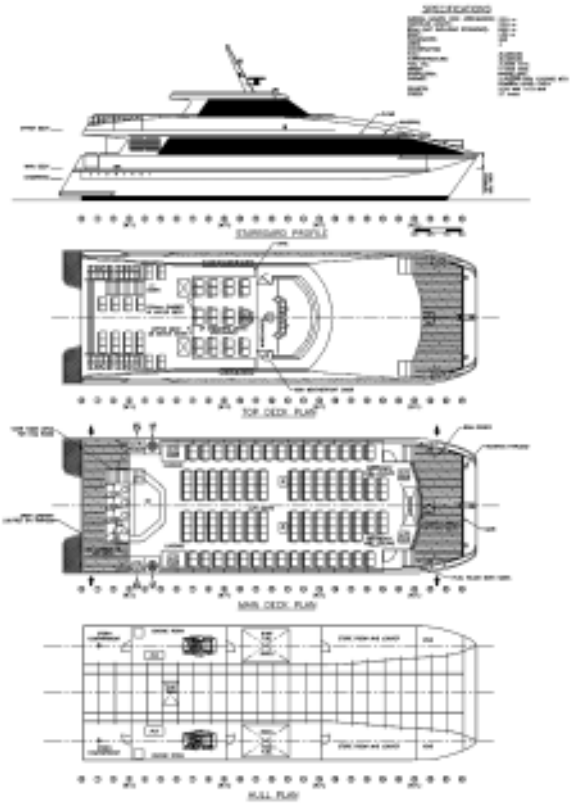
Construction has commenced and the vessel is due to enter service by March 2004.



General Arrangement of Incat's 58 m Ro/Pax Ferry
(Drawing courtesy Incat Designs)

Bow Quarter of Incat's 58 m Ro/Pax Ferry
(Image courtesy Incat Designs)

Crowther Design has been commissioned to design a new vessel for construction at Asian Marine Services (ASIMAR), Thailand. It is the second vessel from Crowther and ASIMAR ordered by operator, Koh Nangyuan Dive Resort. The vessel is to be of aluminium construction, 25 m length OA, and is to be powered by twin MTU 12V 2000 diesels. Sprint speed will be at least 30 knots. Capacity is 200 passengers with a VIP lounge for 24 on the upper deck and 176 on the main deck. The vessel is similar to the Crowther-RDM vessel *Marana*, apart from stern boarding and foredeck access via forward doors. Operation will be for passenger transit from the Thai mainland to Nangyuan Island in the Gulf of Thailand.



General Arrangement of Crowther Design's Vessel for Thailand
(Drawing courtesy Crowther Design)

Crowther Design's *Marana*
(Photo courtesy Crowther Design)

New Construction

North West Bay Ships has signed a contract for the supply of two catamaran ferries for the Department of Marine and Ports Services, Bermuda. NWBS (Sydney office) won the tender from an international field after being short listed with

four other yards from the USA, UK, New Zealand and Bermuda.

The 23 m vessels were designed by Teknicraft New Zealand, and feature asymmetrical hulls and a lifting foil. Smaller in size than the existing fleet (comprising 23 kn catamarans and 12 kn monohulls), the new cats have the same internal seating capacity and travel at 34 kn at 85% MCR. More importantly, the new design has a draft only 50% of that of the existing fleet, enabling services to be extended to new commuter and tourist destinations.

Principal particulars of the vessels are:

Length OA	23.3 m
Beam	7.8 m
Draft	0.9 m
Passengers	177
Crew	3
Speed	35 kn
Class	Lloyds ✠100A1 SSC Passenger Catamaran HSC G2 Bermuda Service Machinery LMC
Machinery	4 x MTU 8V2000 each 525 kW @ 2100 rpm 4 x Hamilton HJ362 waterjets

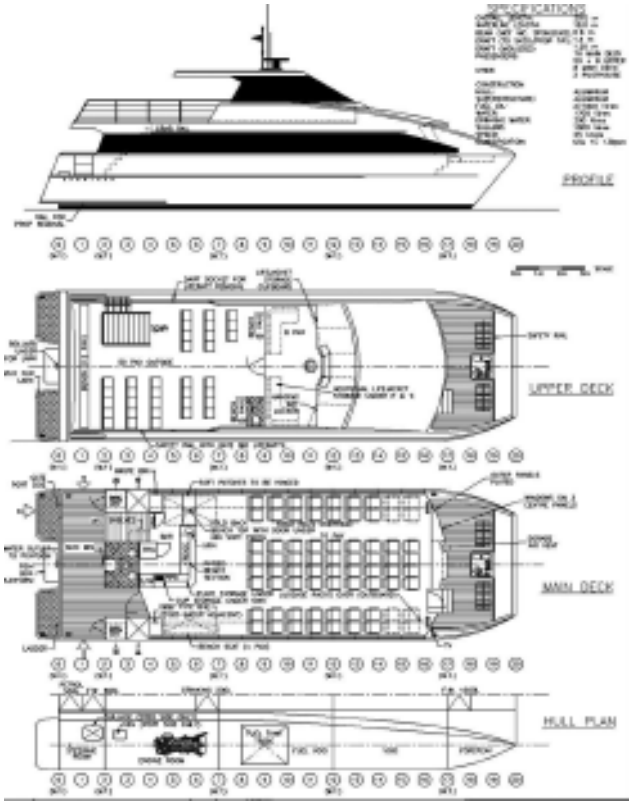
The vessels will be built in Hobart. This contract brings the number of vessels currently under fabrication at NWBS to four. The new vessels will be built alongside the NWBS 60 m luxury trimaran motor yacht for an international client and a 34 m sightseeing catamaran for Sydney Harbour.

A 20 m passenger catamaran, *Spirit of 1770*, to a design by Crowther Design has recently been completed by Eagle Farm Marine in Brisbane. The vessel will be operated by Captain Cook Great Barrier Reef Cruises which is based in the town of Seventeen Seventy, Qld. The vessel has been constructed to meet the increasing tourist demand in the small historic town. The vessel will make day trips to the beautiful Lady Musgrave Island, with the journey taking just over one hour. The company has also built a 45 m pontoon at the island to accommodate passengers at the reef. Activities include scuba diving, snorkelling, reef fishing and coral viewing through a glass-bottomed boat. The vessel features onboard fuel tanks which are used for refuelling the reef fishing vessel and the glass-bottomed boat which stay at the offshore platform.

Principal particulars of the vessel are:

Length OA	20.0 m
Length WL	18.0 m
Beam	6.60 m
Draft (hull)	1.20 m
Passengers	98 (main deck) 54 (upper deck) 8 (pilot house)
Crew	2 (pilothouse)
Fuel capacity	3000 L
FW capacity	1700 L
Deadweight	17.0 t
Engines	2 x Caterpillar 3406E 447 kW @ 2100 rpm
Gearboxes	2 x Twin Disc MG5114
Speed	26 kn
Survey	USL Code Class 1C 139 Pax
Material	Aluminium

The vessel required a low draft to operate across the shallow entrance to the town of Seventeen Seventy. A propeller draft of 1.40 m was achieved with propeller tunnels. For the vessel's size it has a high passenger capacity which helps to maximise the return for the operator.



General Arrangement of *Spirit of 1770*
(Drawing courtesy Crowther Design)

Crowther Design's *Spirit of 1770*
(Photo courtesy Crowther Design)

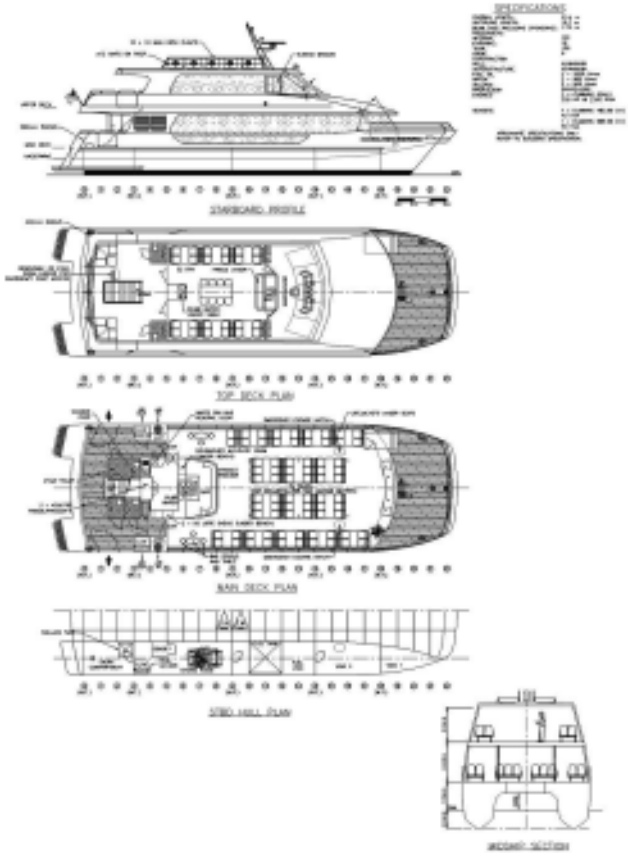
Richardson Devine Marine has recently delivered another Crowther Design vessel, *Sea Melbourne*, to Port Phillip. The vessel will be operated by Cruise Victoria. The company is located in Melbourne, Vic. The vessel will cruise the Yarra River and Port Phillip Bay, Melbourne's major waterways. She will take passengers to bay areas such as Geelong, Queenscliffe, Portsea, Sorrento and Frankston.

The vessel is primarily for charter and can cater for small groups or large (up to 150 passengers). The operators are targeting weddings, corporate functions, tourists, luncheons and parties. *Sea Melbourne* is fully air conditioned and heated in all areas. Facilities include wheelchair access with other disabled amenities.

Principal particulars of the vessel are:

Length OA	23.4 m
Length WL	19.7 m
Beam	7.75 m
Draft (prop)	1.45 m
Draft (hull)	1.00 m
Passengers	150 (132 internal, 18 external)
Crew	8
Fuel capacity	4000 L
FW capacity	1920 L
Deadweight	17.0 t
Engines	2 x Cummins QSM11 each 400 kW @ 2300 rpm
Gearboxes	2 x ZF350 RR 2.63:1
Speed	25 kn
Survey	DNV 1C
Material	Aluminium

Sea Melbourne is the third vessel designed by Crowther Design for Melbourne waters in recent years, together with *George Bass* and *Mathew Flinders*.



