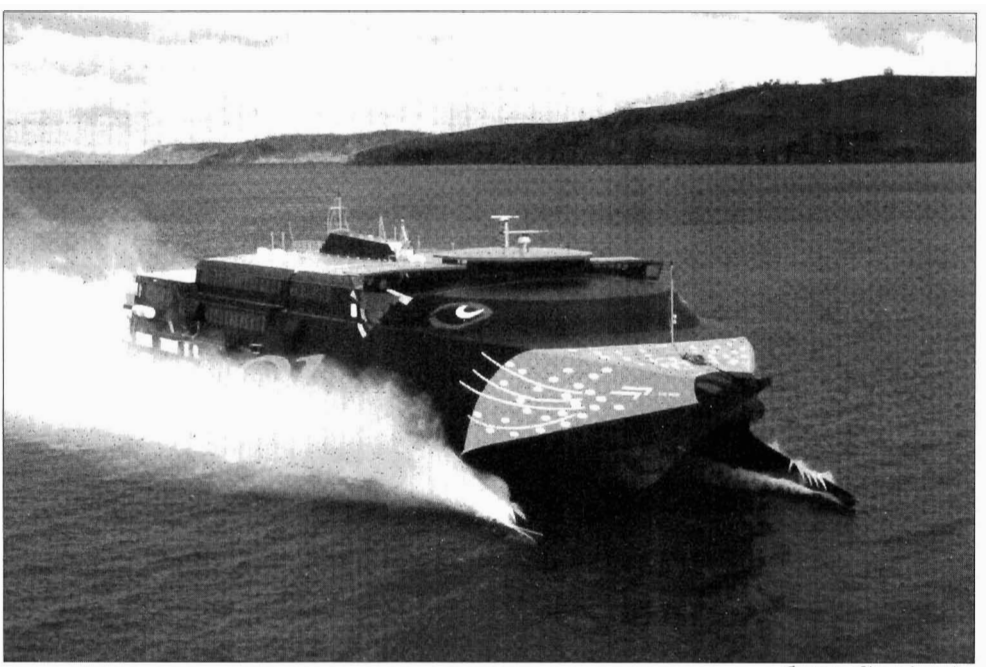
THE AUSTRALIAN NAVAL ARCHITECT

NOVEMBER 1997
ISSUE 3

NEWSLETTER OF THE AUSTRALIAN DIVISION OF
THE ROYAL INSTITUTION OF NAVAL ARCHITECTS



Courtesy of Incat Australia

THE ROYAL INSTITUTION OF NAVAL ARCHITECTS (AUSTRALIAN DIVISION)
Box No. 4762,
GPO, SYDNEY,
NSW 2001

Please send all correspondence and advertising for the next issue of 'The Australian Naval Architect' to: The Editor
Australian Naval Architect
c/- RINA
Box No. 4762, GPO,
SYDNEY. NSW 2001

The deadline for the next 'Australian Naval Architect' (March 1998), issue 4, is Friday February 27, 1998.

CONTENTS:

Cover Photo: Incat's 91 mt "Devil", see Just Launched, page 20.

A NOTE FROM THE DIVISION PRESIDENT

From information that has already been sent to all members you will be aware of the decision to reorganise the structure of the Division. This move resulted from a proposal made by Brian Robson when he was president of the Division some four years ago and has been carried on by the succeeding presidents. The advantages that I see accruing from this reorganisation are that the various sections will have more say in the operation of the Division and the new Division Council will be seen, by some, as being more representative of the rank and file than it is perceived at present. I am hopeful that we will be able to complete the reorganisation at the AGM next March but to achieve this time table I suggest that the sections start acting now on choosing their representative to the new Council rather than leaving it until the last minute.

In the second issue of our journal I mentioned that I had attended a Council meeting in London

last April and, inter alia, that I tabled a request for additional financial assistance from the parent body until we reorganised the Division structure. I had intended to go back to London later in the year to speak to our case on this matter. However, this is no longer necessary as I received a letter from the Secretary last week to inform me that no additional money would be forthcoming. Therefore we will have to make do with what we are allocated at present. I was disappointed that the Council in London did not give us the opportunity to at least speak to our case before it made its decision.

You will be aware that an organisation has been set up to revise the USL Code. This resulted from a decision made by the ministers concerned from the state and the federal governments desiring to provide greater uniformity in the administration of the Code by the various authorities concerned. Over the years I have heard some of my colleagues criticise the Code but, despite its shortcomings, it has played an effective role in providing designers and builders with a basic instrument to prepare designs with the confidence that the resulting vessel would operate effectively. The genesis of the Code goes back more than twenty years so I agree that it is time to revise it to take into account the advances in technology and computational methods that have been introduced in that period. I do not believe that complete uniformity can be achieved Australia wide. When one considers that our boundaries include climatic zones from tropical to subtemperate it is hard to imagine that one set of regulations can be all embracing. Therefore I think that there should be some allowance in the new Code to provide for these differing areas of operation. It will be of benefit if those who are involved in the application of the Code, either in design, construction or survey, take an active part in establishing the problem areas that they have encountered with its application and bring these matters to the attention of the state or federal authority in whose jurisdiction they operate. From my past experience this is the only chance, for the next twenty years, you will have to assist in getting the Code right. So if you don't have some input now you will have to live with it for a large proportion of your working life.

The articles by David Lugg and Jim Black in the last issue of the journal provide a lot of food for thought and the constrictions of space and my inability to adequately express myself do not allow me to examine the content in the detail that I would like. However, there are a couple of points that should be commented upon. The first is that this journal is an appropriate vehicle for members to communicate their ideas to the profession at large through letters to the editor. Unlike the popular press we do not have any axes to grind, as we represent the profession as a whole, and it is in our collective interest to foster debate on current issues that affect the design and operation of marine vehicles.

The second point that I want to highlight is Jim Black's comments on career paths. It is undeniable that the large shipbuilding industry in Australia is no longer in existence. However, the popular technical press would have us believe that the only part of the industry that is now functioning here is the fast ferry sector. This is not correct as there are still other areas where one can still make an honest dollar such as in small commercial vessel design, vessel modification and refit and straight consulting. Having made that point I want now to briefly discuss the training of naval architects. I am of the opinion practical experience is a necessary part of a young naval architect's training and whether he/she does this as a labourer in a shipyard or as a deckhand on a fishing boat matters not. The main object is to observe first hand how vessels go together and the conditions under which they operate. I advise those students that I teach, who have come straight from school to the university, to take a couple of years after they graduate to get some practical training. The experience gained in these early years will help to prevent them from designing the draftsman's ultimate, i.e. it can't be built, and will give them a feel for the what is right and what is not quite right in their design careers.

The third point that needs comment is on whether the newly minted graduate should seek to achieve NPER 3 status or not. I believe that this qualification will become more important in the immediate future. We have seen it enshrined in legislation and this trend is likely to continue. For this reason I think the qualification should be sought. I agree with Jim that professional development in our own field is vital but I do not see this being different to that to obtain NPER 3 status. For myself I obtained the necessary recognition without having to go outside the profession to meet the continuing professional development requirements. Thus there is good reason to attend technical meetings put on by both RINA and IMarE as each hour spent at the meetings counts towards the average of fifty hours of continuing professional development (CPD) that is required each year. A word of encouragement to those who baulk at the CPD requirements, every hour of installing or learning to run a new computer program counts as two hours for CPD. Also every hour required to give a lecture or present a paper counts as ten hours for CPD and reading technical journals and articles counts as half time for CPD. So that with attendance at technical meetings, on the job learning and normal reading I do not find it difficult to meet CPD requirements.

You will have read, in this issue, Andrew Tait's letter that addresses the matter of the merger of RINA and IMarE. About 80% of the members in each body voted to merge but after several years since the voting nothing has happened. Curiously, nothing significant has yet occurred on this matter. Andrew's letter was sent to the Editor of the Naval Architect for publication in that journal but it was refused. However, after some prodding it was published by IMarE. I think this begs the question on whether the wishes of the majority of the members of both organisations will, if ever, be realised on this matter. While there may have been some justification that oil and water did not mix in earlier times it seems to me that the lines of demarcation have now become sufficiently blurred that the merger of the two institutions would be of benefit to all members. It may be of general interest for members to comment in later issues of this journal on the merger either at section, division or institution level.

I hope that some of the points that I have raised will stimulate discussion on which direction the Division and the Institution, as a whole, should be heading.

Noel Riley

EDITORIAL

I was very pleased to read Mark Smallwoods letter to the editor. Mark has touched on a couple of important points. There must be a social side to RINA. Our institution should strive to not only promote technical excellence but to provide a social atmosphere. Secondly the days of the lone naval architect are long gone. We work with naval draftsmen, technical officers and marine stylists and it is important that we include these people in our social and technical events. I believe that the success of the WA section of RINA is partially due to the venue, the Flying Angel Club, which is centrally located, has easy parking and bar facilities. Meetings are a good forum for networking and often work and job placements eventuate from these gatherings.

Our president has been lobbying RINA UK for the return of a larger portion of our subscription fees. It appears that his requests have not found favour. We pay good money for our RINA membership. I often wonder if it is money well spent! I believe we get far less value for our dollar than the average UK member who can attend numerous RINA symposia and workshops throughout the year and has access to the London headquarters and library facilities. One of the major roles of our Institution is the dissemination of information. Those of us who are also SNAME members are only too aware that the SNAME list of publications, membership directory, ease of ordering titles using credit card

and fax or internet facilities is far superior to the RINA efforts. If RINA UK won't give us a greater share of our money then I believe we must demand better service for the money we do pay. I consider the RINA web site could be the catalyst to improved service. Money spent on developing the web site facilities and improving the library access would be money well spent. We must also look for support from the RINA UK to export some of their symposia, even if they be in a "lite" form. A strong united RINA can offer members far greater benefits in both the UK and Australia.

Our first issue of ANA featured Frank Jaroseks assessment of the Design Loadings Australian Standard. I have heard that a common criticism of the new Australian Standards is that some engineering knowledge is required to be able to apply them. When I catch a train, plane or drive in my car I expect that the person responsible for the safe design of those vehicles has not just "some" but a high level of engineering knowledge. Members of the Australian public board commercial vessels that have been "designed" by people with no formal technical training. We must act to rectify this situation.

