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7 Editorial comment

The trouble with capacity

8-14 News

- 8-10 News
- 12-14 Equipment news

16-23 In-depth

- 16-20 **Ice-going ships** | Ice makes a difference
- 22 **Shipbuilding** | Wilhelmsen gets the whole packet
- 23 **Environment** | Chamber favours emissions trading
- 23 **Environment** | Lighthouse lights the way

84 Book review

85 Letters

90 Diary

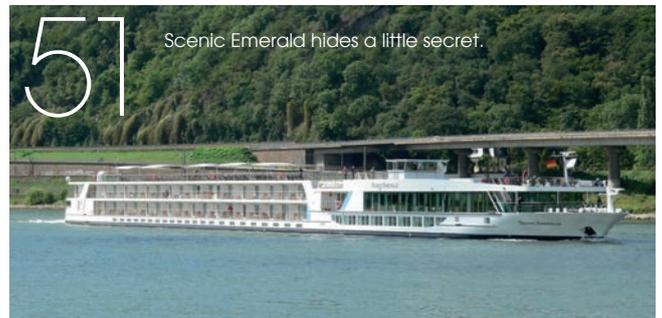


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25-83 Features

Feature 1 Cruiseship technology

- 25-34 Maximum squats for *Victoria*
- 36-39 ABB at the heart of the *Solstice* celebration
- 41-43 Industry awaits scrubbing solution
- 44-45 Aker Arctic takes pole position
- 46-47 G.A.P closes on *Expedition* safety
- 48 STX in cruise debut
- 48 *Eclipse* on the Horizon
- 51 Minimax out of sight
- 51 ESD gets Florida approval
- 52 Waste not, want not
- 52 EVAC brings quiet relief
- 53 Marlink stays connected
- 54 Boldt on deck
- 54 Api down on the floor
- 55 Estillon floors the cruise market
- 55 Voyager in luxury

Feature 2 Finland's marine industries

- 56-59 A year of consolidation
- 60-63 The rub of the green
- 64-65 Wärtsilä aims to side-step crunch
- 66-67 VTT remains leading light
- 68 Eniram trims fuel cost
- 69 Vision at the cutting edge
- 71 Vacon gives thrusters a boost

Feature 3 Cranes and cargo handling

- 73 Emerson gets with the marine programme
- 73 MacGregor supplies flexible solution
- 75 Fibres get near to the knuckle
- 76 Aker contracted for offshore loading system
- 76 Langh ships cradle thrown into the deep
- 79 On-site bearing replacement
- 79 Explosive warning for shipping

Feature 4 Indian report

- 81-83 From here to uncertainty



On-line Edition

The Royal Institution of Naval Architects is proud to announce that as of January this year, *The Naval Architect* journal has gone digital. We are very pleased to inform the maritime industry that each issue will be published online, on the RINA website. Visit www.rina.org.uk/tna and click on the issue cover you wish to view. This means that the entire publication, including all editorials and advertisements in the printed edition, can be seen in digital format and viewed by members, subscribers, and (for a limited time) any other interested individuals worldwide.



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OPTIMIZING RESOURCES



The trouble with capacity

Time to reflect on the consequences of overcapacity.

Financial meltdown, economic slowdown, declines in seaborne trade, crashing freight rates, high operational costs are not seemingly the ingredients of a good news story for shipbuilding, particularly at a time when 5% of the containership fleet is reported laid up and, in the Capesize market, the number of ships on order exceeds the number of ships in operation. However, Reinhard Lünen, secretary general of the Community of European Shipyards Associations suggests that the financial conditions currently defining world markets may come to be seen as the wake-up call shipbuilding has needed to dissuade it from a capacity binge that, should it have come to pass, would have undermined the very structure of the industry.

“The good thing about the current crisis is that, very clearly, the development of much of the new capacity will not now take place,” Dr Lünen told the first SMM Istanbul Conference, staged in mid-January, without a trace of irony. “Maybe in 10 years time we will say how lucky we were to have a crisis in 2008, so that we did not get all of this capacity that we do not need. If all of the yards discussed had been implemented, capacity would have been such that we would have been living with the consequences for the next three decades.”

Dr Lünen points out that, in September 2008, even before the world’s financial crisis had bitten heavily into shipbuilder expectations, the expected annual newbuilding requirement for 2010 was 35 million gt, against a forecast newbuilding capacity of 57 million gt. By 2014, with the newbuild-

ing requirement pegged at 35 million gt, capacity was expected to have reached 70 million gt.

Now, Dr Lünen went on record as saying, CESA’s expectations were that some 15

“European shipbuilders should not expect, or even desire, governments to step in to save their skins on a bridging basis in prevailing market conditions”

million gt of orders would likely be cancelled in the period 2009-2011. He made no estimate of the volume of options that would be withdrawn.

“Wherever you can, reduce capacity at this stage as quickly as possible,” he said..

The brunt of the order evaporation is being felt by hard to finance greenfield yards, the very players that threatened to visit massive overcapacity on the market, even should the ‘good times’ have proved sustainable.

Dr Lünen said that it was critical that European shipbuilders “must not cut future orientated activities first”. He added that

European shipbuilders should not expect, or even desire, governments to step in to save their skins on a bridging basis in prevailing market conditions.

Speaking to *The Naval Architect* after SMM Istanbul, Dr Lünen amplified this part of his remarks, even in the context of January’s liquidation of Italy’s De Poli yard and the wholesale resignation by management at a leading Polish shipyard, and the continuing travails of shipbuilders in Croatia.