General Arrangement of *Sea Melbourne*
(Drawing courtesy Crowther Design)

Around and About

The Australian Heritage Fleet's magnificently-restored *James Craig* has won the World Ship Trusts's prestigious Maritime Heritage Award. This award recognises the outstanding thirty-year effort which went into preserving the hull and the research that went into, and the reconstruction of, the rest. Previous recipients of the award include *Mary Rose, Great Britain*, and *Cutty Sark* (UK), *Vasa* (Sweden) and *Constitution* (USA).

Phil Helmore

Sea Melbourne Stern Quarter
(Photo courtesy Crowther Design)

Sea Melbourne Bow Quarter
(Photo courtesy Crowther Design)

End for *Stalwart*

On 19 February 2003 a ship named *Tara II* arrived at the shipbreakers at Alang in India. This last voyage ended the life of the escort maintenance ship launched at Cockatoo Island in Sydney on 7 October 1966 as HMAS *Stalwart*. Completed on 8 February 1968, the Australian-designed ship, later designated destroyer tender, was intended to support destroyers and frigates at locations away from major ports. The ship was fitted with a wide range of workshops and sufficient power to supply to ships alongside. A large and comfortable ship, *Stalwart* served at times as flagship of the RAN, but spent most of her life secured to a buoy east of Garden Island in Sydney, where she became known as 'Building 215', after her pennant number.

Stalwart was laid off in 1990 and sold to Marlines S.A., a Greek shipping company providing ferry services in the Mediterranean, and renamed *Her Majesty M*. It is said that the new owners could hardly believe that her main engines had been barely run-in! She was renamed *Tara II* in 1999.

Her Majesty M alongside Garden Island in Sydney in May 1990 shortly before sailing for Greece
(Photograph John Jeremy)

Tricolor Salvage

On 14 December 2002 the Wallenius Wilhelmsen vehicle carrier *Tricolor* collided with the Bahamian container ship *Kariba* some 20 n miles north of the French Coast in the English Channel. *Tricolor* sank within 30 minutes of the collision, about half way between the Belgian port of Zebrugge and Dover.

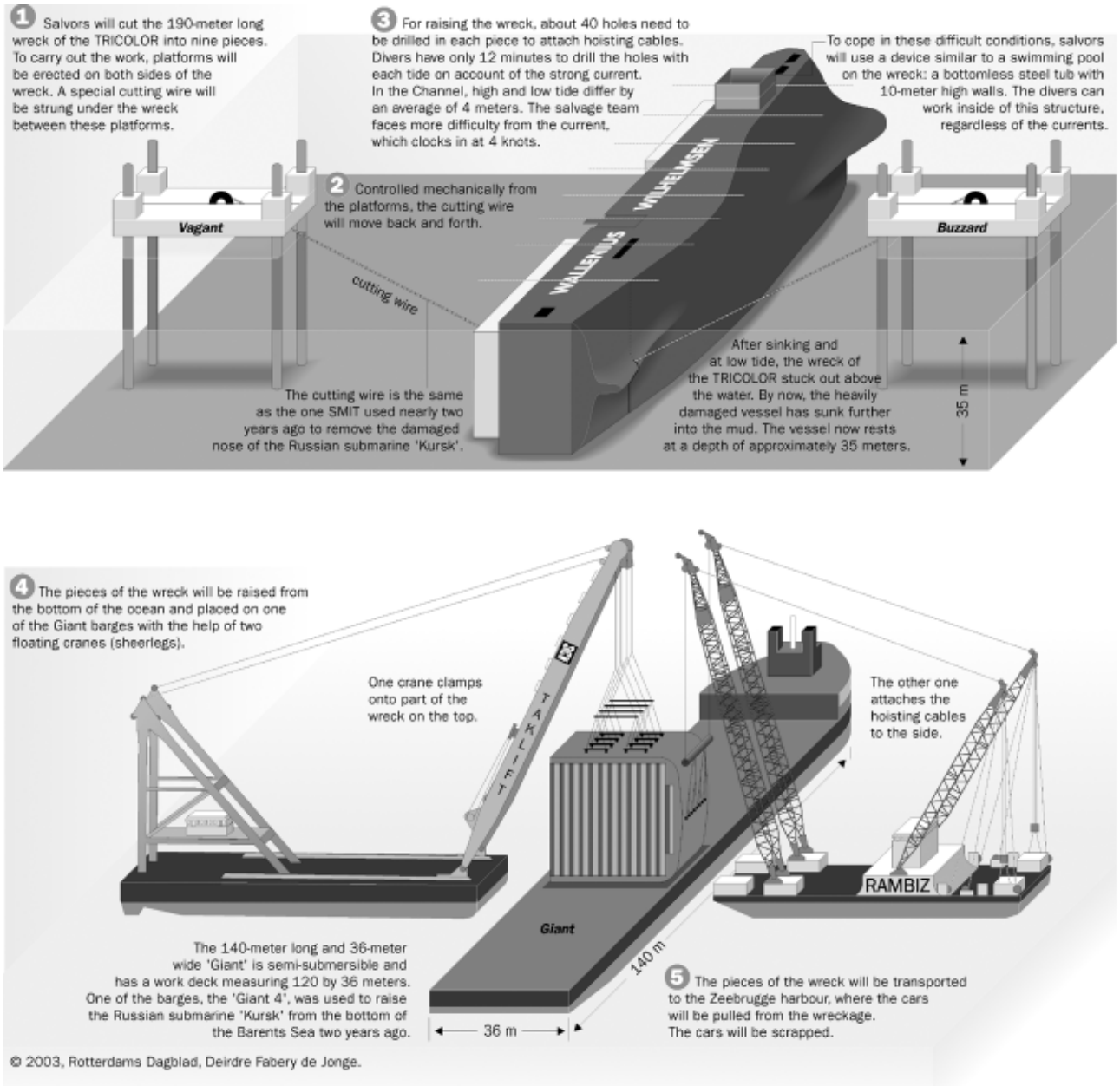
Tricolor was a single-screw PCTC (Pure Car Truck Carrier) of 49 792 grt with a length overall of 190 m. Owned by the Capital Bank of Scotland, the ship was on bare-boat charter to Wilh. Wilhelmsen and carried a cargo of 2 871 new cars and 77 units of ro-ro cargo.

A wreck buoy was installed immediately, and one French Government ship and a UK ship were deployed at the site. Despite these actions and the broadcast of navigational warnings, two days after the sinking, the unloaded German cargo ship *Nicola* hit the wreck, but was rescued by two tugs the same day. There were further near misses on 17 December and an enhanced system of buoys, including one with a radio beacon, was laid 600 m around the wreck. Shortly before Christmas, oil recovery from *Tricolor* began and the ship was declared a total loss. The French authorities issued a wreck-removal order on Christmas Eve.

Good progress was made with oil removal, but despite continued warnings to shipping, on Wednesday 1 January 2003 the wreck was struck again by the 77 000 t Turkish tanker *Vicky* steaming at speed. *Vicky* was able to pull off the wreck under her own power, but there was some escape of oil from the tanker. *Tricolor's* owners were asked to maintain a crane barge on the site continuously. Following this incident an additional buoy was laid and the number of ships on-site increased to one French naval vessel with two dedicated civilian guard vessels chartered by the owners.

Heavy weather in the Channel during January 2003 took its toll on salvage efforts, delaying oil recovery and survey work by divers. An anchor-handling tug collided with the wreck causing further damage. By February, as plans were developed for the recovery of the wreck during the summer, the wreck was no longer visible above the surface, having sunk further into the seabed.

Diagram of salvage operations (below)
(Image from www.tricolorsalvage.com)

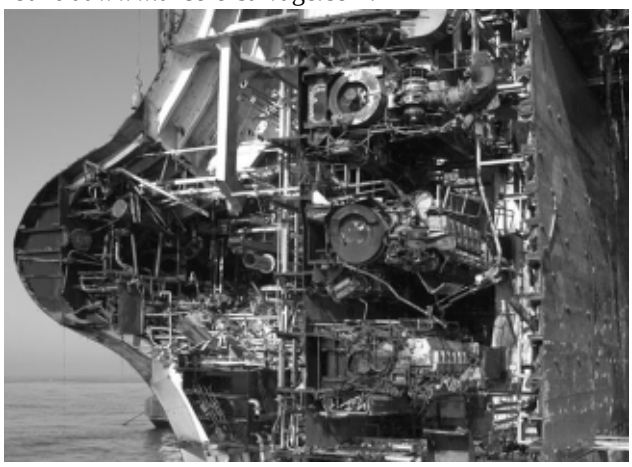


A contract for the recovery of the wreck of *Tricolor* was placed with Combinatie Berging Tricolor (CBT) a consortium of SMIT Salvage B.V., Scaldis Salvage & Marine Contractors N.V., URS Salvage & Maritime Contracting N.V. and Multraship Salvage B.V. It is one of the most ambitious ship wreck recovery operations ever attempted, and draws upon the techniques developed for, and the experience gained in, the recovery of the wreck of the Russian submarine *Kursk*.

The same cutting wire as was used to separate *Kursk* from her damaged bow section is being used to cut *Tricolor* into nine sections. The wire is controlled from two jack-up platforms on each side of the wreck. Severed sections are then lifted to the surface by large floating cranes and placed on the deck of a semi-submersible heavy-lift ship *Giant 4* for transport to Zebrugge harbour. The sections and the cargo will be scrapped.

The first 3 000 t section of the wreck was successfully lifted and placed on *Giant 4* on 3 August 2003. The second section was cut free, after some 52 hours of cutting, early on the morning of 11 August. This cut was particularly difficult as it required the sawing wire to slice through the engine room. The section was expected to be lifted within a few days, weather permitting.

More details of this remarkable salvage operation can be found at www.tricolorsalvage.com.



The first salvaged section of *Tricolor*, a 3 000 t stern section, emerging from the waters of the English Channel in perfect weather conditions for salvage work
(Photo CBT)

THE INTERNET

Australia Wins the Admiral's Cup

The Admiral's Cup is an international sailing team event organised by the Royal Ocean Racing Club in association with the Royal Yacht Squadron, and sailed from Cowes on the Isle of Wight, UK. Teams for 2003 consisted of two yachts, one an IMS600 class and one an IRC (Endorsed) class with a TCC of between 1.280 and 1.600 and a displacement-length ratio less than 120, length OA less than 15.15 m and hull factor greater than 9.9. There is a series of nine races, varying over short coastal courses to longer offshore courses.

Eight nations challenged in 2003, and Australia's challenge was via the Royal Prince Alfred Yacht Club, with Bob Oatley's *Wild Oats* (IRC Endorsed) and Colin O'Neil's *Aftershock* (IMS600).

The series of nine races turned out to be almost a two-team race from the start, between Spain's Real Club Nautico de Sangenjo, and the Australians, with the Spanish going into the final race with a one point lead. However, Bob Oatley's *Wild Oats* stormed home to win the final race, and snatched the trophy from the Spanish team.