Finally we had good feed back from our advertisers this month. They have had a number of enquires from RINA members. Keep it up. Without the advertisers we can't go to print. This newsletter is your voice and link with other RINA members throughout Australia.

David Lugg

NEWS FROM THE SECTIONS

CANBERRA

We are desperately seeking an enthusiastic contributor to report on the Canberra activities. Please contact the editor.

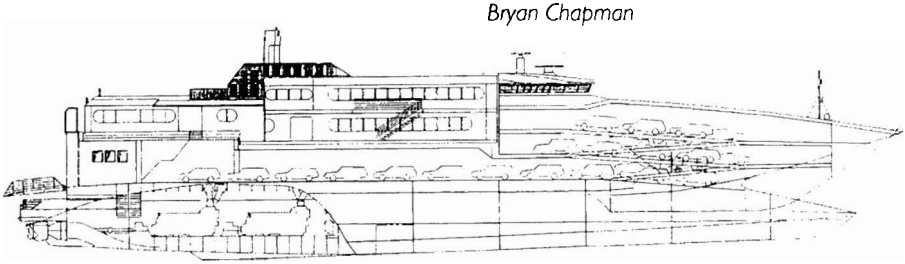
VICTORIA

Graham Taylor presented "The development and future of high speed ferries" to a joint IMarE RINA meeting in September. He reviewed the prominent role that Australia has played in the design, construction and operation of large high speed ferries. In many cases it has been the airline industry that has provided the basis for the operation of these new ferries. He spoke of the high standard to which these vessels are now outfitted. He pointed out that the expectations of reliable and punctual service have not been fully realised. Graham indicated that new machinery had on occasions failed to meet the challenge.

In October Mike Hines of Shell Australia spoke on the Design, Building and Commissioning of a 40,000 dwt product carrier.

The final meeting of the year will be held at the I.E.Aust. building in Bedford street, North Melbourne on 18 November. Anybody interested is welcome to gather at 5:30 for a meeting start of 6:00 PM to hear Alan Mather from BHP Transport talk on the Safety and Operating Features of Bulk Carriers. Coffee and sandwiches will be provided. Any queries may be addressed to myself, or to Howard Mumford at A.S.P. Ship Management, (03) 9623-1234

Bryan Chapman



WESTERN AUSTRALIA

Laurie James, chairman of Partners, Kott Gunning, Perth presented Alternative Dispute Resolution in Marine Contracts to a large audience at our June technical meeting. His excellent presentation is printed in this issue under "Our Profession". Laurie is exceptionally well qualified to talk on such matters. He is senior Vice President of the Institute of Arbitrators Australia and a registered Conciliator and Mediator with experience in dispute resolution in the marine industry. Certainly not a man to be argued with!

In July, three representatives from Germanischer Lloyd gave a presentation to a combined meeting of RINA and IMarE. Dr-Ing Ulf-Dieter Ulken, Dipl-Ing Jurgen Jokat and Dipl-Ing George Spiliotis gave a video presentation and then discussed FRP technology in propulsion systems, non-linear dynamic simulation, HSC (and WIG craft) and Ship acoustics on HSC and their interaction with the ship structure.

Professor of Hydrodynamics at the University of Newcastle upon Tyne, Grant Hearn, spoke about Design for Seakeeping at our August meeting. He posed and answered the question "is it really worth it?". Professor Hearn trained initially as an industrial mathematician, later becoming an engineer. He worked in the aircraft, telecommunications and glass industries before joining the British Ship Research Association where he became head of the mathematics support group. At BSRA he worked on seakeeping, vibration, wave energy, turbulent boundary layers and many other subjects. His talk was very well supported and yes it does seem that it will soon be worth it!

We were on line, for the September meeting, to hear Patrick Couser and Giles Thomas bring us up to date with the internet. A brief introductory talk with a most helpful handout was followed by hands on experience. We visited the RINA site and other marine specific web pages.

Role out the Red Carpet

Trevor Blakeley, the recently appointed RINA Secretary in London, will be visiting us on Thursday 23rd October. Trevor will attend our October meeting for the presentation of three student papers. We expect a good attendance to welcome Trevor and give him a view of RINA future directions from this part of the world.

Thanks Jim

I am very sorry to advise that Jim Black, one of the founding members of the Western Australian section and secretary treasurer since then, will be unable to continue in that role due to work commitments. Jim has contributed enormously over the last four years. He has always notified us of upcoming meetings, minuted our committee meetings, kept our account books perfectly balanced and helped shape the direction of the Western Australian section. His efforts will be greatly missed. It will be some role to follow but we do need another member to stand up and take his place.

David Lugg

INDUSTRY NEWS

NORTHERN TERRITORY

Darwin has been the hub of activity, with amongst other things, the final touches to the conversion of the MV Vivienne. Sea trials proved to meet all expectations and requirements of the client, and she is now stationed in Vansittart Bay in WA. A review of her modifications is due to soon appear in either Work Boat World or Professional Fisherman. More vessels of her kind are likely to be needed in the future; a direct indicator of the universal growth of the Northern Territory and the pearling industry.

The effect of other developments in the region are likely to be felt by the maritime industry. One development of particular interest is the progress towards down-stream processing of our near-by natural gas reserves. Such a move is

likely to bring LNG carriers to the area, and will complement Darwin's East Arm Port and Trade Development Zone (TDZ).

Recently Darwin has been host to a 43 m luxury yacht, SY Enterprise. She is a twin screw, twin mast, 8 mm steel vessel, displacing around 270 tonnes and is furnished superbly. Italian built in 1987, she is very impressive to the eye. The Enterprise has been in dock while she was here, with the overhaul of generators, renewal of the underwater paint scheme and other minor repairs carried out.

The closure of the prawn trawling season is upon us again, and whilst these vessels are not at the glamour end of the industry, they certainly provide their own challenges and a considerable amount of work.

Samantha Tait

WESTERN AUSTRALIA

Seachrome Build for Pleasure

The well known Conquest range of commercial hulls have continued to be a success for Seachrome Marine, Western Australia's largest FRP builder. This year they have already built a number of vessels for cray and shark fishing as well as passenger and dive charter operations. These vessels are operating in Victoria, Queensland, South Australia and Western Australia.

To compliment the commercial boats Seachrome are also building the Precision range of pleasure vessels from 17 metres and upwards in length. Three smaller vessels have been completed to date as well as a 25 metre motor yacht for a South Australian client. Two 20m sportsfisherman are under construction and will be completed before Christmas for local and overseas customers.

Previously only known for building the highest quality cray fishing vessels Seachrome now expects to produce an equal mix of pleasure and commercial boats in the future.

Austal Ships

Austal's first 60 metre Auto express designs "Turgut Reis I" and "Cezayirli Hasan Pasa I" were transported to Istanbul by float-on float-off cargo ship the "Developing Road" in September. The vessels entered service across the Maramara Sea on 11 October 1997.

Also on 11 October, Austal launched their latest and fourth Auto Express vessel for the year. The 82 metre vessel; "Superstar Express" has been built for Malaysian cruise line operator, Star Cruises. Following completion of sea trials, the ship will commence a delivery voyage, expected to take around 4 days, to Malaysia. Meanwhile, Austal's 29th vessel built for Chinese owners - the 42 metre passenger catamaran "Zhao Qing", is due to be transported to Hong Kong.

Current projects include Austal's first and largest vehicle-passenger catamaran built to date - an 86 metre design, a 48 metre car-passenger catamaran for the French Carribbean and a 44 metre cruise catamaran for tourist operations in Bali, Indonesia.

In new developments, Austal has introduced a 95 metre high speed ocean freight catamaran the "Cargo Express", aimed at providing a cost effective alternative to conventional sea and air freight transport. From information derived from the analysis of particular routes, variants have been developed for both container and truck/trailer haulage.

In other activities, work is set to commence on a new jetty in front of Austal's yard which will accommodate two large 80 - 90 metre vessels and two 40 metre vessels at the one time. The project is due for completion by mid February 1998.

Current Austal Projects

Hull	*Name*	*Type/Destination/Delivery*
122	Zhao Qing	42 m Pax Catamaran Hong Kong, Oct 1997

Hull	*Name*	*Type/Destination/Delivery*
60	Superstar Exp.	82 m Auto Express Malaysia, Nov 1997
61	Jade Express	48 m Auto Express Gaudelope, April 1998
63	TBA	86 m Auto Express TBA, May 1998
62	TBA	44 m Pax Catamaran Indonesia, July 1998

Duyfken Foundation

We hear much of the enormous technology strides being made here in the West. But there are also strong links with the past. Many of the skills re-learnt during the building of the Endeavour are being used again on the construction of the Duyfken.

Captain Willem Janszoon of the Dutch east India company commanded the Duyfken (Little Dove) to Australia in 1606. It is the first known voyage to Australia in recorded history and his chart the first to depict the Australian coastline. In her day the Duyfken was regarded as a fast and manoeuvrable yacht. Such vessels were often used to scout ahead of the fleets that they served.

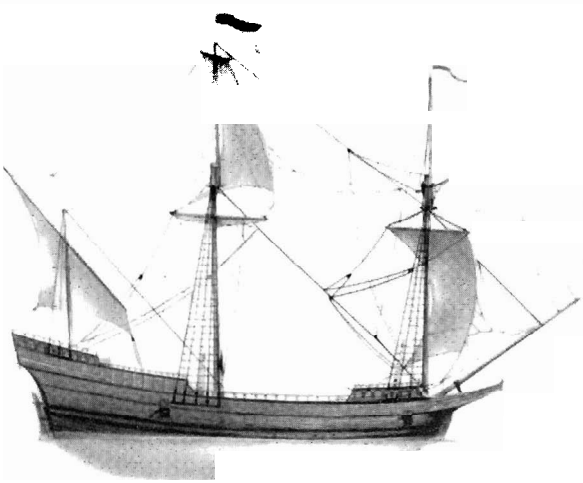
The Duyfken 1606 replica foundation have pledged to make the Duyfken the most authentic reconstruction of an "Age of Discovery" ship ever built.