“There is excess capacity, and where does it come from?” asks Dr Lünen. “Not from Europe, that is for sure. We have not created this problem and we are the only ones with an anti-subsidy policy. What happened in Spain and Poland showed that the European Commission very strictly enforces its rules, and we would love to see the same approach being taken at a global level.”

Rather than propping up ailing yards with state subsidies, Dr Lünen said that the “masters of economic theory”, and “politicians and analysts who live in a bubble” would be better placed turning their attention to creating the best business conditions for manufacturing, “whether that be through environmental legislation, the tax regime, or social security. They should be focusing on the factors that determine competitiveness. While we prefer a world without subsidies, it is fair to say that, rather than working against manufacturing and keeping their attention on the services sector, they should be focusing on developing competitive structures. And that goes for Europe and the US.” *NA*

Containerships

13,800TEU giant enters fray

The biggest containership ever classed by Germanischer Lloyd (GL) was delivered in mid-December at Samsung Heavy Industry Shipyard in Geoje, Korea. The newbuilding, named *MSC Daniella*, has a capacity of 13,800TEU.



The 13,800TEU capacity *MSC Daniella* is the biggest containership ever classed by Germanischer Lloyd.

MSC Daniella is exceptional not only in terms of size, but also in her design overall. To meet SOLAS requirements for bridge visibility on the large containership, the design includes the separation of deckhouse and engine room. The arrangement of the deckhouse in the forward part of the ship permits an increase in container capacity and a reduction in ballast water. In addition, the international regulations on the protection of fuel tanks are being fulfilled, since they are located in the protected area below the deckhouse.

Also, reduced bending, as well as increased stiffness of the hull, were realised in the design. The use of high tensile steels (HTS) was a prerequisite for building the mega box ship. Due to HT steel the plate thickness had been reduced to allow lightweight and strong ship construction. This was necessary to keep the plate and stiffener dimensions at an acceptable level.

Systems

Fincantieri and ABB join forces

Shipbuilder Fincantieri and systems supplier ABB S.p.A. have signed an agreement to create an equally owned joint venture in Italy for the design, develop-

ment, and delivery of marine integrated automation systems for the naval, cruise, ferry and megayacht markets. The company will be headquartered in Genoa.

The venture has been established to exploit the way that integrated automation systems are playing an increasingly important role in shipbuilding, facilitating the development and construction of single control platforms, with considerable benefits for ship functionality, performance and maintenance.

Design

Offshore designers consolidate

IJmuiden-based Offshore Ship Designers (OSD) has adopted a more integrated approach to work sharing. Design teams in IJmuiden, Montrose, Escrick, Bideford and Shanghai will henceforward operate under the OSD name. The office in Bideford is new.

OSD's IJmuiden office was formerly WorldWide Marine Engineering, now renamed OSD Holland. It will lead the group's tug and harbour craft work. Montrose and Escrick are the former IMT Marine Consultants teams, now renamed OSD-IMT, and leading the group's continuing focus on cost-effective offshore service vessels. The Bideford office will add expertise on cargo ships, patrol vessels, dredgers, ferries and yachts to the group. OSD Shanghai retains its name.

Michiel Wijsmuller, managing director of OSD, said: "WorldWide Marine and IMT are now an integrated design company with solid engineering capacity but above all, a strong independent presence in all the key markets. There are hardly any truly independent ship design companies now, especially in the offshore world. Most of them are tied to engine and equipment manufacturers."

Propulsion

Becker signs Mewis Duct first

Becker Marine has signed its first order for its Mewis Duct fins, designed to stabilise water flow to a ship's propeller. Three units have been ordered by Grieg Shipping Group AS, of Bergen (Norway), for retrofit to 16knot capable, 46,000dwt vessels of 185m length, ranging in age between 10 and 15 years.

Becker expects to improve propulsion efficiency by at least 5%, although model testing will establish the anticipated improvement in detail. The first Mewis Duct fin will be installed at the beginning of July 2009.

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Plus the new ST14 TV-at-Sea antenna features an advanced pedestal assembly, made of durable nylon polyamide injection molding used on aircraft antennas. Tests reveal 1.3 dB more signal than competitors.

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Becker said it was now “looking forward to auspicious success because of the huge interest [in] the Mewis Duct from the shipowner side.”

Systems

BMT leads electric ship study

BMT Defence Services Limited, a subsidiary of BMT Group, is heading a consortium of 30 companies to investigate the commercially effective application of electric ship technology in a €23 million European Union funded project.

The Power Optimised Ship for Environment with Electric Innovative Designs ON board (Pose2idon) project will see BMT Defence Services co-ordinate the activity of the consortium, which includes Converteam Technology Limited, DCNS, DNV, SAM, Sirehna, GICAN, EMEC and BALance.

The project will aim to enhance the electric ship concept so that it can be applied to a wider range of vessels than is currently the case. The Pose2idon consortium is focusing on achieving size reduction through the development of new technologies across all aspects of marine electrical engineering. A key element of this will be the application of state of the art High Temperature Superconductivity (HTS) technology, provided by Converteam Technology that will allow for smaller principal electrical components and an increase in efficiency.

Propulsion

Not so smooth lubricants

The shipping industry could be sailing into another lubricants shortage – this one potentially more serious than the supply crunch of four years ago, writes *Neville Smith*.

Most of the supply problems during 2004/2005 were related to shortages in additive manufacture, caused by damage to plants in Singapore and New Orleans. While causing prices to rise as availability tightened, the pinch was temporary.