Australia has won the Admiral's Cup twice before: in 1967 with *Mercedes III*, *Balandra* and *Caprice of Huon* wining from twelve nations, and in 1979 with *Police Car*, *Impetuous* and *Ragamuffin* winning from nineteen nations, so *Wild Oats* and *Aftershock* join some distinguished company.

Full details may be found on the website www.rorc.org/admiralscup.

Jules Verne Trophy Attempt

American skipper Steve Fossett announced in July that he is targeting the biggest record in sailing — the Jules Verne round-the-world record — the absolute record for the fastest boat around the planet, for January 2004, at the helm of his 38 m maxi-catamaran.

Currently holder of 10 of the 13 fastest world-record passages in sailing (as certified by the World Sailing Speed Record Council), Fossett and his crew made sailing history in October 2001, setting a new TransAtlantic record of 4 days 17 hours and shattering the previous record by over 43 hours. He has twice set the 24-hour record (in 1999 and 2001), signifying the world's fastest sailboat.

"We are going. I regard the round-the-world as the most important of all sailing records and it's the one we have never held. The time has come to get committed. I aspire to join the list of the great Jules Verne record skippers: Bruno Peyron, Olivier de Kersauson, Peter Blake and Robin Knox-Johnston," said Fossett.

Cheyenne is the new name planned for his vessel, the former *PlayStation*. The catamaran is undergoing a refit in Norfolk, Virginia, USA. An assault on the 24-hour record will be made during October 2003, with the goal of logging the first 700 n mile day. The current record is 694.78 n miles by *Maiden II*, set in June 2002. The round-the-world crew will be named in September. Final preparations will be made in southern Europe during November and December.

The Trophée Jules Verne, with the initial magical round the world target of 80 days, was established in 1992, with a start/finish line between Ushant in France and Lizard Point in Cornwall, UK. Over the past eleven years there have been thirteen attempts to set this record, with just four successful. The current record was set by Bruno Peyron (France) and crew aboard the 33.5 m catamaran *Orange* in 2002 at 64 days 8 hours, 37 minutes, 24 seconds.

Further information may be found on the website www.fossettchallenge.com.

New Edition of SDC

The Society of Naval Architects and Marine Engineers has announced the release of the third edition of its text, *Ship Design and Construction*, edited by Thomas Lamb, Professor of Naval Architecture at the University of Michigan. The new two-volume edition covers all practical aspects of design and construction of ships of all types. The material is all new and up-to-date, with fifty-five chapters by authors of international repute. Newcomers and those familiar with the previous editions alike will be pleased with the breadth and depth of the content. This book is far more than a textbook for students: it is a professional reference without parallel for designers, builders, owners, and operators. Access the website for a list of chapter headings.

Orders are being taken now for the two-volume set, with the first volume expected to be available in September. For orders placed through 1 September 2003, the two-volume set is priced at US$200 list, US$160 for members, plus shipping; for orders placed after 1 September, the prices are US$260 list, and US$200 for members, plus shipping. The student price is US$150, plus shipping. Order on-line at www.sname.org/publications_sale.htm or contact Claudio Pujols at cpujols@sname.org.

Phil Helmore

Technical Note: Correction to Fung and Liebmann's FAST'95 Paper

Background

Fung and Liebmann (1995) published a numerical method for predicting the resistance of fast transom-stern craft in the early design stage. It was quickly ascertained that there were errors in the original publication, as the quoted results for an example calculation could not be reproduced.

Following correspondence with the authors, Peacock et al. (1997 and 1999) published two reports which corrected the errors for naval architects in Australia.

However, as a result of recent programming, it has come to light that the version of the correction published in *The ANA* (Peacock et al. 1999) also contained a different error.

Correction

The equation published by Fung and Liebmann (1995) for their parameter lambda (λ) was:

$$\lambda = a_1 C_P + a_2 \Delta/(0.01 L_{WL})^3$$

where the symbols have their usual meanings.

The corrected equation published by Peacock et al. (1999) was:

$$\lambda = a_1 C_P + 0.034977 a_2 C_P \Delta/(0.01 L_{WL})^3$$

In fact, the C_P appearing in the second term is superfluous and should be omitted, so that the correct equation for lambda is:

$$\lambda = a_1 C_P + 0.034977 a_2 \Delta/(0.01 L_{WL})^3$$

All other equations given by Fung and Liebmann are correct (noting that their LN means ln (i.e. the natural logarithm of).

Further Details

The version of the correction published by Peacock et al. (1997) is correct, and their programming and results published in both reports are correct.

It should be noted that, although Fung and Liebmann's example uses imperial units throughout, they have used the international nautical mile of 1852 m in lieu of the imperial nautical mile of 6080 ft for the determination of speed. This has a surprising effect on the results due to the combination of two factors:

(a) the appearance of Fn^2 and Fn^e (where $e = -1.93$) in the parameter x_2, and
(b) the appearance of v^2 in the expression for total resistance,

all of which depend on the nautical mile used. If the international nautical mile is used, then results for C_R and R_T agree with Fung and Liebmann's example to about four significant figures, but if the imperial nautical mile is used, then the results agree to only three significant figures. Practically, this is of little moment, but it makes a real difference when you are looking for errors in programming.

References

Fung, S.C. and Liebmann, L. (1995), Revised Speed-Dependent Powering Predictions for High-Speed Transom Stern Hullforms, *Proc. FAST'95*, Lübeck-Travemünde, Germany.
Peacock, D., Smith, W.F. and Pal, P.K. (1997), Correction to the Published Resistance Methods of Fung and Liebmann, AME CRC Internal Report IR 2/97.
Peacock, D., Smith, W.F. and Pal, P.K. (1999), Typographical Corrections for Three Recently-published Regression-based Resistance Prediction Methods, *The Australian Naval Architect*, v.3 n.4, November.

Phil Helmore

Queen's Birthday Honours

Eagle-eyed members will have been pleased to note the following in the Queen's Birthday honours lists:

- Captain Kenneth Hugh Ross, Member (AM) in the General Division, for service to the Australian maritime industry, particularly through the development of sectors including ship towage and salvage, pilotage and ship safety.
- Robert John Herd: Medal (OAM) in the General Division, for service to naval architecture and ship safety, and to the community through the Polly Woodside Maritime Museum.

Congratulations to both.

Bicentennial of Circumnavigation

On 9 June 1803, Mathew Flinders sailed back into Sydney Cove in his ship *Investigator* to complete the first circumnavigation, and the first complete map, of the Australian continent. On 9 June 2003 (the Queen's Birthday holiday), Sydney's Lord Mayor, Lucy Turnbull, hosted a reception on board MV *Sydney 2000* to mark the occasion of the 200th Anniversary of Flinders' accomplishment.

Meanwhile, the Tasmanian sail-training brigantine *Windeward Bound* has been retracing Flinders' route. She was built in Tasmania in 1995 totally by volunteers, and with the support of many sponsors, and is now operated by the Windeward Bound Trust. She has a length OA of 33 m, and is built from Tasmanian eucalypt, Huon Pine and oregon. Your scribe saw her in mid-July Eden where she was resting after a double crossing of Bass Strait (Melbourne to Devonport to Port Welshpool), close to voyage end. *Windeward Bound* sailed back into Sydney to complete her own circumnavigation on 24 July 2003. Details of the ship and her itinerary can be found on the website www.windbound.com.

Phil Helmore

KAZ Takes the Round-Australia Record

Owner/skipper David Pescud and his six crew members from Sailors with disAbilities have taken the round-Australia sailing record and, in so doing, have helped make the public aware that disabilities do not stop people from achieving their dreams.

They left Sydney on 25 May on their 16.5 m yacht, *KAZ*, designed by David Lyons, and circumnavigated Australia non-stop and unassisted. On 1 July they re-crossed the line off South Head, and wrote themselves into the world-record books with the fastest time recorded for a circumnavigation of Australia by a monohull yacht. They shattered the previous record of 43 d 19 h 29 min 55 s, set by Jeremy Pearce and Kanga Birtles in October 1999 on an 18.3 m yacht, finishing in 37 d 1 h 23 min 57 s, and lopping over six-and-a-half days off the previous best.

Out on the harbour to greet *KAZ*, John Messenger, Commodore of the Cruising Yacht Club of Australia (from where *KAZ* races), praised their efforts and presented each of the seven crew, David Pescud (severe dyslexia), Phil Thompson (arm amputee), Kim Jaggar (arm amputeee), Al Grundy (polio), Harald Mirlieb (deaf), Albert Lee (double leg amputee) and Brett Pearce (spina bifida) with individual commemorative plaques.

Afloat, August 2003

World Water Speed Record

Ken Warby's amazing boat *Spirit of Australia* — the fastest boat in the world for the last 25 years — has been given a prominent new position in the Australian National Maritime Museum: cantilevered above the ramp that leads to the museum's exhibition galleries. The jet-powered hydroplane is now clearly visible to visitors in the museum's entry foyer, and can be inspected more closely by visitors entering the Tasman Light.

Ken Warby set the world water speed record twice in *Spirit of Australia*, the second time averaging 511.11 km/h on Blowering Dam in southern NSW on 8 October 1978. This record has never been bettered and still stands. [*Despite several attempts and one death* — Ed.]

Ken, who now lives in the USA, attended a news conference at the museum on 26 April for the unveiling of the new *Spirit of Australia* display during the inaugural Speedboat Festival.

Mr Warby announced that the new boat he has built in the USA for a new assault on his own world record will be shipped to Australia later this year. He plans to have it on display at the Australian National Maritime Museum in October for the 25th Anniversary of setting the present world record in *Spirit*. He also announced that his son, David, will drive the new boat in its world record attempt, which he hopes will take place on Blowering Dam in 2004.

Signals, June–August 2003

Maxsurf Version 9.6 Released

Formation Design Systems has announced the release of Version 9.6 of its popular Maxsurf software for hull generation and associated calculations in various modules. This release focuses on a large number of improvements to Workshop including plate forming and assemblies of parts, the addition of sounding pipes in Hydromax, better management of markers in Maxsurf, the addition of two more resistance algorithms in Hullspeed, improved AutoCAD compatibility and a raft of other enhancements.

Workshop Version 8.5 of Maxsurf introduced the concept of assemblies to make it easier to manage designs with large numbers of surfaces. FDS in Version 9.6 has extended this concept to Workshop where grouping parts together in assemblies makes management of structure dramatically easier. Specific enhancements include plate forming (plate templates for doubly-curved plates, and pin jigs to support formed plates during attachment of interior structure), a user-defined coordinate system (for working on individual parts), and enhanced data exchange between Ship Constructor (from Albacore research, widely used in shipyards to create parts and manage ship construction) and AutoCAD.