No plans exist for the original Duyfken. An intensive research program has been undertaken to determine the form of the vessel. Original material has been sourced from archives in the Netherlands, translating ships log books of the period, obtaining data from ship wrecks, comparative analysis of maritime art of the period and computer analysis of hull designs.

The foundation sought the assistance of maritime archaeologist Tom Vosper and naval architect Eric de Brey of Phil Curran Design who modelled the Duyfkens hull lines using Maxsurf. Formation design's Workshop program has been used to generate the shape of planks and frames throughout the ship.

The projects budget is 3.5million. The foundations chairman is Dr. Michael Kailis of the well known MG Kailis group of fishing and pearling companies.

David Lugg



The Duyfken as drawn by Nick Burmingham

Crew	20
Cargo capacity (approx.)	50t
Displacement (approx.)	125t
Length between stem & sternpost	20m
Length overall	24m
Beam	5.6m
Draft (laden)	2.4m

Rig - Three masts and bowsprit, square lower and topsails on fore and mainmasts, lateen mizzen.

The flagpole atop the mainmast is approximately 20m above the deck.

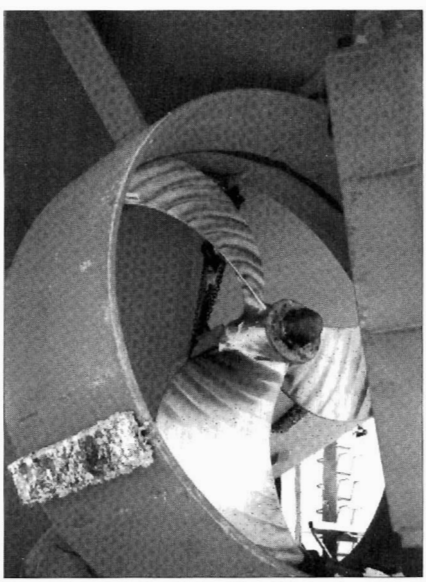
TRADE NEWS

VEEM

Skew Propellers / Tiplets

Some interesting designs seen around VEEM Engineering lately have turned heads and proven highly successful. Two WA trawlers fitted wit three bladed Kaplan propellers suffered from severe vibration. A skewed nozzle propeller, 1728mm in diameter, designed and manufactured by VEEM Engineering solved the problem. The propeller features 36 degrees of skew and a variable pitch distribution. The new design also produced an increase in bollard pull.

Tiplets have been fitted to a modified VEEMSTAR propeller. The tiplets have a chord length of 150mm and extend 40mm from the low pressure back of the propeller. This same propeller features an epoxy / carbon fibre patch which is being monitored for endurance to cavitation erosion.



Recent orders include the supply of two pairs of 1820mm diameter four blade custom skew propellers to IHI of Japan. The propellers are to be fitted to a 70m high speed catamaran car ferry. The propellers were designed in the Perth office, numerically modelled in the USA and physically modelled and tested in a cavitation tunnel in Japan prior to manufacture.

VEEM offer a free selection service for VEEMSTAR, VEEMSURF (Surface piercing propellers), Kaplan and Wageningen propellers. Custom designs are available for a design and pattern fee.

EDUCATION NEWS

CURTIN UNIVERSITY

Undergraduate Activities

Ship Science student Des Dunstan is carrying out a project identifying suitable criteria for assessing the ride comfort of small runabouts. A number of claims are made for the smooth ride of various design configurations, but formal criteria and comparative measurements are not usually available. Once a set of suitable metrics is established, Des hopes to extend the project next year by conducting comparative seagoing trials on a range of boats.

Postgraduate Activities

Postgraduate student James Gale is undertaking a project to predict the environmental operating envelope of a heavy lift barge as part of his studies for a Postgraduate Diploma in Applied Physics. Such vessels are often used in the oil and gas activities of North-west Australia and in South-east Asia.

The Centre for Oil and Gas Engineering at the University of Western Australia is running a Masters degree by course work in Oil and Gas Engineering. It contains units with naval architecture and offshore engineering content. Lecturers on the course include the Centre's Director, Professor Beverley Ronalds and the recent joint Curtin/UWA appointee, naval architect Dr. Krish Thiagarajan.

Postgraduate Research.

There has been a new addition to the postgraduate research student numbers at Curtin. Rick Shock, a graduate from the University of Michigan, USA, has transferred from the Australian Maritime College to study for a Master of Science degree on lift-dumping foils. This concept was first experimented in the 1930s in Germany. The amount of lift generated by a foil (used as a ride control surface, for example) is controlled not by adjusting the angle of incidence, but through controlled aeration of the water flow over the foil surface. There are a number of technical challenges in getting an effective system working, but the potential economic benefits are substantial. This work is part of an AME Task.

Rick's enrolment brings the number of naval architecture research students in the Department of Applied Physics up to six. Masters student Jonathan Binns graduated in August with a thesis on hull-appendage interaction of sailing yachts, part of the AME Yacht Technology and Performance program. A new PhD student from Indonesia is expected to enrol later this year, working on the seakeeping of catamarans - another AME Task.

Three research students will be presenting a summary of their work at a RINA(WA) meeting later this year.

Short Courses

Courses in Design for Small Craft and Applied Hydrodynamics are running again this semester, offered jointly by the AME and the Department of Applied Physics at Curtin.

The South Metropolitan College of TAFE's Maritime Studies Centre offers training for operators of Autonomous Underwater Vehicles. They are also about to start training courses for ship pilots on the new ship simulator at their Fremantle campus.

Kim Klaka

Rats, its a Boat

Students in the first year of Bachelors of Engineering (Naval Architecture), (Ocean Engineering) and the multidisiplinary Bachelor of Applied Science programs recently competed to see who could design and build a model which would travel the furtherest by mechanical power. This exercise was part of the course work for the subject "Introduction to Ship and Maritime Engineering".

The race was won by the "Yellow Submarine" powered by a modified rat trap. The "Yellow Submarine" outlasted its rivals, "Southern Cross", "Shower Express" and "Red Cat" to cover a very commendable 37 metres. The distance trials were carried out in AMC's Ship Hydrodynamics Facility, the largest in the southern hemisphere.

Of the four vessels, two were catamarans, one a trimaran and the winner a monohull. Two models utilised rat traps, one a mouse trap and the fourth used elastic of the type used in underwear.

Students soon discovered that achievement of maximum distance required the efficient use of power available. This meant 'slow and steady' was the key to success. Other lessons learned were that it is also important that the vessels be able to withstand the loadings placed on them by the power source. In this, the rat and mouse trap powered vessels had the advantage because the traps were self contained.

The project's success, in terms of both practical learning and enjoyment, will almost certainly ensure it becomes an annual event, perhaps involving other year levels of the Bachelor courses and local schools. The students were required to write a report on rationale, methodology and outcomes of the project.

"They certainly came up with some ideas that would not have occurred to me", commented Graham Jacob, Lecturer in the Faculty of Mantime Transport and Engineering at the College.

UNIVERSITY OF NSW

SHIPSAFE '97

A workshop on Ship Safety is being organised for Monday 10 November by a group including IMarE (Sydney Branch), AMC, AMECRC, AMSA, Australian Shipowners Association and UNSW. The program includes bridge resource management, maritime safety developments, passage planning, fast ferry safety, the ISM Code, bulk carrier safety, OHS, electronics and safety, social factors in safety, maritime training, and structural problems. Presenters include international experts in these fields of ship safety. Cost is $250 (the date for early-bird registration has passed). If you have not yet registered, then contact Mr Laurie Prandolini on (02) 9878 1914, fax 9878 4669, or e-mail sbimare@msn.com.

For the Future

Up-coming workshops at UNSW include:

- *15-16 June 1998 Third workshop on Very High Speed Craft*
- *13-17 July 1998 Structural Analysis of Vessels*

Reserve these dates in your diary now, and watch this space for further information.

FAST'97

The fourth international conference on fast sea transportation was held at the University of NSW from Monday 21 to Wednesday 23 July. There were 102 papers and six keynote addresses presented on all aspects of fast craft by the experts in the field. The prize for the best paper presented at the conference went to Ms Alice White of Condor Marine (UK) for her keynote address *Crisis Management.* The inaugural award for the best paper presented by a young (less than thirty years) person was contested by twelve entries, many of them from overseas. The prize went to Ms Jacqueline Rovere of Australian Defence Industries and a recent graduate of UNSW, for her paper *Catamaran Resistance from Tests on a Single Demihull.* Congratulations Jacqui!

Workshop on Composite Structures

A workshop on the Structural Analysis and

Design of Composite Boat Hulls was held at the University of NSW from Wednesday 16 to Friday 18 July. The three-day program included the important aspects of composite design and construction, together with many examples and practical details of construction. There were more than forty participants, and much lively discussion ensued, due to the growing awareness that composites provide a good alternative to aluminium alloys in some areas.

Undergraduate Research

One of the interesting undergraduate thesis projects in progress is Mr Antony Krokowski's investigation of the hydrodynamic efficiency of paravane stabilisers. Many trawlers and longliners use paravane stabilisers to reduce roll motions at trawling (and sometimes free-running) speeds. However, the flat-plate, delta-wing stabilisers in universal use are hydrodynamically inefficient. A new set of paravanes having the same areas, effective mass and centre of gravity location as an existing flat-plate set, but with NACA-section timber fairings has been designed by Antony and built by J.C. Helmore and Associates of Eden, NSW. The chart and DAT recorder instrumentation, load cells and cabling have been set up by Antony. As we go to press he is testing the performance of both the foil and flat-plate sets on board the 17-metre trawler *Seaberu* operating out of Bateman's Bay, NSW, thanks to Messrs Merv, Ben and Steve Innes, owners and operators of the vessel. The foil stabilisers generated much local interest, resplendent in their towing-tank yellow paint and UNSW logos, while the vessel was in Ulladulla for slipping recently.

Post-graduate and Other Research

There are two opportunities for post-graduate research commencing next year:

The AMECRC is offering two scholarships leading to PhD degrees at UNSW (faculty funding is available to complete the term). Enquires should be directed to Dr Tony Robinson on (02) 9385 4198.