Now, industry analysts are warning of structural changes to the lubricants base oil business which will have a longer-term impact.

The base mineral oils used in most conventional lubricants – including marine engine oils – are based on so-called Group I base oils, which have been the predominating standard for decades.

In many non-marine applications, these base oils are being replaced by Group II and III products,

which give better performance, prompting the closure of older Group I refineries.

But some of the particular grades of base oil needed for marine engine oils, particularly brightstock, cannot be produced on Group II or III refineries prompting concern about availability.

By one estimate, about 8000 barrels per day of brightstock has been taken out of the market in the last decade as Group I plants closed, despite demand continuing to rise.

It is believed that some of the major marine engine oil manufacturers are undertaking the process of reformulating their products in order to minimise these problems, but that this project could take five years to complete.

CAD/CAM

GL's new Friendship

Maritime consulting and software companies Friendship Consulting GmbH and Friendship Systems GmbH are now members of the Germanischer Lloyd Group. The acquisition expands GL's advisory services for shipping companies, yards and the maritime supply industry. It will be able to offer its maritime and industrial customers a range of additional software programs to optimise the design process. GL said that, due to the great complexity of relevant systems, mathematic models are playing a key role in developing designs that would achieve lower fuel consumption.

Friendship Systems, centred in Potsdam, supports computer aided engineering (CAE) for ship hulls, propellers, turbines, pumps and other units.

Shipbuilding

STX looks forward

STX Europe has said that the first half of 2009 will see it focusing on developing concept ideas for future vessels, as its newbuilding orderbook dries up. In January, the group announced plans for 1060 redundancies at its Turku yard, Finland.

In the short term STX Europe says that 2009/10 will be a time of high activity for its yards, but its immediate focus will also include working with shipbuilders and owners on future ship concepts that are more environmentally efficient, to better meet regulations that start to come in to effect this year, and also to look at improving ergonomics on future ships. The designs will then be presented as options to buyers when the market starts to pick up.



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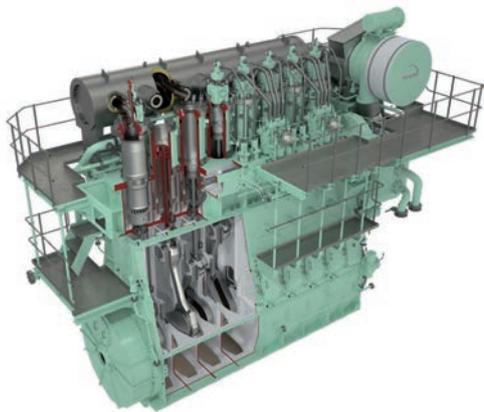


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Propulsion

MAN S35ME-B gets approval

MAN Diesel has performed a main engine Type Approval Test (TAT) for the smallest member of its electronically-controlled ME-B family. The test programme for the MAN B&W S35ME-B ran for three days. All members of IACS were present for a



MAN S35ME-B passes TAT testing.

presentation of the engine, test bed trials, tests of safety devices, survey of performance data and thorough inspection of engine internals and dismantled key components. The engine is the second S35ME-B unit produced in Denmark, developing 6960kW at 167revs/min, in an 8-cylinder execution. Like its predecessor, it will be delivered to Soli Trading & Shipbuilding Industry S.A., Turkey. Powering a newbuilding, the 8S35ME-B engine will be fitted to drive MAN Diesel's 4.4m Alpha CP Propeller type VBS 1280 and from the front-end, a 1200kW step-up gear and alternator.

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Propulsion

HHI awards Ricardo V16

The latest design and development of a V16 gas variant of the H32/40 series of medium speed diesel engines for operation on compressed natural gas fuel, has been announced by Ricardo UK Ltd.

The scope of work will see Ricardo UK Ltd assist HHI with a complete new engine development programme that is scheduled over 26 months. The first phase of work will involve the concept design of the engine, which will range from market surveys, outline component and system specification and initial supplier selection to the production of a full concept design layout. In the second phase of the programme the design of the engine will be developed in detailed form, supported by extensive use of computer aided engineering methods. The penultimate phase will see the procurement of parts and build of the V16 gas variants of the H32/40 series power generation and marine propulsion family of engines.

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Software

Creative systems updates

Creative Systems, Inc has added new functionality to its General HydroStatics (GHS) software. Version 11.50 of the package includes the ability to run an analysis for accidental oil outflow performance required by the International Maritime Organization (IMO). This regulation will apply to all ships delivered on or after August, 2010. "We focus on the tool, not the regulation," explains Bill Plice, Creative Systems president and the creator of GHS software. "In that way we give the power to the naval architects and engineers to interpret the regulations and design a vessel accordingly."

Meanwhile, the company has been broadening its representation to take into account new market demand. Company business manager, Julie Knott, says: "For instance, we've always had a presence in China, but we have a much stronger presence with the addition of Singtong Marine & Offshore, our newest GHS distributor." In its first year as a GHS distributor, Singtong brought GHS to several naval architecture and engineering firms, including a key university. Singtong has the technical expertise to train customers, as well as distribute GHS software.