Maxsurf Functions have been added to assist with the fitting of existingf hull shapes into Maxsurf, including background image display, genetic algorithm surface fitting and DXF background functions. Management of markers has now been enhanced to automatically sort markers, draw lines connecting markers on the same section and generate a Maxsurf grid based on the imported markers.

Hydromax Sounding pipes have been added. The default is vertical from highest to lowest points, but sloped or cranked pipes can easily be defined by adding points to the definition, and the user can now define the spacing of increments for tank soundings.

Hullspeed Two new algorithms have been added: Compton (*Trans. SNAME* 1991) for coastal patrol, training or recreational powerboat hullforms with transom sterns in the displacement and semi-planing regimes, and Fung (*Trans. SNAME* 1991) for larger displacement vessels with transom sterns.

Seakeeper New options have been added for the free sea surface by modelling regular or irregular waves. Once a surface has been calculated, a real-time movie of vessel and sea motions can be produced. The addition of a grid allows the sea surface to be more clearly visualised in the rendered view.

Maxsurf News, June 2003

LR Wins Type 45 Contract

Lloyd's Register has won the contract to provide classification services for the first six of the UK Royal Navy's Type 45 destroyer, all to be built under survey in accordance with Lloyd's Register's *Rules and Regulations for the Classification of Naval Ships*. The contract was signed on 2 July 2003 at the prime contractor BAE Systems' office in Bristol, UK, by Martin Robinson, Head of Procurement, Combat Systems, for BAE Systems and Dave Philip, Lloyd's Register's Type 45 Project Manager.

The vessels will be built in sections at the BAE Systems yard on the Clydeside and at the new Vosper Thornycroft facilities at Portsmouth, with final assembly and launch to take place at the BAE Systems Scotstoun yard. Lloyd's Register surveyors will work at all yards to ensure construction proceeds in accordance with the approved design. The first of the six vessels, HMS *Daring*, will be launched in September 2005 and delivered to the Royal Navy in September 2007. HMS *Daring* will be notable in that it will be the first Royal Navy front-line combatant vessel to be built to the requirements of Lloyd's Register's *Rules and Regulations for the Classification of Naval Ships*. The departure from the use of naval engineering standards reflects the changes which have been made in the Ministry of Defence's (MoD) procurement practices and its pursuit of SMART acquisition policy. It is also the first major project in the world for which this approach has been applied from the concept stage.

Vaughan Pomeroy, Director of Lloyd's Register's Naval Business, says: "Lloyd's Register has worked on the Type 45 project throughout the design phase and has already approved the design by carrying out an independent assessment against the requirements of the *Rules* for the classification of naval ships. This contract for survey during construction of the initial production batch of six ships will result in the ships meeting the requirements for classification.

"The adoption of Lloyd's Register's approach to naval ship classification by the prime contractor, BAE Systems, and the UK Ministry of Defence demonstrates that we have created a recognised set of standards for front line naval ships. This contract is highly valued by Lloyd's Register, and we look forward to working with BAE Systems and the supply chain to ensure that these ships satisfy the expectations of the Type 45 Integrated Project Team."

The Type 45 destroyer is the most recent example of the collaboration between Lloyd's Register and the MoD. Lloyd's Register is also preparing to publish its updated *Rules for Naval Ships* in July 2003. The *Rules* were first published in 1999 after eight years of development with significant support from the MoD, in particular its Defence Procurement Agency's Sea Technology Group, as well as many other British and overseas defence organisations.

The *Rules* provide a common technical standard for hull structure, machinery, electrical systems and statutory safety requirements in a form that can be applied to any size or type of naval vessel, from aircraft carriers to small patrol boats. With the Type 45 destroyer intended to remain in class for the duration of its service life, control of material state in line with design intent will be clearly visible without the cost penalties that 'unique to navy' standards impose.

LR *Press Release 26/03*, 3 July 2003

The US Navy's newest and most advanced submarine, *Virginia* (SSN 774) moved outdoors for the first time on 5 August 2003 in preparation for her naming on 16 August. (Photo courtesy Electric Boat)

EDUCATION NEWS

Australian Maritime College

Giles Thomas has recently joined the Australian Maritime College as a Naval Architecture Lecturer. For the last three years Giles has been working on a research project with the University of Tasmania, Incat Tasmania and Revolution Design investigating the wave slam response of large high-speed catamarans. The work focused on the loads imparted onto the vessels by severe slams using a combination of full-scale data and finite element analysis. The dynamic whipping response of the structure was also examined along with its influence on fatigue life. This work constituted Giles' PhD thesis which was submitted in June 2003. Giles brings to the AMC a wide range of skills and experience which will be utilised in both his lecturing and research work. Initially he will be teaching finite element analysis and segments of the ocean vehicle design course. He intends to conduct research work in a number of areas including slamming, ship motions and yacht technology.

AMC hosted *Showcasing AMC Research* at both its Newnham and Beauty Point campuses on 15 and 16 May during the Australian Innovation Festival. Research staff and higher-degree-by-research students presented a series of seminars to AMC staff, students and some members of the community. The event also provided an opportunity to showcase AMC's teaching, learning and research facilities at both campuses.

A workshop on hydrodynamics for high-speed craft was conducted at AMC over three days in late June. Prasanta Sahoo organised the workshop and presenters included Professor Volker Bertram from Ecole Nationale Superieure Des Ingenieurs Des Etudes et Techniques D'Armement (ENSIETA) in France, Professor Lawry Doctors from UNSW, Stan Gottschalk, Paul Brandner and Prasanta Sahoo. Attendees included a US representative from NAVSEA, a number of people from the Department of Defence, staff from NQEA in Cairns and a representative from DSTO.

Australian businessman and adventurer Dick Smith spent a couple of days at AMC to witness the conduct of some ship model tests in the Towing Tank. The tests were on a 1:16 scale model of a 32 m research vessel that Dick is considering getting built by Tenix Defence in Western Australia. In addition to spending time with staff at the towing tank, Dick had discussions with staff at other facilities including the cavitation tunnel, integrated marine simulator and model test basin.

The AMC has successfully completed Stage 1 of their launch into international maritime crew training for the super-yacht industry. In a world first, AMC has led the industry in becoming the first approved training provider for the Royal Yachting Association (RYA) of the UK here in Australia. The RYA with its close links with the Maritime Coastguard Agency (MCA) enables mariners to be certified as masters and skippers of commercial vessels up to 24 m (power and sail) for world-wide operations under their Yachtmaster certificate. The Stage 2 objectives, scheduled for completion by mid 2004, will see the AMC approved to deliver, train and certify mariners under the prestigious MCA "White Boat" classification which is the benchmark and backbone to the super-yacht industry. The MCA is the leading authority in standards and crew training for super yachts. The entry requirements for their qualifications are the RYA Yachtmaster for which the AMC can now immediately start training and certifying mariners.

On 4 and 5 August the UNSW third-year naval architect students made their annual visit to AMC for laboratory sessions with AMC staff in the towing tank, cavitation tunnel, model test basin, ship handling simulator and circulating water channel. The nine UNSW students also had a brief tour of AMC's vessels. As is usual during these visits, Professor Lawry Doctors gave a presentation to AMC students and staff as part of the joint AMC/Royal Institution of Naval Architects (Tasmanian Section) Seminar Series. This year the presentation was on the influence of viscosity on the wavemaking of a model catamaran. The talk was followed by a counter meal which provided an opportunity for students studying naval architecture from both UNSW and AMC to compare notes.

Australian Maritime Hydrodynamics Research Centre

The Australian Maritime Hydrodynamics Research Centre (AMHRC), based at AMC, has recently appointed Dr Jimin He as the Centre manager. In this role he is responsible to the Centre Board. In addition to day-to-day management of the establishment, enhancement and operation of AMHRC, the manager liaises with participating organisations to ensure adequate and timely access to AMC hydrodynamic testing facilities by all interested Australian users. He also directs the application of AMHRC funds in accordance with the budget and ensures that AMHRC meets the Commonwealth requirements. Jimin has over 15 year's engineering experience, working in industry and academia in Australia, and has published widely. He had focused on research organisation and management in recent years before assuming his role in AMHRC.

In addition to upgrades of experimental facilities, a high-performance computer (HPC) has recently been installed. The HPC is a 32 PC cluster designed specifically for computational fluid dynamics (CFD) to complement and enhance the experimental research program. The HPC forms part of collaboration between the Australian Maritime College (AMC), University of Tasmania (UTAS) and University of Cambridge (UCAM) in the United Kingdom. The hardware for the HPC has been developed in consultation with UCAM and will run the UCAM NEWT suite of CFD codes. AMC and UTAS (incorporating TPAC (Tasmanian Partnership for Advanced Computing)) have recently signed a software agreement with UCAM for access to the NEWT suite of codes and a formal collaborative research agreement between AMC, UTAS and UCAM is currently being finalised.

Dr Paul Brandner, and Dr Greg Walker from UTAS, recently travelled to France, Germany and the UK on business relating to the AMC Cavitation Tunnel and the AMHRC. Meetings were held with Yves Lecoffre, a French consultant, on aspects of the cavitation tunnel upgrade and a visit was made to the

Bassin d'Essais des Carenes near Paris. The Grand Tunnel Hydrodynamique was demonstrated and an inspection was made of specialised equipment including nuclei and degas systems and acoustic treatment. A similar visit was made to the Hamburg Ship Model Basin where considerable information was acquired on tunnel acoustic treatment. Finally a visit was made to the University of Cambridge to discuss collaboration including the AMHRC High Performance Computer and Cambridge's computational fluid dynamics software. An agreement was also drafted between AMC, UTAS and the University of Cambridge that included the possibility of researcher exchange and Australian and European grant opportunities.

Gregor Macfarlane

The University of New South Wales

Undergraduate News

The Anzac Ship Project Management Office was a generous host to our final-year students accompanied by lecturer Mr Phil Helmore, and to the AMC final-year students accompanied by lecturer Mr Gregor Macfarlane. This enabled them to see the launching of the ninth Anzac-class frigate, HMAS *Toowoomba*, at Tenix Defence Systems' construction facility at Williamstown. On Thursday 15 May, the day before the launching, Hull Systems Engineer Ms Sam Tait welcomed students from UNSW and AMC to the yard and made the Introduction to Safety presentation. She then invited Construction Engineering Manager, Mr Peter Goodin, to give a presentation on the construction, contract, logistics and other details. Ms Tait then made a presentation on the launching drawings, arrangements and calculations. Tenix's Dockmaster, Mr Sean Johnston, with Mr Steve Lohr and Mr Saeed Roshan-Zamir and Ms Tait then led them on a tour of inspection of the ways where preparations for launching were in progress, including the trigger release mechanism. Ms Tait then continued with a tour of the dry dock, the transporters, and the berths where HMAS *Parramatta* is nearing hand-over to the RAN, and HMAS *Ballarat* is mid-way through fit-out. After lunch, Ms Tait made a presentation on further launching details before returning to the launching ways to see a trial run of the champagne bottle and the complete trigger release. Ms Tait then led them on a tour of the Tenix construction facility, from cutting plate through to modules for Anzac 10 waiting to go onto the building berth.