Lloyd's Register of Shipping is offering the annual Chevening Scholarship leading to a one-year MSc degree in naval architecture/marine engineering at a British university, commencing September 1998. The scholarship covers tuition and other fees, a maintenance allowance, and return economy airfare. Applications close 31 October, but an immediate inquiry to Ms Silke (pronounced silka) Kerwick at the British Council, phone (02) 9326 2022 would be considered.

Phil Helmore

LETTERS TO THE EDITOR

Dear Editor,

Congratulations on another interesting issue of The Australian Naval Architect. I found the technical paper by L. Lazauskas and E.O. Tuck particularly thought provoking.

I have been researching the performance of high speed catamarans for a number of years with Dr. Molland at the University of Southampton and last year I took up a position at the Perth Core of AME CRC and am continuing my research in this field.

Firstly, may I congratulate L. Lazauskas and E.O. Tuck on a very interesting paper in what I feel is a very important field - low environmental impact vessels. There are several points relating to their paper that I feel are worthy of discussion.

Would the authors be able to confirm the accuracy of Figure 1 and its caption. As presented the figure seems to contradict the caption and the subsequent paragraph, with the catamaran curve showing a fairly significant reduction of total resistance over the whole speed range when compared with the alternative hullforms.

With respect to the wave resistance of catamaran forms, I would like to report that the

results of model tests and similar Michell integral wave resistance calculations carried out at the University of Southampton confirm the findings presented in their paper. These findings were that demihull separation, S, was important around Fn=0.5 (7.5kts for a 6m vessel). At this Froude number, the widest separation had the least wave resistance, and the increase in wave resistance for narrow demihull separation was reduced as speed was increased. At around Fn=0.8 and above, the wave resistance of catamarans with S/L=0.2, 0.3, 0.4, 0.5 and indeed the demihull tested in isolation all converged. Figure 3 of their paper demonstrates the insensitivity to S/L at higher speed, with a maximum speed reduction of approximately 1.5% for the optimum/variable separation compared with the fixed maximum separation catamaran. A typical plot of the variation of wave resistance with spacing and Froude number is given in Figure A and the interested reader is directed to Molland et al. 1996, 1994a and b.

It is likely that, for a vessel operating at above Fn=0.5 (7.5kts), a transom stem might lead to some reduction in total resistance. The presence of a cleanly releasing transom effectively increases the length of the vessel, reducing wave resistance. A method for applying Michell's integral to transom stem hulls was proposed by Couser 1996, Couser et al. 1997b and refinements to this model have been recently presented by Doctors 1997.

However it is possible that the time is ripe for turning ones attention to asymmetric forms. Both Larrson 1997 and Söding 1997 have presented work showing that it is theoretically possible to cancel the wave patterns completely. These asymmetric models, however, require more complicated 3D formulations to predict the wave pattern and resistance numerically.

The importance of viscous resistance and form factor should not be underestimated. For slender catamaran forms, at high speed, the viscous resistance is 60%-80% of the total resistance (Couser et al. 1997a). It would be of interest to investigate the sensitivity of the optimum hullforms to changes in form factor and viscous resistance. There is significant evidence to suggest that, due to viscous interaction, the form factors of catamarans should be up to 10% greater than that of the corresponding monohull and that this is likely to be true for trimarans also. This is an area which deserves considerable attention. However, this is not to say that methods for determining wave pattern are not useful and they are particularly relevant when the impact of wash is to be assessed.

As discussed above, multihull designs are likely to suffer due to viscous interaction effects, but may gain favour if stability becomes a criterion. Stability may become more important if the length and beam of the hullforms were not restricted. It is mentioned in their paper that at 10kts the unrestricted optimum monohull was 12m in length this would correspond to a beam of 0.32m (assuming that B/T=2, CB=0.5, (=0.3m3), such a narrow beam vessel may have stability problems.

In conclusion, their paper presents findings which are confirmed by experiments carried out at the University of Southampton, however I feel that it might be more fruitful to investigate asymmetric hullforms rather than variable geometry vessels. In addition, the large component of viscous resistance should be investigated more thoroughly, and should certainly not be overlooked.

References:

Couser, P., 1996, "An investigation into the performance of high-speed catamarans in calm water and waves". PhD thesis, Department of Ship Science, University of Southampton.

Couser P., Molland, A.F., Armstrong, N.A and Utama I.K.A.P, 1997a, "Calm water powering predictions for high-speed catamarans". Fast '97, Sydney, Australia, July.

Couser, P., Wellicome J.F. and Molland, A.F., 1997b,

"An improved method for the theoretical prediction of the wave resistance of transom-stern hulls using a slender body approach". Accepted for publication in International Shipbuilding Progress.
Doctors, L. and Day A., 1997, "Resistance prediction for transom-stern vessels". Fast '97, Sydney, Australia, July.
Larsson, L., Jansen, C.-E. and Brun P., 1997, "A numerical investigation of trimaran configurations". Fast '97, Sydney, Australia, July.
Molland, A.F., Wellicome, J.F. and Couser, P.R., 1996, "Resistance experiments on a systematic series of high-speed displacement catamaran forms: Variations of length-displacement ratio and breadth-draught ratio". Transactions, Royal Institution of Naval Architects, 138A.
Molland, A.F., Wellicome J.F. and Couser P.R., 1994a, "Resistance experiments on a systematic series of high-speed displacement catamaran forms: variation of length-displacement ratio and breadth-draught ratio". Ship Science Report 71, Department of Ship Science, University of Southampton. March.
Molland, A.F., Wellicome J.F. and Couser P.R., 1994b, "Theoretical prediction of the wave resistance of slender hull forms in catamaran configurations". Ship Science Report 72, Department of Ship Science, University of Southampton. March.
Söding, H., 1997, "Drastic resistance reductions in catamarans by staggered hulls". Fast '97, Sydney, Australia, July.

Yours faithfully,
Patrick Couser.

P.Couser@amecrc.curtin.edu.au
http://student.curtin.edu.au/~rcouserp/index.htm

Dear Sirs,
Subject: Merger of IMarE and R.I.N.A.
Some years ago the memberships of both RINA and IMarE voted convincingly in favour of a merger into a single Maritime Engineering Institution. Despite the massive majority vote for the amalgamation the Executive Councils and Administrations of both bodies have not yet carried out the wishes of the present members. For whatever reasons they have decided to defer matters there are distinct rumblings here in the former colonies giving a clear indication of dissatisfaction with the lack of action and progress in this vital matter.

Tomorrow, or not too far in the distant future both institutions may wake up to find that a large proportions of their memberships have defected somewhere, and that possible new members do not eventuate.

I would not like this to happen and believe that the merger should be speeded up to ensure that the wishes of the members are carried out without further preambles and delays so that a strong, viable, International; society becomes a reality, for if we wait until 1997 before resuming progress it may be too late.

Yours sincerely,
Andrew R.L.Tait (Fellow of both bodies)

Dear Editor,
I am inspired!! The recent FAST 97 in Sydney turned out to be a great opportunity to meet industry friends and colleagues with whom I have lost touch over the last 15 years. It also focused my attention on the lack of organised gatherings of Naval Architects and RINA members in the state of Victoria. While IMarE provides a regular forum for interesting technical presentations, we tend to rely on Bryan Chapman and a few others to fly the RINA flag. In an attempt to revive a camaradene amongst engineers, draftees and techos in the Victorian marine industry, I am proposing to initiate the gathering of interested people on a regular basis (say quarterly). Whether these are purely social evenings or combine something of a technical nature (eg. Presentation, selected discussion points etc) we need to decide as a group.

From my perspective, the profession in Victoria is fragmented and lacks adequate forums for

AUSTRALIAN MARITIME ENGINEERING COOPERATIVE RESEARCH CENTRE (AME CRC)

RESEARCH ASSISTANT - SHIP MANOEUVRING (FAST TRACK SIMULATION)

A vacancy exists for a research assistant in the field of ship manoeuvring at the Launceston Core of the Australian Maritime Engineering CRC Ltd. The Australian Maritime Engineering CRC Ltd is a national research organisation, which has research cores at: Launceston; Melbourne; Perth and Sydney.

The successful candidate will work within the manoeuvring group, developing a pilot module for existing ship manoeuvring simulation software. Applicants must have a good first degree in naval architecture, computer science, mathematics or related discipline, with some experience in experimental research and software development. Candidates must be highly computer literate, with experience in C++ programming. Familiarity with ship manoeuvring theory and ship handling practice are advantageous. The position requires good communications skills, and the ability to coordinate a research project involving staff from several facilities.

The Launceston Core of the Centre is based on the campus of the Australian Maritime College, and candidates will be encouraged to enrol in a higher degree at AMC.

Situated at the head of the beautiful Tamar River where the North and South Esk Rivers meet, Launceston is the heart of Tasmania's thriving northern agricultural and commercial region. The population of the greater Launceston area is approaching 92,000. Launceston has a pleasing temperate climate and experiences four distinct seasons.

The salary will be at the research assistant level, which is currently $30,130 per annum. The appointment will be initially for a 12 month term with excellent possibilities of further employment depending on funding.

For further details please contact Dr Martin Renilson, Phone: (03) 6335 4770. Fax: (03) 6326 6261. Email M.Renilson@mte.amc.edu.au.

APPLICATIONS: Including full details of qualifications and experience, together with the names and contact telephone numbers of two referees, should be submitted to:

The Manager-Human Resources (Applications)
Australian Maritime College
PO Box 986
Launceston Tasmania 7250

The closing date for applications is 17 November 1997, although late applications may be considered.

Equality of Opportunity of Employment is AME CRC and AMC Policy.

AB1/43183

socialising and the passing of knowledge. Drawing on the memberships of RINA and MARENSA and of the marine industry in general, I am hoping that we can form a group which will be of benefit to those involved while having positive spin-offs for our industry.

The location/date of the first gathering hasn't yet been decided (maybe in a pub?) and will depend on how much interest exists. As a start, I would appreciate all those interested to give me a call or drop me a line on one of the following numbers. Please remember that this group is informal and open to all so spread the word.