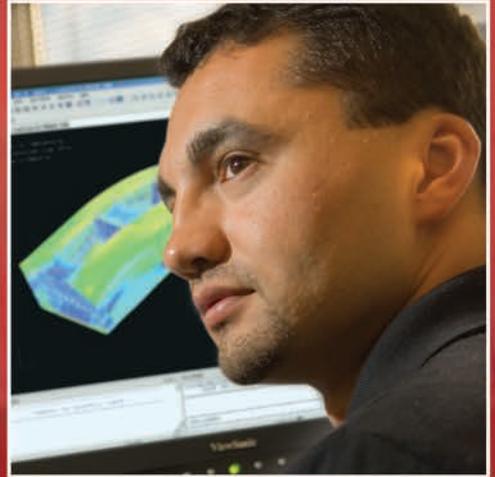
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Auxiliary equipment

Cathelco Brazilian venture

Cathelco has set up a joint venture with Workshop do Brasil, the Rio de Janeiro-based marine equipment supplier, which will now be known as Cathelco Brasil.

The venture will oversee the kitting out of 10 x 157,000dwt crude carriers on order for Transpetro with Cathelco Jotun marine pipework anti-fouling equipment in conjunction with Impressed Current Cathode Protection (ICCP) and hull corrosion protection systems.

The ICCP equipment will consist of a 150amp forward system using elliptical anodes and a 600amp aft system using linear loop anodes which emit a powerful current from a relatively small surface area. The pipework anti-fouling system will protect two sea-chests on each ship using copper and aluminium anodes connected to a control panel.

In December, Cathelco Brasil won an order to supply a series of five 2700dwt container vessels with ICCP equipment. The ships are being constructed at the Eisa Istaleiro Ilha yard in Rio for Log-In Logistic Intermodal and will each have 350amp forward and aft systems.

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Auxiliary equipment

Ecospec launches CSNOx

Ecospec Global Technology Pte Ltd has launched CSNOx, a new system designed to reduce nitrogen oxide sulphur dioxide, carbon dioxide and particulate matter emissions from ships in a single process system. The scrubbing process is claimed as being achieved at a net carbon credit gain without any net increase in CO₂ to the atmosphere or acidifying of the ocean. There are also no other secondary pollutants discharged into the sea, according to Ecospec. Due to its compact design CSNOx, is easy to install on ships.

Drawing from its core technology in water and oil treatment in its development, Ecospec has tested CSNOx onboard an ocean-going supertanker, jointly with ABS, and a tanker shipping company.

The results of the test show that the device has 92.9%, 82.2% and 74.4% efficiency for scrubbing SO₂, NOx and CO₂ respectively, according to Ecospec.



The CSNOx technology developed by Ecospec.

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Auxiliary equipment

MiKO gets the drift

Miko Marine AS, of Oslo, has begun work on the ShipArrestor project following the signing of a contract with the European Union in October 2008.

The two year project is aimed at developing a technique that can enable a tow line to be attached to an unmanned vessel and used to reduce the drift of ships that have experienced a loss of power, to reduce the chances of grounding and the pollution.

Miko Marine holds the patent for the ShipArrestor principle, which is designed to enable a conventional Search and Rescue helicopter to deploy a tow line around the winch gear on the foredeck of an abandoned vessel. The helicopter can then lay the line upwind, and release it attached to a sea anchor. The effect upon the ship will be almost immediate so that it is turned into the wind with its drift speed reduced by 50%. A tug can then pick-up the the sea anchor and ShipArrestor line and effect a rescue. If a ship is already drifting close to shore, the use of a sea anchor may not be appropriate, in which case the helicopter may deliver the line directly to the first available rescue tug.

The concept of the sea anchor is already well known to seafarers but, until now, its use has been restricted to smaller vessels. Part of the project will include the mathematical modelling needed to identify the size of sea anchors needed for ships of different tonnages.

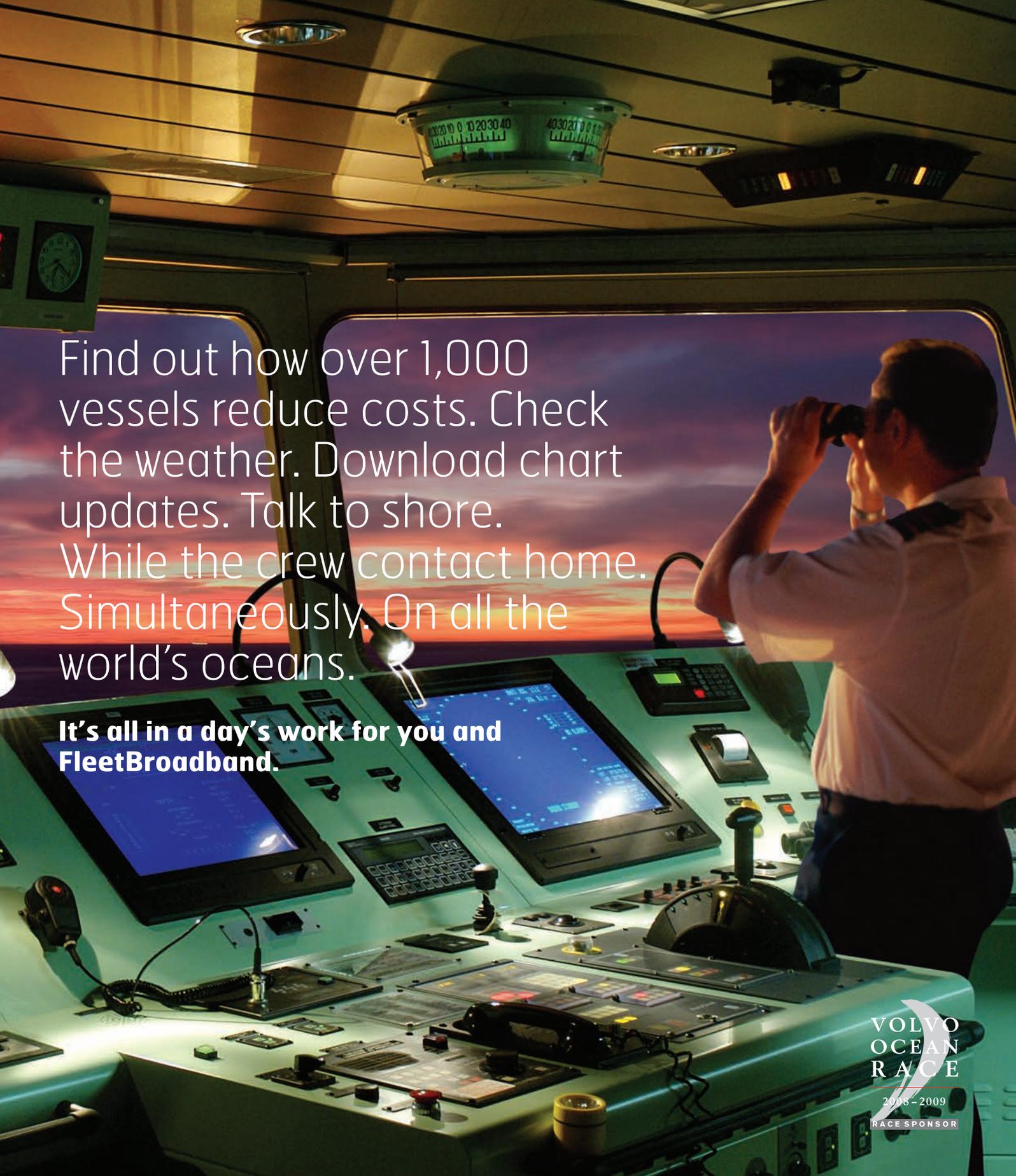
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Ice makes a difference