The launch lady for HMAS *Toowoomba*, on Friday 16 May, was Ms Judy Blight, whose father, the late Lieutenant Commander Howard Goodwin, was the last commanding officer of the original vessel bearing this name, a Bathurst-class minesweeping corvette. Visiting dignitaries included the Chief of Navy, the Minister for Defence, the Minister for Industry, Tourism and Resources, and the Premier of Victoria. Music was provided by the Royal Australian Navy Band (Melbourne), and the Williamstown Children's Choir, formed especially for the occasion with singers from St Mary's Primary School, St Paul's College and Mount St Joseph's Girls' College. A number of officers and crew of the first HMAS *Toowoomba*, and other retired RAN personnel, were there for the occasion.

The first *Toowoomba* was with the RAN from 1947 till 1954 and Admiral Barrie, in his speech, assured the crowd that the latest *Toowoomba* would be with the RAN for much longer than that!

The launching of HMAS *Toowoomba* was textbook-smooth and a credit to all concerned. UNSW would like to thank Mr Richard Hallett for making the visit possible, and Mr Peter Goodin, Ms Sam Tait, Mr Sean Johnston, Mr Steve Lohr and Mr Saeed Roshan-Zamir for their parts in making our visit interesting, informative and entertaining.

HMAS *Toowoomba* on the ways prior to launch
(Photo Phil Helmore)

HMAS *Toowoomba* showing the zero-thrust propellers used for trialing the engines,
(Photo Phil Helmore)

Crews from UNSW and AMC sampling the Williamstown hospitality
(Photo courtesy Rachael Helmore)

Sydney Heritage Fleet provided access to their steam yacht *Lady Hopetoun* for the third-year students to conduct an inclining experiment at Rozelle Bay on 21 May. The students conducted the experiment with the guidance of lecturer Mr Phil Helmore. The day was perfect for an inclining, flat calm and with the wind at five knots from the west, and the students

made a good job of their first inclining. This time the boiler was undergoing maintenance and was therefore dry and minus firebars, and there are more *Ons* and *Offs* than usual. The theory of stability is fascinating, but seeing it in practice at an inclining makes it come *to life* for the students.

UNSW Year 3 students on board *Lady Hopetoun*
(Photo Phil Helmore)

At the graduation ceremony on 27 May, the following prizes were presented:

- The Royal Institution of Naval Architects (Australian Division) Prize and Medal for the best ship design project by a student in the final year to Rozetta Payne.
- The David Carment Memorial Prize and Medal for the best overall performance by a student in the final year to Nigel Lynch.

2003 Graduates with Prof. Lawry Doctors and Mr Phil Helmore
(Photo courtesy Helen Wortham)

Presentation of the David Carment Memorial Prize and Medal to Nigel Lynch
(Photo courtesy Tracie Barber)

Presentation of the RINA (Australian Division) Prize and Medal to Rozetta Payne
(Photo courtesy Wendy Payne)

Among the interesting undergraduate theses projects under way this year are the following:

- An investigation by Tony Sammel into the roll-damping characteristics of passive-fin stabilisers for fishing vessels. These have been shown to be more effective than paravane stabilisers, and Tony has tested models of a fin as fitted in the south-east trawl fishery and an improved foil-section fin in the wind tunnel. He is now modelling both using computational fluid dynamics.
- An investigation by Peter Holmes into the air and wind resistance characteristics of small vessels. He has tested a model of a monohull cruise vessel in the wind tunnel, and is now looking at a simplified method of predicting the air and wind resistance from the cross-section and profile characteristics.
- An investigation by Cengizhan Uluduz into the operational characteristics of free-fall lifeboats. He has tested a model of a free-fall lifeboat in the wind tunnel to determine the lift, drag and pitching-moment characteristics at various angles of attack, and is now analysing the optimum height and angle for release.

Post-graduate and Other News

Prof. Lawry Doctors attended the International Workshop on Hydrodynamics of High-speed Vessels held at the Australian Maritime College on 26 to 28 June 2003. Lawry, along with Dr-Ing. Habil. Volker Bertram from the École Nationale Supérieure d'Ingénieurs (ENSIETA) in France, were the principal presenters. Other presenters included Dr Stan Gottschalk, Dr Paul Brandner, and Dr Prasanta Sahoo, all from the Australian Maritime College. A report on the workshop appears below.

Phil Helmore

International Workshop on Hydrodynamics of High-Speed Vessels

Dr Prasanta Sahoo was the able organizer of this most successful workshop which was held at the Australian Maritime College on 26 to 28 June 2003. The topics that were covered included seakeeping, resistance, wave generation, propellers, waterjets, and foils. Theoretical, computational, and experimental techniques for understanding these aspects of high-speed vessels were all considered.

The principal presenters at the workshop were Dr-Ing. Habil. Volker Bertram, from the École Nationale Supérieure d'Ingénieurs (ENSIETA) in France, and Professor Lawry Doctors from The University of New South Wales. The former lecturer concentrated on computational methods and the latter lecturer concentrated on analytic methods. Both academics demonstrated that excellent and reliable predictions of the hydrodynamics of modern vessels could be made, and that these predictions could be used for the purpose of design.

The other lecturers were Dr Stan Gottschalk, Dr Paul Brandner, and Dr Sahoo, all from the Australian Maritime College.

The number of attendees was thirteen, which is most respectable considering the relatively small size of the hydrodynamic community in Australia. Interestingly, one attendee travelled from Virginia in the USA in order to participate. Such educational events should be organized on a more regular basis for the benefit of high-level naval architecture consultants in industry.

Lawry Doctors

INDUSTRY NEWS

On-line Research and Business Tool for Australian Defence Industry

Opportunities for Australian businesses in the defence industry are expected to improve significantly following the launch in July of a new on-line database and research and promotional tool designed to appropriately match suppliers and purchasers.

Industry Capability Network Limited (ICNL), formerly known as ISONET, has developed the Industry Capability Showcase (ICS) database to assist Australian firms gain access to national and international supply chains.

ICNL CEO, Nicholas Driver, said the ICS has been specially designed for Australian Industry and will ultimately become a comprehensive database of companies, with enhanced functionality.

"The on-line database will assist large and small contractors to flag their capabilities for millions of dollars in supply opportunities and nationally-significant projects across a range of industries," Mr Driver said.

"The showcase will provide on-line information about individual companies, their ability to meet specific project requirements and other procurement factors such as a supplier's accreditation, contact details, price, quality and experience," he said.

"Access to this information will be particularly attractive to international purchasers," Mr Driver said.

Registration on the ICS is free for Australian suppliers, under the Bronze membership, with the option to upgrade to Gold and Silver levels for greater benefits.

Formerly ISONET, ICNL was formed in 1995 to find competitive local sources to meet Australian and international procurement needs utilising the ICN Network.

The ICN Network has placed over $3.8 billion worth of orders with local Australian suppliers which may have otherwise been placed overseas.

ICN has since developed into a reputable and reliable source of knowledge for a range of industries and performs a significant role in creating jobs, increasing exports and reducing our foreign debt.

Companies seeking to find out more about the Industry Capability Showcase should visit www.icsonline.info or telephone (02) 6285 2033 to speak to an ICN representative.

Repeat Orders for Four Wärtsilä 64 Propulsion Systems

Wärtsilä Corporation received repeat orders in May for the Wärtsilä 64 which is the world's most powerful medium-speed diesel engine.

Four Wärtsilä 6L64 engines were ordered at the beginning of this year by the Polish shipbuilder Stocznia Szczecinska Nowa Sp.z o.o. as main engines for four 18,900 tdw multi-purpose vessels recently contracted by the Dutch shipowner Spliethoff Bevrachtningskantoor B.V.

These vessels are repeats of the ten S-class vessels delivered in 1999–2000 to the same owner. Four of these vessels were built by Stocznia Szczecinska in Poland, three by Mitsubishi Heavy Industries Ltd, and three by Tsuneishi Shipbuilding Co. Ltd in Japan. The latest four ships are expected to be delivered between April 2004 and April 2005.

The Wärtsilä 6L64 engines will each develop a maximum continuous power of 12 060 kW at 333 rpm. The engines will be built at Wärtsilä's Trieste factory in Italy.

The engine is coupled to the reduction gear through an elastic coupling without a clutch. For each vessel, Wärtsilä is also supplying a Lips controllable-pitch propeller together with the shafting and remote-control system, as well as a power take-off (PTO) generator.

The scope of supply from Wärtsilä includes ancillary equipment for fuel oil, lubricating oil, cooling water and starting air systems. The lubricating-oil and cooling-water pumps, oil cooler and filter are built on the engines.

The shipowner is operating 10 similar installations with similar Wärtsilä 6L64 machinery on which a total of more than 161 800 running hours have been accumulated. All engines are running according to an average load profile which is close to 85% MCR. The component experience is very good and cylinder liner, bearing and piston-ring expected lifetimes can be easily reached and even doubled (liners and bearings).

The Wärtsilä 64 engines are delivered with E.I.A.P.P. certificate as complying with the IMO NOx emission limit. Owing to the high engine flexibility (twin injection pump) there is the possibility to adjust the fuel injection timing according to engine load and run to a best efficiency profile when sailing at cruising speed, or according to best emission profile when operating in port or coastal areas.

The flexibility of the Wärtsilä 64 installation gives the

shipowner the possibility to run in the most severe conditions (all vessels are built to ice class) without an engine performance penalty.

The Wärtsilä 64 engine with its PTO alternator and reduction gear driving a controllable-pitch propeller is a dynamic installation that provides the shipowner with the following benefits:

- More space for cargo deadweight.
- Good manoeuvrability.
- Less cost for producing electricity.
- Optimum propeller rpm, i.e. improved efficiency.

Wärtsilä to Power Novel Propulsion Concept

Wärtsilä Corporation was awarded a contract in May by Mitsubishi Heavy Industries to supply eight Wärtsilä 12V46 medium-speed diesel engines for two new ferries ordered by Shin-Nihonkai Ferry of Osaka in Japan. The ferries are due for delivery from Mitsubishi's Nagasaki yard in mid 2004. They will employ a new propulsion concept known as CRP pod propulsion with a Combined Diesel-Electric and Diesel-Mechanical (CODED) machinery plant.