Work telephone: (03) 9602 4999
Home telephone: (03) 9397 1114
Facsimile: (03) 9602 5100

Cheers,
Mark Smallwood MRINA

OUR PROFESSION

ALTERNATIVE DISPUTE RESOLUTION IN MARINE CONTRACTS

Laurie James
Chairman of Partners, Kott Gunning, Perth

The orthodox mode of dispute resolution arising out of marine contracts is for the aggrieved party to issue proceedings out of a court against those who might be considered ultimately responsible. If not settled, the case will come before a judge of the court for trial and eventually a judgement will be pronounced in favour of one party or another. That judgement will be subject to the usual appeal process, if a disgruntled loser decides to take it further.

Before considering alternative modes of dispute resolution, let us review some of the features of a court action which deals with maritime matters. The case itself may involve complex expert evidence about questions of seaworthiness and the appropriateness of the design for the tasks the vessel was to undertake. It would be unlikely that any trial judge would possess very much marine experience so as to enable him to form his own views on the subjects under contention, although he might be very much assisted by the expert witnesses if they give clear and straightforward technical evidence an reports.

Fortunately, help is at hand. Even courts are making available alternative modes of dispute resolution and the Supreme Court of Western Australia has the power to refer even actions before it to alternative modes of dispute resolution such as mediation or arbitration. Even if the whole action is not referred out to some qualified person, it is still quite possible for a judge to decide to refer the technical issues to an independent third person of suitable skills and qualifications, to be appointed as an expert referee and to make binding decisions (subject to acceptance by the judge) on the technical questions of the case.

Notwithstanding these facilities, which have been considerably enhanced and improved in recent times by the courts, in my view it is far better for the parties to provide in marine contracts themselves for the direct reference of disputes between them arising out of those contracts to alternative dispute resolution, thus avoiding the inevitable delay and expense in getting a court action to the point where alternative dispute resolution processes such as mediation can be considered.

Arbitration

The alternative dispute resolution procedure which has had most use in dealing with marine disputes is arbitration. Arbitration is a formal dispute resolution process whereby the parties refer to their dispute to an independent third person (the arbitrator) for a binding determination, based upon the documents, the evidence and the submissions which the parties put to the arbitrator and in accordance with the relevant laws relating to the arbitration.

Until it comes into the public domain by being

appealed to the Supreme Court, an arbitration is entirely confidential and this is a considerable advantage of court proceedings, which are necessarily before the public gaze throughout. Arbitration is also much more flexible in terms of place, timing and mode of trial.

Court hearing dates are generally fixed, with very considerable difficulty in the way of a party who seeks any variation. Each case is one of a long chain of cases before a particular judge and any deferment throws out of kilter the entire programme. By contrast, arbitration can usually be adjusted to suit the parties in the sense that it is quite common for lay days to be called or for hearings to be only on certain days of the week or even to be moved by a few days or even a few weeks by agreement between the parties, so that witnesses and parties can be accommodated.

If it is appropriate to do so, the parties can also agree upon an arbitrator who is technically qualified. Alternatively, if the main issue is one of law, they can choose a lawyer arbitrator. If the case is a big one and there are issues of both kinds, it will be perfectly feasible to appoint two arbitrators, one lawyer and the other a marine expert.

Arbitrators, unlike judges, are private persons whose selection and training is not regulated by the Government in any way. How can a party be confident that an arbitrator has the abilities to deal with the case fairly?

Since 1975, the Institute of Arbitrators Australia has been training and grading arbitrators. The Institute is a voluntary professional body (like RINA but without royal patronage) consisting of persons interested in arbitration and other forms of dispute resolution. It has over 1,000 members and about a tenth of those are graded arbitrators.

Our Institute recommends a standards clause be inserted in agreements as follows:
"Any dispute or difference whatsoever arising in connection with this contract shall be submitted to arbitration, in accordance with, and subject to, the Institute of Arbitrators Australia Rules for the Conduct of Commercial Arbitration."

The rules in question not only provide procedures which the arbitrator and the parties are recommended to follow but also provide for a nominating procedure whereby if the parties cannot agree upon an arbitrator, the arbitrator is nominated by the Institute. There is no magic about this clause and parties can and do substitute their own clauses and provide for all kinds of nominating bodies, depending on the nature of the dispute.

One feature which makes arbitration particularly suitable for marine contracts, where the parties often come from around the world is that, unlike court judgements, arbitration awards are generally more enforceable internationally. For example, in Australia the International Arbitration Act 1974 adopts an international convention on the reciprocal enforcement on awards (known as the "New York Convention") to which many countries are signatories.

Conciliation and Mediation

These forms of dispute resolution involve the parties themselves trying to reach an agreement as to how the dispute should be settled, assisted by an independent third party (the mediator or conciliator) who facilitates the negotiations. In the strict classical sense of the term, the word "mediation" denotes a mode of dispute resolution in which the mediator assists the parties to examine the issues in dispute and to explore alternatives, but offers no advice or suggestion of his own in relation to the subject matter of the dispute, whereas a conciliator will often do so. In practice, most people use the word "mediation" in a broad sense as encompassing both versions.

In a real dispute resolution, all mediators find themselves in a position where assessing realistic outcomes and finding solutions involves the mediator becoming concerned to a greater or lesser extent in advising parties of his own views

about the dispute, either in separate private discussions ("caucuses") or in joint sessions.

One of the advantages of mediation is that enforcement is seldom required as the parties having voluntarily reached the settlement normally carry it out without further difficulty. There is also a much better level of respect and understanding between the parties, as each person has his say in a relatively informal atmosphere, without any of the constraints or difficulties associated with giving formal evidence in the unfriendly atmosphere of a court room. The fact that mediations are entirely private and confidential encourages frankness and a general willingness to see the other party's point of view.

The standard Institute clause dealing with resolution of disputes in this manner refers to conciliation, to avoid any disagreement as to whether the person concerned is entitled to make recommendations based upon his own assessment of the dispute. The clause is as follows:
"Any dispute or difference in connection with this contract shall be submitted to conciliation in accordance with, and subject to the Institute of Arbitrators Australia Rules for Conduct of Commercial Conciliation."

The clause normally then goes on to provide that if the dispute is not settled within a given time frame, the dispute is referred to arbitration. Certainly, some form of default provision is required whereby if mediation or conciliation fails, a binding method of dispute resolution falls into place.

Expert Determination / Early Neutral Evaluation
A third form of alternative dispute resolution which has been coming to the fore in recent times because of the perceived expense and delay not only of arbitration but even mediation is the referral of disputes to an expert for a decision, either binding or non binding. If the parties are bound by the decision by the expert on the point in question, the process is called expert determination. On the other hand, if the option is simply by way of advice to the parties and they are not obliged to carry out but may reserve their position to a decision elsewhere, the process is called early neutral evaluation or appraisal.

There are obvious difficulties in this type of approach where clearly the expert is not going to be able to have the advantage of the hearing of evidence and submission of documents to the same extent as in an arbitration, nor is he likely to have the benefit of a party's views given to him in confidence as a mediator. As a result, this form of expert dispute resolution is more readily used in a situation where either:

a) The dispute is simply a technical dispute which can be referred to a naval architect for an opinion in the usual course of his profession or;
b) The dispute is simply a legal point arising out of the interpretation of a clause in the contract, perhaps in a charter party, and can be referred to a lawyer practising in that field.

Participation of Naval Architects

Naval architects can be involved in dispute resolution in a variety of ways. For the most part, my experience of such people in dispute resolution has been with them in their capacity of expert witnesses.

An expert witness should be entirely professional and straight forward in providing his report and testifying. He should try to present his opinion so as to be of assistance to the judge, arbitrator or mediator rather than regard himself as a partisan, whose only concern is to assist the client.

Expert witnesses have severely damaged their credibility in the past by doggedly refusing to acknowledge any difficulties or shortcomings in the case presented by their clients, even when those shortcomings are manifest to everybody listening to the evidence, including themselves. By contrast a witness who frankly acknowledges the telling point made against his client certainly reinforces the tendency of the tribunal to accept what the witness has to say on other matters in favour of the client.

Naval architects are also in a position to become arbitrators or to handle references out from the Supreme Court as technical referees. Membership of the Institute of Arbitrators Australia gives the naval architect the opportunity to attend courses on arbitration offered by the Institute and to sit for the Institute's examinations, after which the candidate will become a graded arbitrator if he passes and the interviewing committee considers him satisfactory.

Similar opportunities exist for a naval architect to be appropriately trained as a mediator and as an expert for the purpose of determinations or early neutral evaluations, although much less training is required in the latter categories. The Institute has mediator training programmes and is looking at the possibility of setting up panels of accredited experts in various disciplines.

Ideally the contract documents will be so well prepared and the administration of the project will be so comprehensive that no disputes can arise. If that step is not fulfilled, then it is in the best interests of all concerned for the marine contract to provide for alternative dispute resolution rather than to compel the parties to have resort to the courts. Suitable drafted dispute resolution clauses could therefore find their way into all marine contracts.

JUST LAUNCHED

91 Metre High Speed Passenger / Vehicle Catamaran Brief Specification *"The 91 metre Devil"*

The Incat 91 metre Devil is a further development of the successful 74, 78, 81 and 86 metre car passenger ferries. The 91 metre wave piercer is built to the requirements of the Det Norske Veritas High Speed Light Craft Rules and, where appropriate, to comply with the IMO High Speed Craft Code.

The vessel is constructed from marine grade

aluminium alloys to a design developed and proven by Incat Australia. Each waterborne hull is subdivided into eight watertight compartments which are connected by an arched bridging structure above the loaded waterline.

An aluminium superstructure supported on vibration damping mounts provides seating for up to 900 persons, including crew. A full width wheelhouse is provided with central and wing positions for docking. A variety of entertainment, navigation, radio, control and monitoring equipment has been provided to meet Classification Society and owner requirements.

The passenger spaces are outfitted to a high standard in full consideration of an intensive ferry service. The functional design ensures rapid turnaround times and low cleaning and maintenance costs. Passenger comfort is optimised by the installation of an advanced Maritime Dynamics ride control system.

The vessel is equipped with the most advanced life saving and fire safety equipment available. Propulsion is provided by four Ruston 20RK270 medium speed diesel engines driving Lips 145/3 DL waterjet units through Renk ASL 60 gearboxes.