Interacting forces and moments generated when ships are overtaking or passing each other at opposite headings in ice channels have a very different type of variation when compared to well-studied hydrodynamic interactions in open water. A submission from Professor Vadim K Goncharov, Natalia Yu Klementieva, and Kirill E Sazonov*.

The growth of oil shipments from the Gulf of Finland in the Baltic Sea calls for special investigations to ensure the safety of navigation in the winter season when the Gulf is covered with ice. These studies have been founded by the European Union under the MS GOF Project (Marine Safety in the Gulf of Finland).

In many cases ship collisions at sea occur when ships are overtaking or passing each other in opposite directions and the beam distance between the vessels is reduced, so that their hulls get involved in hydrodynamic interaction. This kind of interaction gives rise to side forces and yaw moments affecting the behavior of both vessels. Analysis of accident statistics shows that hydrodynamic interaction of hulls account for 10% of collisions and contacts between ships sailing in opposite directions, and for 17% of such accidents when one ship is overtaking the other one.

This problem is particularly urgent for ships sailing in a narrow ice channel. These navigation conditions are typical of the Gulf of Finland with relatively shallow water depths and an increasing number

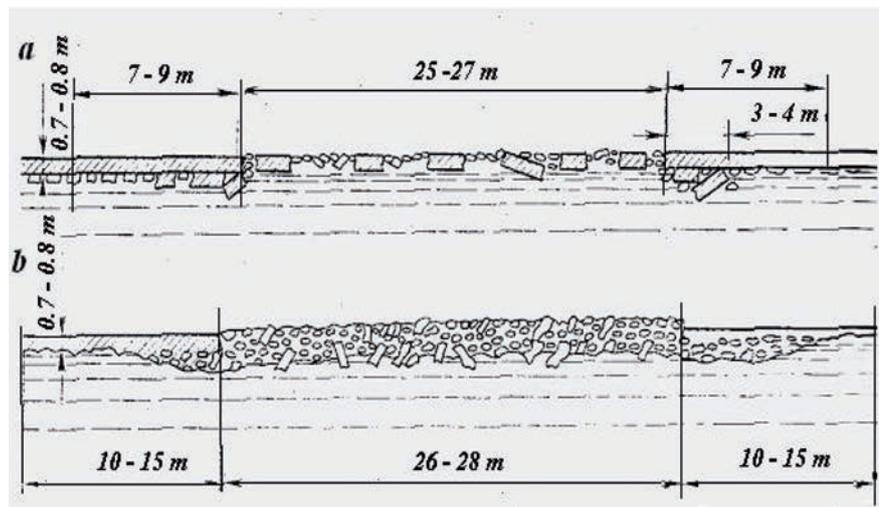
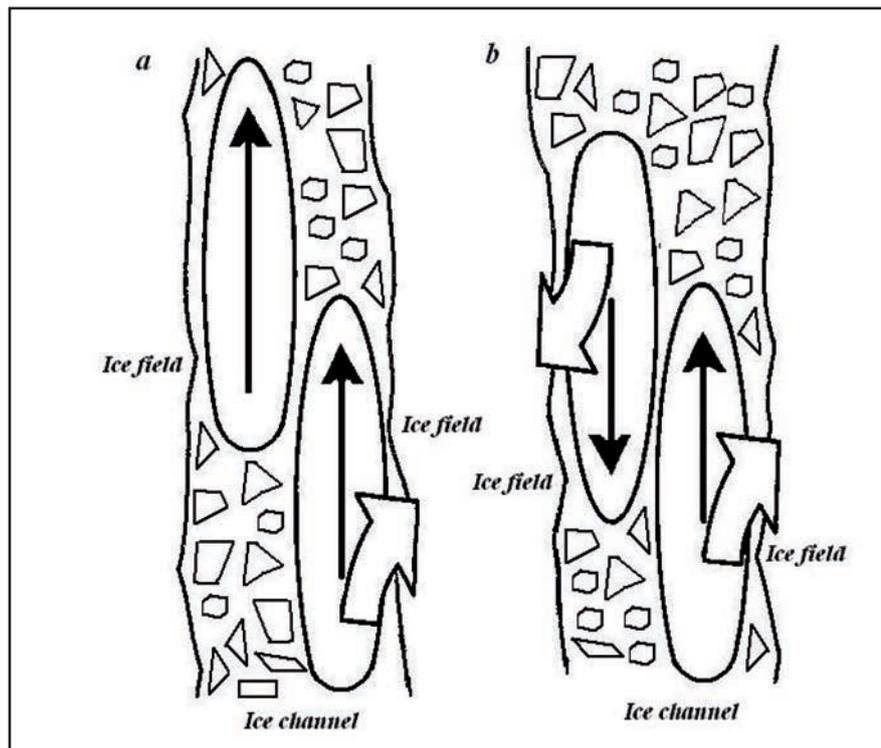