The new ferries will each have a single controllable-pitch propeller driven mechanically by two Wärtsilä engines, while an azimuthing-pod drive immediately aft of the main propeller will be electrically driven from two Wärtsilä-engined generating sets. The pod drive is in contra-rotation to the main propeller, thus giving contra-rotating propeller (CRP) pod propulsion.

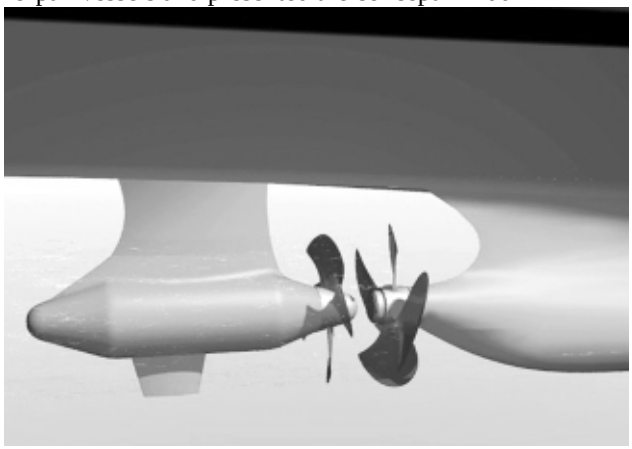
The ferries are designed for a trial speed of 31.5 kn. They measure 17 000 grt (Japanese domestic measurement) and have a length of 224.5 m.

The twin Wärtsilä 12V46C main engines used for mechanical drive of the main propeller have a combined output of 25.2 MW. The electrical power for the 17.6 MW azimuthing pod drive and the hotel load is supplied in each ferry by two similar Wärtsilä 12V46C engines in main generating sets and one smaller harbour generating set.

The CRP pod installation results in lower power demand than a conventional twin-shaft arrangement owing to the lower resistance of a single-skeg hullform and improved propulsion efficiency. The aft propeller takes advantage of the rotative energy left in the slipstream of the forward propeller when it turns in the opposite direction. The single-skeg hull also leads to a favourable wake field for the propellers.

The new CODED machinery with a CRP pod offers most of the benefits associated both with diesel-electric and diesel-mechanical machinery without their respective drawbacks. The result is a very competitive solution that provides outstanding technical and economical performance for fast ro-pax vessels.

Wärtsilä has been involved in the development of this new efficient propulsion machinery solution for fast monohull ro-pax vessels and presented the concept in 2001



A similar CRP arrangement for a fast RoPax vessel
(Wärtsilä Image)

An artist's concept of a possible design for the next class of aircraft carriers for the US Navy. The new class will be powered by a new nuclear propulsion plant that will require fewer operators, thereby lowering life-cycle costs, and will provide increased electrical power that will be available for the demands of developing technology. Smart sensors will assist in further reducing Navy watch-standing requirements and in automating damage control functions such as detecting fire and flooding situations. Flight-deck redesign and a transition to an advanced aircraft recovery system is expected to reduce crew workload, enhance safety and reduce the costs of operating and maintaining a carrier throughout its planned 50-year life cycle.

(US Navy image)

Modern Powerboat Design

Glance around almost any metropolitan vista, workplace or domestic environment in 2003 and you will see evidence of the effort made by industrial designers to improve the design and quality of the products we use for work and play.

The classic example which illustrates the power of design and style is the private car. Cars combine engineering design with ergonomics and styling, to give the car an emotive quality. It is the style which engages the buying public.

Increasingly this emphasis on style and quality design is visible in marine products, particularly powerboats of all sizes designed for the pleasure market. Some Australian manufacturers of these marine products recognise the importance of style and design, particularly when competing in the home and export markets with European and American boats.

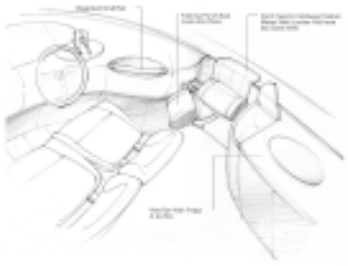
The general public is also aware of the role of ergonomics and user-interface design. What was previously an esoteric, semi-scientific study of the man-machine interface is now the topic of discussion wherever new products, be they boats, planes or trains, are used or discussed.

Manufacturers are turning to industrial design specialists like Sydney-based TDI (Transport Design International) in an effort to maximise the full impact of industrial design and styling.

Exterior styling for an InterCity double-deck train
(Image courtesy TDI)

TDI has completed an extensive range of commissions in Australia, Asia and Europe. The company has offices in Sydney and Warwickshire in the United Kingdom. Best known for the group's work with passenger rolling stock, the company has recently worked on a range of powerboats, using the same CAD technology, virtual modelling (including computer fly-throughs), and user interface or ergonomics design. In the case of the design and development of modern rolling-stock passenger vehicles, TDI caters for a large cross section of passenger needs from business commuters to families with young children, the elderly, disabled and partially sighted. These demands must be managed while creating a high-quality exterior style and interior ambience for the vehicle. The final result is intended to inspire

46 FOOT MUSTANG SPORTS TOP



CONCEPT SKETCH

SUB BUG

46 FOOT MUSTANG SUN BRIDGE

NSW SRA 4GT

Exterior styling for the NSW SRA fourth-generation train
(Image courtesy TDI)

Fourth-generation train CAD interior visualisation
(Image courtesy TDI)

confidence and admiration, expressing values such as efficiency, safety and prowess.

In the case of powerboats, the exterior styling is normally intended to give the impression of leading-edge technology, power, grace and high performance. A key factor in both rolling stock and marine design is the need to maximise the use of interior space to provide ergonomically-correct seating, efficient flow paths, driver desks and innovative interior design features for toilet areas and galleys.

Scott Allen, Design Manager at TDI, explains "Our work starts after the engineers have completed the basic structural envelope for a passenger vehicle and, in the case of a power boat, the naval architect has completed his hull design and the concept is ready for superstructure, styling and interior design. The techniques we use include full-size or scale foam models, mock ups of particular sections of the interior and computer-aided design renderings and virtual models to show marketing people how the final product could come together."

The company specialises in adding that special something, in the form of style, a compact interior layout, clever use of colour or innovative, unique features to make the product stand out. Australian designers in this industrial design area are well respected in international markets. Many of their products are world class. The designers themselves have often worked in Europe or the United States, honing their skills in the world of modern design. Nothing is left to chance, most new designs are researched by the design team through workshops with customers and users to perfect the features they offer in next year's model.

Further information can be obtained from John Brown, Design Director, TDI, email johnb@designresource.com.au, or Scott Allen, Design Manager, TDI, email sallen@designresource.com.au or telephone (02) 9906 5300.

Mustang 13.9 m sports cruiser styling (below)
(Image courtesy TDI)

Incat Ship Wins Award

Incat Australia has received the award for the *Most Significant New Build — Fast Ferry* at the biennial event for the ferry, fast ferry and cruise industry, The Cruise and Ferry Exhibition and Conference.

The award was presented in May to the builders Incat and owners Bollinger/Incat USA for the US Army Theatre Support Vessel TSV-1X *Spearhead* in front of around 800 industry professionals at a gala dinner at the Hilton London Metropole.

Shipping professionals crowned the 98 m *Spearhead* as the ship most deserving of the title amongst fierce competition from other nominees, including Austal Ships and EuroFerrys for *EuroFerrys Pacifica*, HDW and Superfast Ferries for the medium speed ships *Superfast IX* and *Superfast X* and Austal Ships and New World Fast Ferry for *New Ferry LXXXI*, *New Ferry LXXXII* and *New Ferry LXXXIII*.

Speaking from the shipyard in Hobart, Incat Australia Pty Ltd Managing Director Craig Clifford said "Incat to some extent were 'reigning champions' having also taken the *Most Significant New Build — Fast Ferry* award at the last Cruise & Ferry event in 2001 with the 96 m Evolution 10 *Benchijigua Express* for Fred. Olsen Lines, so this year's win was particularly pleasing."

BBC TV current affairs presenter John Humphrys announced the winner after judging by a panel including Trevor Blakeley, Chief Executive of the Royal Institution of Naval Architects; Michael Crye, President of the International Council of Cruise Lines and Len Roueche, CEO of IMTA-Interferry.

The award goes to the owner and builder of the vessel voted by the panel of judges to have made the most significant impact on the industry as a whole. This may be due to a combination of factors such as speed, capacity, range and size, design or other factors at the discretion of the judges.

In November 2002, when Incat delivered *Spearhead* for service with the US Army, expectations were high. As the Army's first Theatre Support vessel the ship would be utilised on missions to maximise its speed and flexibility, being required for both sustainment deliveries and the movement of Army pre-positioned stocks, and troop units.

Leaving Hobart soon after handover *Spearhead* headed directly to the Persian Gulf to be part of the major military build-up in the region.

By May she had sailed some 30 000 n miles and her operations had covered most of the western part of the CENTCOM Theatre from Jordan to Kuwait. The craft had carried troops and hauled over 1500 pieces of military cargo, just about everything in the inventory except for tracked vehicles.

Speaking of the award while en route back to Australia an elated Incat Chairman Robert Clifford said, "The US Army is to be warmly congratulated for having the foresight and vision to acquire what leading professionals in the shipping industry recognise as a superior high speed ship."

"It is thanks to military visionaries such as the US Army's Program Executive Office for Combat Support and Combat Service Support (PEO CS &CSS), Col. Genaro Dellarocco, Project Manager — Force Projection, that *Spearhead* has been put into the fight as seen throughout the world following recent events in the Persian Gulf" Mr Clifford said.

Incat delivered another 98 m craft, HSV 2 *Swift*, to the US Navy on 12 August 2003.