Principal particulars

Speed, max.	- lightship condition	49 knots
	- deadweight (450 t)	43knots
Length overall		91.30 m
Length waterline		81.34 m
Beam overall (excluding fenders)		26.00 m
Hull beam		4.33 m
Hull centreline to vessel centreline		10.83 m
Draft fully loaded (approx. salt water)		3.70 m
Fuel capacity (approx.)		56 m3
Long range fuel capacity (approx.)		246 t
Total deadweight		450 t
Passengers		876
Crew		24
Vehicles (or up to 4 coaches)		242 cars

THE AUSTRALIAN DIVISION OF RINA

Keith Adams
Executive Officer of RINA (Australian Division)

Keith Adams has been the Executive Officer of the Australian Division of RINA for past three years. Although relatively unknown to our rank and file members, Council members know Keith well and rely on his valuable contribution to both our day to day activities and the plans for the future. The advent of the Australian Naval Architect gives us the opportunity to introduce Keith to all members.

Prior to joining the Institution as its Executive Officer, Keith held a number of senior appointments with government departments and agencies.

He was science adviser on marine science matters to the Department of Prime Minister and Cabinet and the foundation Executive Secretary of the Australian Marine Sciences and Technologies Committee (AMSTAC), a Standing Committee of the Australian Science & Technologies Council (ASTEC).

Keith was involved in the framing and presentation to Cabinet of the submission for the provision of a national Oceanographic Research Vessel and was a member of the Steering Committee for the construction of a vessels for the Marine Science Laboratories built in Hobart.

Following this, Keith was assistant Secretary of the CSIRO Advisory Council before becoming the Secretary of the National Facilities Steering Committee for the operation of RV Franklin. Keith was a long time serving officer with the Royal Australian Naval Reserve and was made a Member of the Order of Australia for his service to the RAN.

Keith's vision for RINA is for it to become more proactive than in the past and considerably more reactive to those elements affecting maritime matters and the profession. He is confident that sections will play an ever increasing role in matters within their geographic region and that the Australian Division Council will concentrate their activities on matters affecting policy and the Institution as a whole. To this end he supports changes to the structure of Council that should see an increasing awareness of section interests and an encouragement for all members to more actively involve themselves in deciding who should represent them at Section and Council level.

TECHNICAL PAPER

Paper originally presented at the RINA Symposium
"The Safety of High Speed Craft", February 1997

CATAMARANS: THE SAFEST WAY TO TRAVEL BY SEA?

N. A. Armstrong, B.Sc., C.Eng., MRINA, Australian Shipbuilders Association

Tony Armstrong is currently involved in full-time research at the University of New South Wales on the subject of "The form factor of high-speed craft", leading to a Ph.D. He is involved with the Australian Maritime Engineering Co-operative Research Centre as a Program Manager, and has a part-time position as Co-ordinator of the Technical Committee of the Australian Shipbuilders Association. He was the Director of Design at International Catamaran Designs Pty. Ltd. during 1989-1995 when the first large high-speed vessels were designed and built. Some time prior to this he was a Surveyor of Ships with the Hong Kong Government.

1. Introduction

The idea that catamarans could be involved in the international transport of passengers and vehicles was unthinkable a mere nine years ago. High-speed craft were limited to a few hydrofoils and hovercraft, which (with one notable exception) were small craft carrying up to two hundred passengers on short journeys. The one exception was the SRN4 hovercraft of Hoverspeed, and it is noteworthy that two of these craft are still in regular operation some twenty six years after first starting the English Channel run, and remain the fastest craft.

The "Owner" of the SRN4 at that time was Sir James Sherwood of Sea Containers, and it was largely his vision that led to the development of the large high-speed catamaran to those that we have today. The SRN4 was expensive to operate and limited in its capability; on the other hand the small 30 metre catamarans that Sea Containers were operating to the Isle of Wight were simple and inexpensive to operate. It was fortune that led to Sir James Sherwood coming together with Robert Clifford and Phil Hercus, because Robert Clifford was convinced that his company, Incat Tasmania, could build anything in aluminium as long as it was a catamaran, and Phil Hercus believed that he could design anything in aluminium, as long as it was a catamaran.

The technical issues involved in the design of the first high-speed car-carrying aluminium catamaran passenger ferry were quite large but not insolvable. However each time the problems were progressively solved, so it was decided to increase the capability of the craft, and so the size of the craft increased from an initial 61 metre length, to 66 metres, to 71 metres, and finally to the 74 metre length of the first craft. This progression inevitably delayed the completion of the first craft, and there were

many occasions where the design had to be altered because the shipyard had already built a particular piece of structure based on a previous plan.

From a design viewpoint there were two major issues to be resolved:

- Structural Design
- Safety of Passengers and Crew

Neither of these issues were adequately addressed in Legislation, Rules or Regulations current at that time. The principal structural design rules in use at the time were the High Speed Light Craft Rules of Det Norske Veritas (DnV), and many vessels had been successfully completed to these rules. However they were limited to vessels having a length of up to 50 metres, and the proposed craft was to be some 50% longer than this limit. How the structure was designed and subsequently refined over a series of vessels is a fascinating story that is outside the scope of this paper, but it should be told one day.

The safety issues were to prove to be as difficult to resolve as the structural issues. To understand this, it is necessary to go back a decade.

By the mid-1970's, a number of small high-speed craft had proved that they were a viable method of transporting passengers over short distances. The safety certification in common use at that time for such craft was issued under SOLAS, and utilised the clause that permitted "ships of a novel nature" to be allowed exemptions. IMO quickly recognised that this was unsatisfactory and could lead to a wide variety of safety standards on such craft. Consequently IMO produced the Code of Safety for Dynamically Supported Craft (The DSC Code), adopted in 1977, and so-called because all high-speed craft at that time relied on some mechanism to (partly) support their weight and hence achieve high speed. These were typically hydrofoils or hovercraft.

The preamble to the DSC Code makes for very interesting reading. It stresses that the Code has been prepared in order that Research and Development may be facilitated and accepted internationally, and makes the point strongly that the traditional methods of regulating passenger ships for safety are not

accepted as being the only methods of achieving an appropriate level of safety. It then introduces the concept of an "equivalent level of safety" to that embodied in SOLAS.

It can also be noted in the Preamble to the Code that the largest vessels conceived at that time had a capacity of 300 passengers, and that a limit of 450 passengers was therefore included in the Code to allow an arbitrary 50% increase above current technology.

The designers of the first large catamaran in 1988/89 consequently decided to stay within the maximum limit of the DSC Code of 450 passengers, and to have the finished craft certified as a SOLAS vessel, with exemptions granted under the DSC Code. One major difficulty that arose during the design and build period was that it was not known where the vessel was to be registered, nor where it was to trade, and therefore it was not possible to discuss safety issues with any particular Administration. This was particularly important because the DSC Code is a very brief document, and leaves much "to the satisfaction of the Administration".

The first vessel was finally registered in the Bahamas, successfully certified, and delivered for operation between the UK and France. There were immediate problems. The Bahamian, UK and French authorities all had their different interpretations of the DSC Code, and the UK and French Administration wanted to impose their own regulations on the craft not included in the DSC Code. It took a considerable amount of additional work and modification for the vessel to be allowed to operate.

The first craft, Hoverspeed Great Britain, was thrust into the public's attention in 1990 by successfully winning the Blue Riband of the Atlantic, the 'Hales Trophy', for the fastest crossing of the Atlantic by a passenger vessel. She was followed by four sister ships, all having a similar outward appearance, but underneath all the lessons being learnt from the previous craft were being applied, particularly in the area of structural design and in the application of the safety philosophy.

By 1991, it was evident that these types of craft were viable, and that their numbers would dramatically increase with time. Again IMO showed remarkable initiative by starting a review process of the DSC Cod

so that the new generation of craft could be more easily certified, and the result was the International Code of Safety for High-Speed Craft (The HSC Code) which came into effect on 1 January 1996.
The HSC Code is a more substantial document than the old DSC Code (216 pages compared to 80 pages), and it attempts to detail many of the safety requirements that had previously been left up to "the satisfaction of the Administration". It also differs from the DSC Code in one very important matter. It provides its own mechanism for certification, and it is no longer necessary to certify the craft under SOLAS, with exemptions granted using the Code. SOLAS has been modified, to include a new chapter which acknowledges that High-Speed Craft have their own certification requirements under the HSC Code.

2. Some Associated Problems with the Application of the HSC Code

There are two major shipyards in Australia currently building large aluminium car-carrying passenger ferries, and about five shipyards building passenger-only ferries at any given time. In addition there are a number of specialised designers and associated industries.
Almost all of the problems that are experienced by Australian shipyards relate to the one problem of interpretation of the HSC Code, or the interpretation of other IMO regulations. Recognising this fact, IMO has started the process of a review of the HSC Code
These problems of interpretation are greatly compounded by three factors:
2.1 Many vessels are built for operation within the national boundaries and are not certified for international voyages under the HSC Code. Invariably the national authority does not have specific rules for such high-speed craft, and therefore uses the national certification process and uses the HSC Code for guidance. In doing so, this usually ignores that the HSC Code is a document that has to be used in its entirety, and it is not possible to take one chapter out of context with another.
For example, the Code requires that as part of the safety philosophy "The management of the company operating the craft exercises strict control over its operation and maintenance by a quality management system". This is frequently ignored by National Certification.
2.2 There are several vested interests. There are many Operators and Owners of conventional vessels who do not like the competition that high-speed craft represent. Worst of all is the type of nationalism that has been experienced where the Administration of one country has made ridiculous demands on the safety aspects of a vessel to be operated within that country, but built in Australia, apparently in order to hinder progress on the craft whilst another vessel is built within the country. That later vessel is then granted exemptions that the foreign-built vessel could not get.
In this same category it is possible to list many surveyors who pine for the traditional methods of SOLAS and the known interpretations of the rules, rather than to have to put their name on a document or certificate that shows that they have made a decision. It is not suggested that Surveyors take risks, rather it is suggested that they attempt to understand and apply the entire philosophy of the HSC Code instead of just applying a list of what can and cannot be done even if it is out-of-context.
2.3 A lack of knowledge of the existence of the HSC Code within IMO process. The HSC Code is a recent document and there has been insufficient time for it to be absorbed by all parties involved with the process of the writing of rules and regulations.
New-building vessels built to the HSC Code have to comply with many other regulations, and these other regulations have been, and are being, written without consideration of the requirements of high-speed craft, indeed in many cases they are being written in apparent total ignorance of the HSC Code.
A typical example might be MARPOL, which requires that all vessels carry an oily water separator, even though the vessel might be on a voyage of only a few minutes, has an unmanned engine room, and pumps any bilge water to a holding tank before pumping ashore at the end of the day's work. Many high-speed vessels are presently carrying oily water separators which are not used and probably never will be. This regulation was written with only traditional SOLAS vessels in mind.