Figure 1. Structure of the navigable ice channel at initial stage after an icebreaker created it (a) and after multiple ships' passages (b).

Figure 2. Possible variants of accident under traffic of ships within navigable ice channel: the drop-off on channel edge under overtaking (a) and under opposite motion (b).



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of vessels sailing in a limited number of navigable channels accessible for larger ships.

In accordance with traditional ice navigation tactics, vessels move in a convoy formation led by an icebreaker making its way along navigable channel through ice cover. In this case the order of ships in the convoy is fixed and established in accordance with the ice-going capability and engine power of specific vessels. Overtaking is forbidden.

Icebreakers are used to restore and maintain existing navigable channels in the Gulf of Finland when these are frozen in winter season. These channels in ice are relatively wide and practically have the same width as a normal ship waterway. The vessels navigating in these ice channels have different sizes and speeds; therefore vessels often overtake each other or sail in opposite directions. The number of large oil and product tankers is significant. Accidents with laden oil tankers manoeuvring in ice channels may result in great oil spill and environmental disaster.

The pattern of navigable ice channels made by icebreakers is changing over time. Initially, the “fresh” ice channel is filled with broken ice pieces measuring across from 2m up to 20m (Fig.1a). Later, under the action of two processed - ice freezing in the channel and continuous ice breaking by ships - the ice channel is gradually filled with small ice cake and brash ice. The ice pieces in the “old” ice channel are not larger than 2m across. The brash ice layer in the channel could be much thicker than the intact level ice around the channel (Fig.1b). Navigable ice channels of different widths experience a similar evolution in their patterns.

In analysing the safety of navigation in an ice channel with manoeuvring constraints, it is necessary to consider ship interactions in the cases of opposite and overtaking movement. The hydrodynamic interactions between vessels in open water have been studied in sufficient detail, but the effects related to distance from an ice channel’s boundaries and ice pieces in the channel, which fill space between ship hulls, have not been investigated so far.

Under these conditions, the decisive factor is the effect of ice pieces on the ship’s

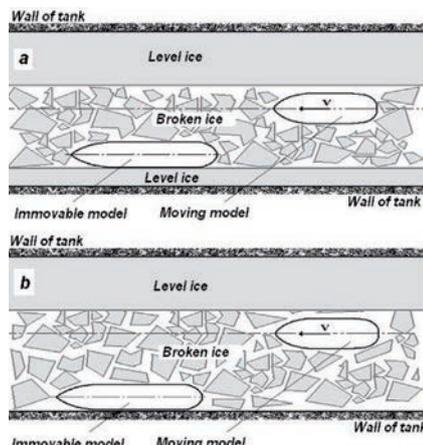


Figure 3. Schema of experiment in the ice-towing tank: narrow (a) and wide (b) variants of the navigable ice channel.

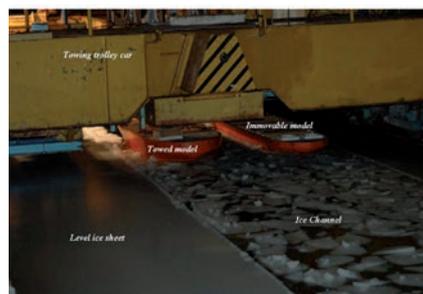


Figure 4. General view of test in the ice-towing tank: the narrow ice channel variant.

hull combined with the hydrodynamic forces and moment. The ice forces and moment are expected to play the dominant role in the interaction of vessels in ice channels because ship speeds in these channels are low in relation to open water conditions. The experimental and theoretical studies initiated in the MS GOF Project focus on the ice forces and moments versus the ice cover properties, ice channel dimensions and kinematic parameters of ship motion.

A prior analysis of emergency situations, which may arise in ice channel, indicates that apart from mutual attraction of ships known from open water experience some other effects may take place. First, one or both vessels could be pushed against the ice channel edge when overtaking (Fig. 2a) or passing by in opposite directions (Fig.2b). This incident can be caused by a significant yawing moment, which is not compensated by rudder deflection in a timely fashion.