Two notable Incat ships came together in Hobart on 14 August 2003. *Joint Venture*, berthed aft of *Swift* (handed over to the US Navy on 12 August), has returned to her builders for a period of scheduled maintenance. Having served the US Navy since she left Hobart on 11 September 2001, *Joint Venture* will be handed over to the US Army during the maintenance period for further trials and evaluation.
(Photo courtesy Incat)

MEMBERSHIP NOTES

AD Council meeting

The Australian Division Council met on 18 June, with teleconference links to all members and the President, Mr Rob Gehling, in the chair. The President welcomed Messrs Werner Bundschuh, Mike Seward, Mark Smallwood and Mark Williams as newly appointed members of Council, noting that Mr Phil Helmore had resigned, with regret, from Council due to his election as Chair of the New South Wales Section and to an increase in some of his other activities. Matters, other than routine, which were discussed included:

- The Chief Executive had provided a copy of a letter from the Institution's insurers confirming that officers and members of the Institution while carrying out official activities undertaken on behalf of the Division or a Section were covered under the current Professional Indemnity Insurance held by the Institution.
- Mr Bryan Chapman informed Council that he had accepted a personal invitation to join the National Marine Safety Committee and agreed he would advise the NMSC that his acceptance would be on behalf of the Australian Division of RINA.
- Ausmarine East 2003: Members of the Queensland Section will be in attendance at this conference to provide assistance and information and arrangements for the Section to hold a mini-conference during the staging of the event.
- Appointment to the RINA Australian Division Council Executive Committee: On the recommendation of the President, Council agreed to the appointment of Mr Jim Black to the Executive Committee to fill the vacancy created by the departure from Council of Mr John Jeremy.
- The RINA/IEAust Joint Board: Mr Bryan Chapman informed Council that the Joint Board had met recently and that the composition of the Joint Board was now himself as Chairman with Mr Noel Riley from RINA and, from IEAust, Mr Rolf Hartley, Professor Mike Davis and Mr Martin Dwyer. He reported that IEAust had decided not to offer a reduced fee to those who were members of both organisations.
- PACIFIC 2004 — International Maritime Conference: Mr Jeremy, Chairman of the Coordinating Committee, reported that the Program Committee had received a large number of interesting papers covering a wide range of topics.
- Council has established a Publications sub-Committee of Council and appointed Mr Jeremy, Mr Helmore and Mr Riley to be members of the sub-Committee.

The next AD Council meeting is scheduled for Wednesday 24 September.

Walter Atkinson Award for 2002

The Walter Atkinson Award for 2002 has been awarded to Keith Murray for his paper *A History of Morts Dock and Engineering Co. Ltd* which was published in *The Australian Naval Architect* February 2002. Congratulations Keith!

Keith Adams

Professional Indemnity — Recent Developments

From *Engineers Australia eNews – 8 August 2003:*

"Cap to be put on professional liability

Engineers and other professionals will be able to cap the amount they are liable for under a new insurance deal agreed on by state and federal governments this week.

Once national standards have been agreed to professional groups will be able to secure liability insurance under the deal and be entitled to a cap on professional liability. The size of the cap will vary according to the profession, the size of a company and the level of risk.

Federal minister for revenue and assistant treasurer Helen Coonan said professionals will need to adhere to a rigorous scheme of risk management and take out compulsory insurance in return for caps on liability.

Engineers Australia's director of public policy and representation, Leanne Hardwicke, said the Institution has been calling for this move for a long time and it is well overdue.

"We are hoping it will bring long-term benefits for engineers," she said. "Engineers Australia will be working on developing a scheme for engineers with the Association of Consulting Engineers Australia (ACEA) and the Association of Professional Engineers, Scientists and Managers Australia (APESMA), so there will be a consistent standard across all the peak engineering bodies in Australia.

But the Institution is disappointed that Queensland is still not prepared to change its ideas on proportionate liability. It is the only state that has a threshold level and we would like it to come on board with the rest of Australia on that issue."

To paraphrase Winston Churchill, this may not be the beginning of the end, but it certainly looks like the end of the beginning. Professional indemnity, and particularly the difficulty in arranging PI insurance cover, remains a serious issue for the engineering profession in Australia.

Immediate-past Division president Bryan Chapman has been monitoring developments in this area and trying to keep people affected by the issue abreast of them. If you are affected, and particularly if you are having trouble arranging insurance cover, he would like to hear from you at navarch@bigpond.com.

Bryan Chapman

[Members concerned about professional indemnity insurance should also read the article on this subject in RINA Affairs July/August 2003 — Ed.]

NAVAL ARCHITECTS ON THE MOVE

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

Doug Beck has moved on from consulting, and has taken up a position with Australian Marine and Offshore Group in Melbourne.

Peter Goodin has moved on in the Anzac Ship Project Management Office in Williamstown and, in addition to the position of Project Engineering Manager, has added the responsibilities of Acting Deputy Project Manager to his portfolio until the new PM is appointed.

Richard Hallett has retired from the position of Project Manager for the Anzac Ship Project Management Office in Williamstown. Richard says that, like a gas turbine, he is going to have a significant period at no-load before winding up again. The Deputy Project Manager, Ollie Liddicoat, is acting in the PM position until the new PM is appointed.

Peter Hinds has moved on from Shipworks Brisbane, and has taken up a position as a naval architect in the design office with Austal Ships in Fremantle.

Sean Johnston has moved on within the Tenix group and has taken up a position with Tenix Marine at Williamstown. This means that, in addition to the position of Dockmaster and being responsible for Hull Section (including naval architecture for the Anzac build program), he has added further responsibilities to his portfolio.

Jake Law, a recent ocean engineering graduate of the Australian Maritime College, has taken up a position with McAlpine Marine Design in Fremantle.

MIDN Katie Miller, a recent graduate of The University of New South Wales, has now also graduated from HMAS *Cresswell*, the RAN Naval College at Jervis Bay, and is now SBLT Katie Miller. Congratulations, Katie! She writes that she has had more time at sea, firstly on MV *Seahorse Horizon* (ex HMAS *Protector*). She says that she learned more in those five days than she did in the rest of the course, and was lucky enough to get some time as Officer-of-the-Watch (in charge of the ship), which is not very common for an engineer. Following graduation from the Naval College, she spent a month at HMAS *Cerberus* for safety, administration and navy organization in preparation for posting to sea, and has now joined HMAS *Success* for a month. She will receive her first seagoing posting in mid-September.

Rozetta Payne has moved on from Commercial Marine Design and, following a month's short-handed sailing cruise from Sydney to Tonga, has commenced work for her PhD degree on a scholarship at The University of New South Wales. She will be researching composite structures under the guidance of A/Prof. Don Kelly.

Greg Shannon has moved on from North West Bay Ships in Sydney and has headed for Sweden, where he can maintain ties with a certain Swedish lady.

Dudley Simpson moved on some time ago from Australian Marine Technologies in Williamstown and returned to Germany, where he studied German in Stuttgart, and a couple of university subjects through an Australian university. He married Sonja in Stuttgart in June, and they have now moved to Pusan, on the south coast of Korea, where they will both be working for five months.

Piotr Sujkowski has moved on from Austal Ships and has taken up a position as a marine surveyor with Germanischer Lloyd in Fremantle. He says that he will, therefore, continue his involvement with the Austal group following the formal three-month training at the GL head office in Hamburg, Germany, and a month in the GL division office in Singapore.

Tim Sullivan has moved on from Tenix Defence in Williamstown, and has taken up the position of General Manager with Alloy Yachts in Auckland, New Zealand.

Giles Thomas has completed his PhD degree at the University of Tasmania where he has been investigating the wave slam response of large high-speed catamarans in a joint project between the University of Tasmania, Incat Tasmania and Revolution Design. Giles recently joined the Australian Maritime College as a lecturer in naval architecture.

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

One could easily develop a complex about these things. We are getting used to calling shipyards and dockyards 'facilities' — apparently the collective noun is 'complex'. This sign identifies one of the most active collections of maritime 'facilities' in Australia — whose initials are not to be confused with another AMC further the east. Apparently these signs have been appearing around the WA waterfront recently. The catamaran in the background, and below, is Image Marine's *First Travel XXXI*. She is one of two 41.5 m sight-seeing vessels built for New World First Travel Services in Hong Kong, each fitted with a 20 m water-spouting Chinese dragon on top of the superstructure. The vessels will carry 351 passengers at 16 kn when they enter service in October. (Photos courtesy Martin Grimm)

Vale David Charles Baron

22 September 1946 – 28 March 2003

David Baron was born, appropriately for a naval architect, at St Albans in the UK and migrated to Australia as a child. His early years were spent in Queensland where he studied mechanical engineering at the University of Queensland before changing over to naval architecture at UNSW in 1972. On graduating David and his wife, Georgie, moved to Whyalla where David worked with the Whyalla Shipbuilding and Engineering Works.

David's career in naval architecture included some interesting variations. Apart from his work in Whyalla, where he stayed for three years from 1975 to 1977, he worked subsequently at Brooke Marine in the U.K. for 4 years, then briefly at M.J. Doherty and Co. in Sydney before joining AMSA in 1982. In 1989 David and his friend Richard Dunworth formed the company Baron and Dunworth Pty Ltd in Canberra. Their original intention was to specialise in the design of small craft but things turned out differently and David and Richard ended up specialising in loading computer software. Their company's flagship product, Mariner, is common on vessels on the Australian coast and they have won a number of export orders.

In his life outside of work, David had many interests. His family was an important part of his life and Richard Dunworth says that there were always small items from each of his daughters dotted around their office.

In Whyalla David developed in interest in athletics and, more particularly, in orienteering, which gave him an opportunity to combine athletics with his love of the Australian bush.

David took every opportunity to get afloat and he had a succession of boats. At university he raced dinghies and later, in Lowestoft, David and Georgie had a Merlin Rocket. In Canberra the family dinghy was supplemented by kayaks and a Mirror dinghy (ostensibly for the children). Family holidays were usually afloat and, more recently, David bought what was to be his last boat — a Lazy E requiring "a little work". This quickly became a major re-building project and the finished craft reflected David's approach to everything he did — as good as he could possibly make it.

Music was important to David and he was an excellent pianist and keyboard player.

Leukemia was diagnosed about nine years ago, but David was determined to continue to live a normal lifestyle as far as possible and he took up the viola and painting. Although these became progressively more difficult for him, he persevered with determination. Bird photography became a new interest late in his life — and an excuse to drag Georgie around on tiptoe through the bush he loved.

David finally retired at the end of June 2002 and died less than a year later following a bone-marrow transplant in Sydney. Everyone who met him will remember David as a total professional in his work and a dedicated enthusiast at everything he undertook.

Richard Dunworth and Bryan Chapman

The US Navy's new amphibious transport dock ship *San Antonio* (LPD 17) afloat in the Mississippi River at Northrop Grumman Ship Systems Avondale Operations in New Orleans after her launching on 19 July 2003
(Photo courtesy Northrop Grumman Corporation)

FROM THE ARCHIVES

Empress of Australia

John Jeremy

The announcement by Spirit of Tasmania that they intend to commence a passenger service between Sydney and Tasmania in January 2004 has revived memories of the previous service operated by the Australian National Line. When she entered service in January 1965, Empress of Australia *was not only the largest passenger ship yet built in Australia, but the largest roll-on/roll-off passenger vehicle ship of her type in the world, with the longest ocean voyage route.*

As an island state, Tasmania was accessible only by sea until relatively recent times when, as elsewhere, aircraft took the passengers away from the rigours of sea travel. For many years a passenger service was operated between Sydney and Hobart by the Huddart Parker Line and the Union Steamship Company of New Zealand. Ships on the route included *Oonah*, *Riverina*, *Zealandia* and *Westralia*. The service ended in June 1940, when the liner *Zealandia* was requisitioned for war service.