Another example is those documents that are referenced in the HSC Code but which have been written without consideration for catamarans. The Code for the Testing of Lifesaving Appliances is a typical example, specifying the procedure for the testing of Marine Evacuation Systems as if they were fitted to monohulls, and making no allowance for the behaviour of catamarans.

A further example refers to a new source of Rules and Regulations outside those of IMO, coming from the Regional Agreement of the European Region and set up following the loss of the "Estonia". These requirements have many aspects, but the damage stability requirements have been derived entirely from research on conventional monohulls. Whilst it is not yet clear that these new regulations will be applied to catamarans, it appears that lacking any other information the rules will be so applied, and this is nonsensical, because the damage behaviour of a catamaran is entirely different to that of a monohull.

Finally, one of the most emotive areas involving passenger safety involves that of fire. There is no question that on a conventional ship there is a fire risk that has to be managed, and the current regulations appear to do this adequately. However there is a substantial penalty to pay if the same approach is applied to a high-speed vessel, involving additional weight and the consequent reduction of ship speed. The requirements for the fitting of structural fire protection to aluminium structures has been allowed to get out-of-hand, because of a lack of knowledge of those demanding such requirements, and the consideration that fast ferries are similar to a high-speed conventional vessel. There are many cases where structural fire protection has had to be fitted to void spaces adjacent to the outside of the ship where there is nothing to protect, not even essential structure for the safety of the vessel, and where there is an almost zero risk of fire. The consequences of such action are an appreciable loss of speed of the vessel, or a reduction in the cargo-carrying deadweight.

High-speed vessels are not conventional vessels having a high speed. They are bound by regulations that disallow sleeping cabins, and do not allow cooking facilities having a heat source. The passenger spaces are always large open spaces and it is incomprehensible to consider any fire originating outside the engine room that is not in the immediate vicinity of a large number of eyes and noses, and can be detected immediately, (unless it is a deliberate act of sabotage). This low risk is borne out by the very low numbers of high-speed passenger craft that have experienced a fire.

3. Some Accidents on Australian-Built Catamarans

The catamaran high-speed ferry represents an interesting solution to the problems of designing for safety. Some of the advantages of catamarans over monohulls are listed in Reference 1, however the principal advantage is that the catamaran is inherently safe, whereas the monohull can be considered inherently unsafe. As an example, the freeboard to the main deck on a RoRo monohull is frequently the minimum allowed, say 50 mm. In case of any accidental breach of the hull watertight integrity, then there will be water on the deck, leading to very large stability problems. The catamaran on the other hand has a main deck well above the waterline, having a freeboard of many metres, and any accidental breach of the watertight integrity will only result in a heel or trim of the craft, with little change in the stability characteristics and no water on the main deck.

The catamaran represents a stable platform for the launching of liferafts. When disabled, both monohull and catamaran high-speed craft will most likely lie perpendicular to the waves. The monohull will roll, and this can be out-of-sequence with the incoming waves if there is resonance. Consequently the relative motions of the liferaft and the vessel can be very large. A catamaran on the other hand rolls very little, and in beam seas one hull will tend to go up-and-down as the waves come in, resulting in generally harmonious motion between the liferaft and the hull on one side.

The catamaran has two hulls compared to the single hull of the monohull, and this leads to an inherent redundancy of machinery and systems. If one engine room is disabled through fire or flooding, then it is extremely unlikely that the engine room on the other side will be affected, and propulsion power, electrical power and any mechanical pumps can continue in operation as required. Furthermore

because of the requirements of two widely separated engine rooms it is normal for the pipework and the electrical systems connected to those engine rooms to be widely separated outside of the engine room, again providing a large degree of redundancy.

Some of these features have been illustrated by incidents involving Australian-built ships. The following examples are a personal interpretation of events, and for the official report on these incidents it is necessary to refer to the official Board of Inquiries.

Fire Aboard Reef Link II.

On the morning of 5 July 1987, a recently commissioned 30 metre passenger catamaran, Reef Link II, left Townsville for a scheduled trip to the outer Barrier Reef. This craft was built to local (State) rules, but the DSC Code had been used for guidance. The operator of the craft was aware that there was a fuel leakage in a cracked fuel return line in the void space forward of the engine room, and was in the habit of using a portable pump to shift the spilt fuel to oil drums on the aft deck. No attempt had been made to repair the leakage because this would require the vessel to be out of service.

The portable transfer pump used to empty the oil had a faulty seal and leaked a considerable amount of fuel into the engine room. At the same time, the fuel filters were being serviced, and the fuel priming pump was left running. The result was a considerable amount of fuel left in the bilge of the engine room as the vessel went into service. As the vessel accelerated and adopted a bow-up attitude, the fuel oil in the bilge flowed to the after end of the engine room where it came into contact with the main engine flywheel and was sprayed outwards. Directly above this spray were the hot main engine turbochargers, which ignited the spray of fuel. This in turn appears to have melted the electrical cabling in the vicinity, and the resultant short circuit appears to have started an electrical fire in the switchboard room in the superstructure aft of the passenger compartment.

To compound the problem, the clutch connecting the fire-fighting pump to the engine on one side had been removed for service and not re-installed, thereby placing reliance on the one remaining pump on the other side.

In any case, the crew appears to have done little to fight the fire. A crew member alerted the Master who went aft to investigate. The engine room smothering system was not manually operated, but the main engines were shut down. This was unfortunate because there was now no power for the remaining fire pump. (Later it was determined that the ship's valves were not set in a position to provide water for fire-fighting, rather they were left in the "bilge-pumping" position).

It appears that little effort if any was made to fight the fire. The engine smothering system did eventually operate automatically and extinguish the engine room fire, but by then the fire in the accommodation was well alight. This set off an automatic radio alarm ashore, which brought the normal ship's engineer (who had been ashore) racing to the scene in a high-speed vessel.

All the passengers were evacuated to the liferafts and to other vessels nearby, and no-one was injured.

It should be made clear that this vessel was built before the current regulations came into effect. Accommodation outfit materials were combustible, and the electrical power supply did not have the necessary devices to shut itself down automatically. What is important is that the crew and operators of that vessel were untrained in the use of the fire-fighting equipment, and furthermore there was very little if any Total Quality Management in place, highlighted by a regime that allowed fuel to remain in the bilge. It can be argued that the cause of this accident lay ashore.

This was a case where only a part of the safety philosophy had been put into place and not the entire requirement. The fact that the vessel was a catamaran helped in that the fire was to one side, and the vessel could be evacuated on the opposite side fairly easily. If an attempt had been made to extinguish the fire, then the fire pump on the port side was still fully active even though the other engine room was out of action.

The Grounding of Condor II.

On the 9th October 1994, the latest car-carrying aluminium 78 metre wavepiercer "Condor 11" was undergoing shipyard trials in the Derwent River estuary in Hobart. It had been a long day, and many

small things had gone wrong. Night had fallen and everyone was tired. The master was also the shipyard owner, and he was a very experienced navigator who knew the waters extremely well, and hadextremely good boat-handling skills.

As with many trials procedures, it was common practice to pass through two known positions for the purposes of timing the passage and thence deduce the vessel speed. At the northern end of the run was a small rocky outcrop known as Black Jack Rock, which had a small beacon on it. It was this beacon that served as a timing mark. (There may also have been some speed advantage in passing close to the mark, as the water was more shallower there.) It was common to pass very close to the mark, possibly as close as five to ten metres, and on this particular night the Master misjudged the distance. Because several people in the wheelhouse were actually looking at the mark for timing purposes, there was time for a brief exclamation before the ship hit the rocks at about 38_ knots.

From examination of the damage afterwards, it is surmised that the vessel struck the rock with one hull first, and this lifted the vessel upwards and slewed it around. The craft would have had a certain degree of dynamic trim by the stem, as well as having a rise of keel, and this keel inclination would have also helped to provide an upwards motion to the vessel. The vessel came down again, and it appears that this is when most damage may have occurred.

The main engines and generators continued to run and were manually closed down. It was very quickly obvious that the boat was stuck on the rocks and was not floating, and therefore the safest procedure was to remain on board. There were a few injuries of a moderate nature (a broken leg, bruises etc) caused by the rapid deceleration. The crew slept onboard overnight until the vessel could be evacuated in daylight. The subsequent salvage of the vessel is another story that can be told elsewhere, with the vessel sustaining possibly as much damage in being removed from the rocks as it did getting on to them. The vessel is now successfully trading in Denmark..

The extent of the damage was large, encompassing the bottom metre of the vessel from the forward perpendicular through to the engine room bulkhead on both sides. (The starboard side engine room plating was pierced in one place with a small hole). In general terms the bottom frames were tripped back and the plating pushed up.

There are many "ifs" to be considered in this experience. If the vessel had been a conventional vessel of steel it would have decelerated at a much greater rate and the injuries could be expected to have been much greater. It is possible that a conventional vessel might not have gone on to the top of the rock in such a spectacular fashion and might have sunk. Certainly the vessel appears to have saved itself by being so lightweight and strong. However if the vessel had not stopped then it might have continued over the rock and floated on the other side. From an analysis of the damage it is unlikely that the vessel would have sunk in this scenario, although there would have been a considerable trim by the bow. It is unlikely that a monohull would have floated with a similar extent of damage.