Under the MS GOF Project, the special-purpose model investigations regarding ice effects on an overtaking ship in an ice channel were carried out in the Ice Basin Laboratory of the Krylov Shipbuilding Research Institute for the first time in the world. The experiments were performed on two special ice-going ship models of $L1 = 3.8\text{m}$ and $L2 = 3.0\text{m}$. The longer model was fixed, while the other model was towed by tank carriage. The loads (forces and yaw moment) were measured only on the towed model by a dynamometer mounted on the carriage. The studies focused on the navigation scenario in the fresh ice channel. Two ice fields of 30mm and 50mm thickness were modelled.

Before each experiment, a channel was made throughout the full length of the tank. The ice in this channel was broken into pieces of approximately equal size. The fixed ship model was positioned either by the channel edge, one meter away from the tank side (Fig. 3a), or by the tank side (Fig. 3b). In the first case a narrow channel was modelled, while in the second case a wide channel was modelled.

The tests were carried out at towing speeds of 0.1m/sec, 0.2m/sec and 0.3m/sec. In the narrow channel case, the distance between the model’s sides was 0.51m and the distance of the towed model from the ice edge on the opposite side of the channel was 0.2m. In the wide ice channel case, the distance between model’s hulls was enlarged to 1.80m and distance of the towed model from the channel border was 0.4m. After each test run the ice pieces forced apart by model hull were brought back to ensure their uniform distribution on the channel surface.

The towed model was connected to the carriage via a three-component dynamometer to measure two forces (resistance and side force) as well as yawing moment in the model water-line plane. Upon completion of tests in the ice channel, the models were tested in open water at the same speeds to measure models’ interaction in open water. The most interesting part in the analysis of ships’ interaction in the ice channel is the variation of the side force PY and yawing moment MZ at the time when model hulls are passing each other.

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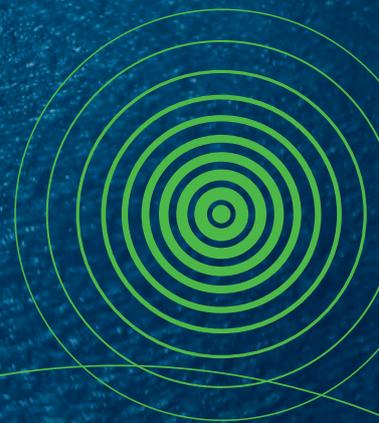
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The model was towed in two ways: bow first to model the case when it is overtaking the fixed model (Fig. 4) with measurement of loads on the overtaking vessel; and stern first to model the situation when the towed model is overtaken by the fixed model with measurement of loads on the overtaken vessel.

The results obtained should be treated as preliminary because they are applicable to a limited range of parameters characterising ship manoeuvres in ice channels. In addition, the stochastic nature of ice floes/ model (ship) hull interactions requires statistically representative samples of measured loads to allow evaluation of their average values and regression analysis of variable ice channel and ship motion parameters.

Fig. 5 presents the graphs with some experimental data: side force P_y and yawing moment M_z data for the bow-first towing mode in the 50mm ice field. Thus, these data show the side force and yawing moment induced by the fixed vessel on the overtaking vessel. The side force is positive in the direction from the fixed vessel to the moving vessel. The yawing moment is assumed positive when it turns the moving vessel bow sideways from the fixed vessel.

The x-axis indicates relative time $-t/T$ describing the time taken by the ship models

to pass by; t - is the real time of force and moment recording. T is estimated on the basis of model lengths (L_1 - length of shorter model, and L_2 - length of longer model) and towing speed V , i.e. $T = (L_1 + L_2) \cdot V^{-1}$. In this case the passing of the towed model past the fixed model is characterised by the following range: $0 \leq t/T \leq 1$.

The results presented in the graphs indicate that the side force P_y and yawing moment M_z in the process of overtaking in ice channel are subject to significant fluctuations in value and changes in sign, and this pattern of parameters' behaviour is very different from the pattern observed during manoeuvres in ice-free open water. The absolute values of lateral force and yaw moment are significantly higher when compared to the values measured on the same models at the same towing speeds but in open water conditions.

If the models used in the experiments had scale 1:30 in relation to real ice-going vessels, then experimental results should be related to the ice thickness of about 1.5m. The scale up of test data indicates that the maximum side force in the process of overtaking can be from 1.5MN up to 1.7MN, while the maximum yawing moment may reach 85MNm.

The following conclusions can be drawn from the results obtained:

1. The test results have provided conclusive evidence that the interacting forces and moments generated when ships are overtaking or passing each other at opposite headings in ice channels have a very different type of variation when compared to the case of well-studied hydrodynamic interactions in open water.
2. The side force and yawing moment when ships are passing each other in ice channel attain significant values, have considerable value fluctuations, and change their direction.
3. Based on the results obtained it can be concluded that the side force and yawing moment values and type of variations during manoeuvres in the ice channel are mainly dependent on speeds of passing ships, thickness and size of ice pieces, overall width of ice channel as well as the distance between ships' sides and ice channel edge.