Based on the success of a service from Melbourne to Tasmania introduced with the roll-on/roll-off passenger vehicle ferry *Princess of Tasmania*, the Australian National Line decided to build a larger ship to operate from Sydney to Hobart, Bell Bay and Burnie. The ship was designed by the Australian Shipbuilding Board and tenders were called in 1961.

The order for the new ship was placed with Cockatoo Docks & Engineering Co. Pty Limited, Cockatoo Island, Sydney, on 17 January 1962, and the yard lost no time in preparing the working drawings and starting the lofting for Ship 220. The general particulars of the new ship were:

Length OA	134.84 m
Length LWL	127.27 m
Length BP	122.73 m
Breadth extreme	21.39 m
Breadth moulded	21.21 m
Depth moulded to vehicle deck	7.42 m
Depth to shelter deck	12.58 m
Max. load draught	6.06 m
Full load displacement	8 909 t
Max. deadweight	2 932 t
Light displacement	5 977 t
Block coefficient	0.517
Gross tonnage	12 037
Installed power	10 067 kW
Service speed	18.5 kn at 225 rpm

The ship was largely of welded construction, although rivets were used for the connection of the frames to the shell, the gunwale angle to the shell and deck and the upper seam of the bilge strake. The hull had two continuous decks, the vehicle deck and shelter deck. A mezzanine deck at the sides of the ship forward and aft provided space for crew accommodation. Below the vehicle deck the hull was divided by ten transverse bulkheads, with deep tanks and double bottom tanks for fuel and water, etc.

The vehicle deck was designed to normally carry 57 cars, 33 semi-trailers and a number of cargo containers. The ship was the last of the ships built in Australia after the war to have defence requirements built into the design from the outset, with the vehicle deck of sufficient strength to carry tanks and areas of the superstructure strengthened for self-defence armament. The ship was also fitted for, but not with, degaussing.

The accommodation for 250 passengers was arranged in single- double- and four-berth cabins, mostly without facilities. A number of two-berth deluxe cabins and suites were provided with private bathrooms. The cabins were arranged in the superstructure. As the ship was to spend about a full day at sea, particular attention was paid to the public rooms. There was a passenger lounge and dining room on the shelter deck with a smoke room and other spaces on the boat deck.

The ship was fitted with two MAN diesel engines driving fixed-pitch propellers, and a KaMeWa bow truster was also provided. Alternating current was supplied throughout the ship with the deck machinery and the stern door hydraulically operated. The ship was fitted with a pair of Denny-Brown retractable stabilisers.

The keel of Ship 220 was laid on No. 1 slipway at Cockatoo Island on 11 September 1962, and progress with the ship, known around the yard as *Duchess of Woolloomooloo*, was fast. The summer of 1962–63 turned out to be particularly wet, and three months of persistent rain in early 1963 slowed progress considerably. As was common at the time, Ship 220 was built 'in the black', that is, the steel was worked in the as-rolled condition, with mill scale allowed to weather off before painting. With the rain, there was soon a very large quantity of yellow, rusty steel on the slipway!

Ship 220 under construction on No. 1 slipway at Cockatoo Island in late 1962 (John Jeremy collection)

Passenger ships are outfit intensive, and, with most of that work above the shelter deck, the shipyard decided to speed construction and get outfit trades working early by constructing and fitting out a 20 m long section of the superstructure well in advance of the hull being ready to

receive it. This section, encompassing the shelter and boat decks and incorporating cold and cool rooms, part of the galley and some accommodation, was built and fitted out in another part of the yard before being separated into parts within the crane capacity and erected on the ship — and all before the term 'modular construction' had been invented.

By the end of 1964 most of the machinery had been shipped and fitting out was well advanced. The ship was named *Empress of Australia* by the Hon. Catherine Sidney, daughter of the Governor General, Lord de L'Isle, and launched on Saturday 18 January 1964.

It was a typical Sydney summer day, with a light north-easter being replaced by a fresh southerly buster just as the ship was released. The ship was lively in the warm conditions, and set off for the sea at a great pace. The strong cross wind caused the ship to swing alarmingly after stern lift, and some lengths of riband were torn from the sliding ways before the ship floated clear to be checked by the bundles of drag chains laid on the bottom of the harbour.

Launching Day — *Empress of Australia* entering the waters of Sydney Harbour for the first time on 18 January 1965
(John Jeremy collection)

Fitting out continued in the following months with the intention of meeting a maiden voyage date of 5 December 1964. However, there were a number of delays with some hydraulically-operated valve systems and, in particular, with the stern door. One Saturday morning, during the first test under hydraulic power, the folding door locked partly open. Something had to give, and in the end the structure of the door failed spectacularly and noisily. The resultant need to redesign the door meant no maiden voyage before Christmas, and when the ship left the island for harbour trials on 2 December 1964, she sailed without a stern door — a move that would not be permitted today.

Sea trials (with a stern door) followed on 21 and 22 December 1964, with progressive, endurance and steering gear trials off Sydney. The ship achieved a maximum speed of 21.5 knots and proved to be comfortable at sea, if inclined to pitch a bit in a head sea.

The *Empress* was handed over on 8 January 1965. She was an expensive ship for her builders. The ASB paid £3 010 501 ($6 021 002) for the ship, but she cost £3 497 760 ($6 995 520) to build.

After a shakedown cruise, she left for Hobart for the first time on 16 January, arriving 37.5 hours later, 11.5 hours

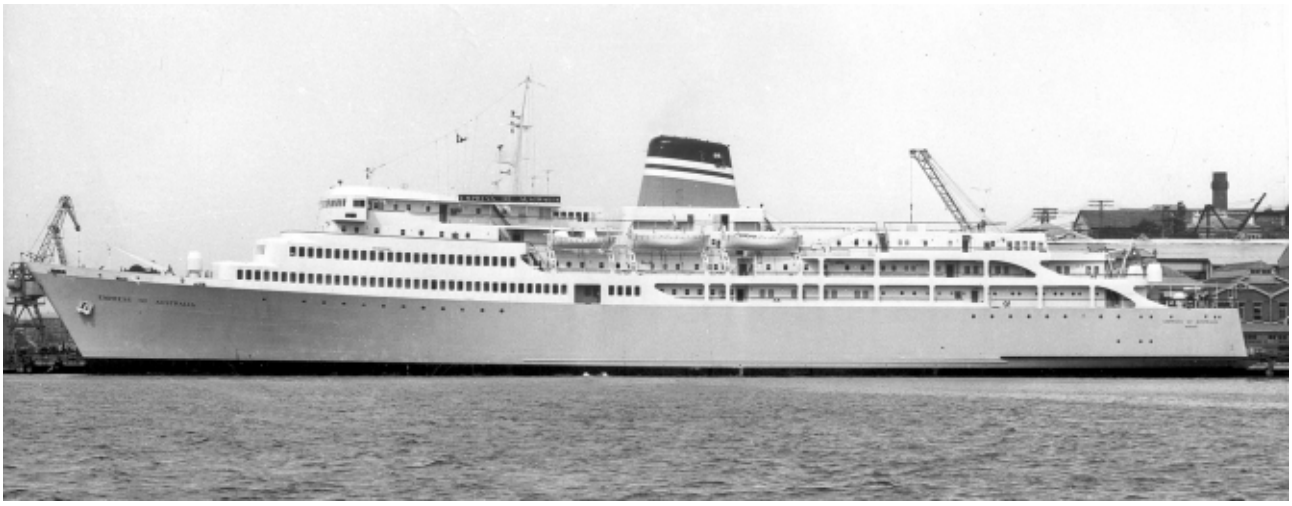
The dining saloon in *Empress of Australia*
(John Jeremy collection)

The passengers' lounge, looking very 1960s
(John Jeremy collection)

A two-berth deluxe cabin — a symphony of plastic and vinyl
(John Jeremy collection)

faster than the previous record time set by *Zealandia*. The service proved to be popular, although recurring industrial problems interfered with schedules, and by 1972 the Australian National Line had decided to rearrange the ferry operations to Tasmania. The two ships operating from Melbourne, *Princess of Tasmania* and *Australian Trader* (based on the *Empress* design and built by State Dockyard — later HMAS *Jervis Bay*) were replaced by *Empress of Australia*. *Australian Trader* took over the Sydney service.

Empress of Australia was modified by State Dockyard to increase her capacity to 440 passengers. The dining room was converted into a cafeteria and the aft end of the superstructure was extended to provide lounges fitted with aircraft-type seats.



Ready for trials — *Empress of Australia* about to depart from the Bolt Shop Wharf at Cockatoo Island on the morning of 2 December 1964 (John Jeremy collection)

The vehicle deck
(John Jeremy collection)

Loading cargo through the stern door at the Mort Bay terminal in Sydney
(John Jeremy collection)

The ship continued to work hard on the Bass Strait crossing. By November 1983 she had completed 2 500 voyages and carried some 1.3 million passengers, but in mid 1985 the Australian National Line discontinued their passenger operations. Later that year *Empress of Australia* was sold to Phineas Navigation Co. of Cyprus and renamed *Empress*. She operated for four years between Larnaca in Cyprus and Jounieh in Lebanon.

In 1989 *Empress* was taken to Avlis Shipyard in Greece for reconstruction as a cruise ship. The external appearance of the ship was considerably changed. All existing accommodation was removed and the vehicle deck was converted to accommodation. Passenger accommodation was increased to 623 in 310 new cabins and new public rooms were built in the superstructure.

Plans for operation of the ship after conversion included, at various times, cruising in the Caribbean, the Baltic and the Pacific but, finally in 1991, the ship was renamed *Royal Pacific* and relocated to Singapore. From there she cruised to Indonesia and undertook short cruises to nowhere for gambling enthusiasts.

On 23 August 1991 *Royal Pacific* was returning to Singapore in the Straits of Malacca, on a calm sea and in good visibility. About 20 miles south-west of Port Dickson, the Taiwanese fishing boat *Terfu 51* apparently tried to pass astern but hit *Royal Pacific* near the stern leaving a very big hole. The ship sank in about 90 minutes, with the loss of two lives.

Reference

Peter Plowman, 'Memories of an Empress', *Australian Sea Heritage*, No. 33, Summer 1992.

Empress of Australia at sea off Sydney in December 1970
(Photograph John Jeremy)

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