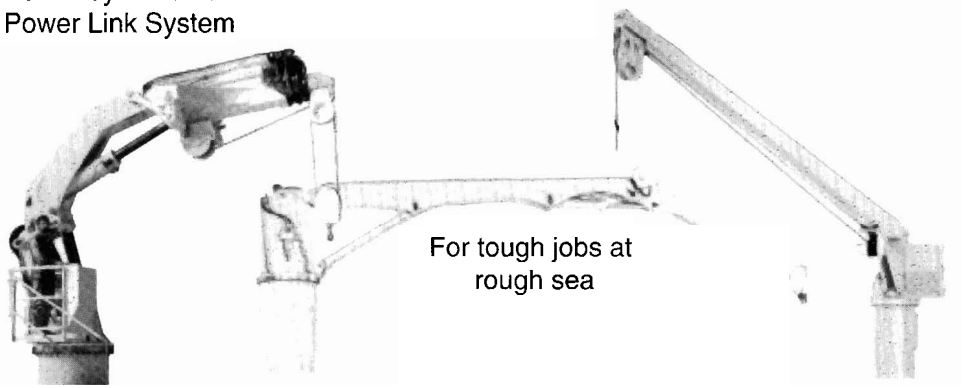
When the vessel was eventually pulled free of the rock, the air vents were sealed and the vessel towed back to the shipyard on the air pressure in the hulls. This has led to the argument that the air vents should be normally closed so that the vessel can float on the air pressure in the case of such damage, because the air vents are not required to prevent corrosion where the hull is of aluminium. However such arrangements may make it difficult to allow for regular inspections of the hull voids because of foul air.

This incident illustrates how immensely strong these vessels are. The hull structure remained intact, although the bottom metre was somewhat re-arranged. The overall geometry of the vessel was not altered, because there is a large amount of structural redundancy.

It is probable that this was an accident where the vessel (and passengers) were saved because the vessel was constructed from aluminium rather than from steel.There has been a previous occurrence of a small aluminium passenger catamaran striking a reef at speed, hurdling the reef and continuing on the other side without breaching the watertight integrity of the shell plating.

PALFINGER MARINE

Power by the unic
Power Link System



For tough jobs at
rough sea

The oustanding provision &
cargo handling crane

THE COMPLETE MARINE CRANE RANGE

PALFINGER

Australia Pty. Ltd.

BRISBANE
93 Formation Street, Walcol, Q. 4076
P.O. Box 273. Inala, Q 4077
Phone: (07) 3271 5811
Fax: (07) 3271 5822

NEWCASTLE
2c John Street, Wallsend,
N.S.W. 2287
Phone: (049) 55 5277
Fax: (049) 55 5166

PCRANE

SYDNEY
1 Kay Street, Granville,
N.S.W. 2142
Phone: (02) 9897 1410
Fax: (02) 9897 3569

MELBOURNE
338-340 Hammond Road,
Dandenong, Vic. 3175
Phone: (03) 9706 5084
Fax: (03) 9706 5237

It would appear to be prudent, from considering this experience, to design large high-speed vessels with a double bottom forward of the engine room. This has been done with the Seajet, designed in Australia and now in operation in Denmark, and also with the new ferries under construction in Canada for BC Ferries, also an Australian design. There is however a size below which it is impractical to fit a double bottom, and there is of course a substantial weight penalty to pay and a loss of speed. It is also unfortunate that this double bottom structure is at a position where it contributes very little, if anything at all, to the global strength of the vessel, being located very close to the neutral axis.

A Collision Between Two High-speed Ferries

This incident occurred in the Pearl River estuary when a high-speed catamaran ferry approached from abeam and then passed behind the stern of a large container carrier. Unfortunately another high-speed catamaran ferry was approaching from the other side of the container vessel and it also passed astern. The two high-speed ferries collided in a classic "T-bone" fashion.

One vessel remained embedded in the other and no attempt was made to remove them whilst the passengers were evacuated. When the vessels were separated the vessel with the damaged bow floated close to the normal waterline, and was found to be damaged back to the collision bulkhead. The other vessel was substantially damaged with penetration completely through one hull approximately to the centre of he vessel. Unfortunately on this vessel a few passengers were seated on the side of the collision and were killed. After separation, this vessel floated, although the foredeck was under water and there was a substantial heel and trim.

This example illustrates the immense strength of the narrow hulls of aluminium catamarans. The most frequently asked question about the high-speed of these types of ferries is what happens when they hit a partly-submerged steel container? Ignoring the question as to whether there is in reality such a thing as a partly-submerged container (usually they would either sink or float), then the answer would appear to be that the vessel would rise up above the container, pushing it down, and would slash the container open. The craft hull would sustain superficial damage, but it is considered unlikely that the watertight integrity would be breached.

4. The Australian Shipbuilders and the Australian Safety Authority (AMSA)

The Australian Shipbuilders recognise that safety is the prime factor in the design and construction of high-speed vessels. Having built more of these types of craft than any other country, there exists a wealth of experience of the problems that can be encountered, particularly with the wide variation of interpretation of the rules.

The various shipbuilders have also seen a wide variation of interpretation of the regulation by different Administrations. In one particular case, the Flag State of Vessel A accepted a particular type of cabin lining, which had the required low flame spread characteristics. For another ship of almost identical size and capability, building at a different shipyard, the Flag State for Vessel B would not accept the same material. Both ships were eventually completed and went into service.

Now the interesting thing is that Vessel A (with the unacceptable lining) is in operation between the two countries represented by Flag States A & B, and is carrying the nationals of Flag State B, who deemed the material to be unacceptable. The conclusion is that Flag State B does not really care about the safety of its nationals, rather it just wants to get the paperwork right. The difference in cost between the two vessels to change the cabin linings was about Aus$ 1.3 million, representing some expensive paperwork, and some considerable frustration by the shipyards.

The Australian Maritime Safety Authority (AMSA) is the national body representing Australia at IMO. There are no high-speed craft certified with AMSA (although there have been), and it is unlikely that there will ever be very many certified craft, because of the distance of Australia from other countries. AMSA therefore might be expected to have little interest in these types of craft.

This in fact has not been the case, and AMSA has taken an active role in the production of the HSC

Code, and is expected to take a similar role in its review. This acknowledges the importance of the high-speed craft building industry to Australia, and represents an attempt by Government to support the industry as much as possible. AMSA maintain a close liaison with the Shipbuilders so that their problems are understood, and it is anticipated that by this means useful feedback can be provided to IMO with the aim of improving the HSC Code.

4. Research into Regulatory Problems

There is a considerable amount of research being carried out into proposed new regulations, and none of this is known to involve catamarans.

An example of the research that has been carried out is that of the amount of water that may accumulate on the vehicle deck of a RoRo. The Regulations issued by the Regional Agreement on RoRo Ferry Safety require 0.5 metres of water on the vehicle deck in the damaged condition. This figure was arrived at after model testing and numerical studies on a wide variety of monohull shapes in beam seas when damaged.

The catamaran behaves entirely differently in a beam sea to a monohull. It does not roll like a monohull, rather the individual hulls move vertically with the passing waves. Consequently the research that found that 0.5 metre of water might typically accumulate on the vehicle deck of a monohull has no bearing on the amount of water that might accumulate on the deck of a catamaran, and the application of this regulation to catamarans is not only unnecessarily onerous to catamarans but also practically meaningless. It represents the application of a greater level of safety for catamarans, rather than applying an equivalent level of safety.

There needs to be more research carried out on catamarans and their behaviour, rather than apply conventional monohull results, and similarly there needs to be an awareness that high-speed catamarans are increasing in numbers and safety issues cannot be thought of in terms of conventional monohulls terms.

6. Conclusion

Catamarans are the safest way to travel by sea. Not only do they have inherent safety features such as very high damage stability characteristics, and a large degree of redundancy by the very nature of having two hulls, but they are being asked to meet considerably higher standards than conventional vessels and even other types of high-speed craft.

This situation has been brought about by the IMO process where individual topics (outside the HSC Code) are discussed and new regulations written in different sub-committees, and very few of these sub-committees have any experience of the characteristics or behaviour of catamaran high-speed ferries. Lacking this information, the regulations become more and more restrictive, and end up as imitations of SOLAS philosophies instead of acknowledging that an equivalent level of safety can be achieved by alternative means. The philosophy of the HSC Code needs to be disseminated amongst all those who attend IMO if we want to embrace better and safer methods of travelling by sea.

7. Acknowledgements

The opinions expressed are entirely those of the Author, and do not necessarily represent those of the Australian Shipbuilders Association nor its individual members.

8. References

1.ARMSTRONG, N. A. - "Safety Aspects of Catamaran Fast Ferries", Cruise & Ferry Conference, 1991

POSITIONS WANTED

If you are a naval architect or naval draftsman seeking work or an employer looking for staff this is the spot for you. Contact the editor. Advertisements for unemployed members are free.

Proven choices for long life propeller shaft bearings

INCREDIBLE
THORDON
MARINE BEARINGS

- **Thordon XL** has exceptional wear life with smooth operation throughout a range of conditions. Low friction and good abrasion resistance is why Thordon XL is one of the world's most sought after propeller shaft bearing materials.

- **Thordon COMPAC** provides the best wear life in a cleaner water environment. A low inherent coefficient of friction ensures low shaft startup torques with quiet, stick-slip free operation. Hydrodynamic conditioning achieved at much lower shaft speeds, increasing bearing and shaft life. Class approved at an L/d ratio of 2:1. Reduced bearing, housing and associated machining costs.

Thordon bearings are fitted to the A-bracket on all Anzac Class ships

- **Thordon COMPOSITE** is specifically formulated to deliver outstanding wear resistance in very abrasive water conditions.

For help in selecting the best long life Thordon bearing for your specific propeller shaft application, call, fax or write to Jacmor today.

Jacmor Engineering Pty Ltd

136 Bell Street Preston
Victoria Australia 3072
Telephone (03) 9480 5000
Fax (03) 9480 5893
NSW: Unit 24/1 Cowpasture Place
Wetherill Park 2164
Telephone (02) 9756 5208
Fax (02) 9756 2784
Distributors in all states.

FreeCall 1800 33 4005
A WHOLLY AUSTRALIAN OWNED COMPANY

JACMOR

Marcom JAC050