Furthermore, ice tank experiments are needed to study ship interaction processes during manoeuvres in ice channels to cover variations of all relevant parameters. It is also necessary to improve test procedures further to involve factors that may have been omitted at this stage of the project. **NA**

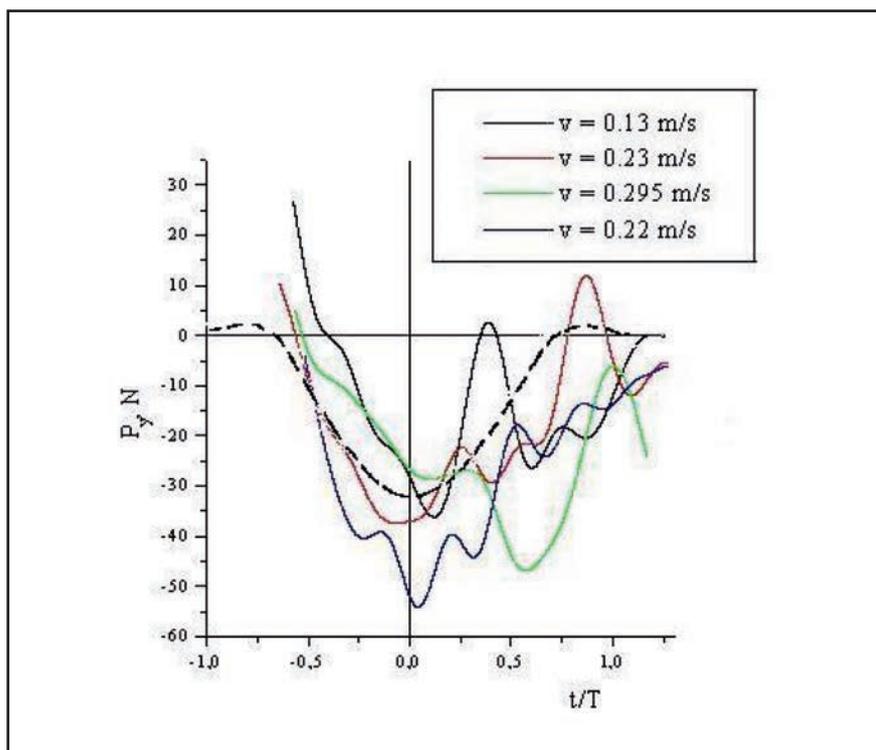
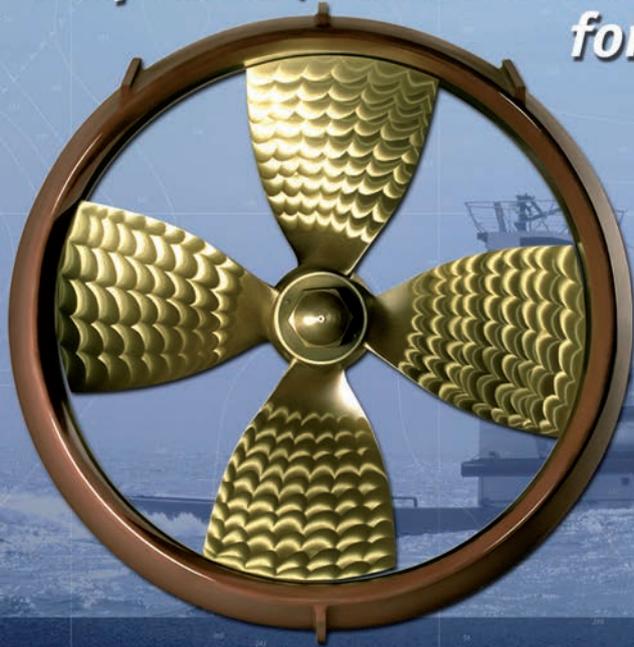


Figure 5. Example of the experimental results: the side force measured on towing model during overtaking for various velocities of tow. (Dashed line refers to overtaking on open water).

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Wilhelmsen gets the whole packet

Wilhelmsen Marine Engineering has been awarded the €3.8 million contract to supply the complete electrical package for two bitumen carriers.

Chinese shipyard Wuhan Nanhua Huanggang Jiangbei Shipyard Co. Ltd has awarded Wilhelmsen Marine Engineering the complete electrical package for two bitumen carriers that are owned by Swedish shipowner Nynäs/Frederiet.

Construction of the first of the FKAB-designed carriers is already underway at the Jiangbei shipyard; with both due for delivery in 2010.

The vessels will be an overall length of 99.9m and a moulded breadth of 15.86m with deadweight of 4700tonnes.

The contract will be to supply electrical equipment and systems such as automation, switchboards and safety systems, as well as the complete electrical design and engineering assignment onboard the vessels and will be managed by Wilhelmsen Callenberg AB a subsidiary of Wilhelmsen Marine Engineering.

As the vessel will be carrying cargo of temperatures up to 250°C the tanks have been designed with this in mind. To handle this type of cargo, special design considerations for thermal expansion tanks and pipes have been put in place. The tanks onboard the vessels consist of two tank blocks with four tanks in each. The tank blocks are fixed in the middle, which allows for expansion longitudinally



FKAB's Bitumen tanker design that will be installed with Wilhelmsen Marine Engineering's complete electrical package.

and each cargo tank block has its own pump room.

Per-Erik Larrson, sales manager, Wilhelmsen Callenbrg AB commented on applying the package to the vessels: "The vessels are rather advanced with a high level of integration and the challenge is coordination between various system suppliers and technical solutions." Carrying such high temperature cargo will mean that the equipment on deck will need to have specific requirements.

The two vessels that are to be constructed at Wuhan Nanhua Huanggang Jiangbei Shipyard Co. Ltd will present other challenges to FKAB such as the size of the vessels, as Claes Claeson, managing director, FKAB commented: "Small ships are not easy – there is no space", as smaller vessels are now starting to be more in demand due to their flexibility of size. To make the most of the space that FKAB have to work with, the vessels will have corrugated vertical bulk heads as this will also generate space outside of the tanks as well. The reason for the vessels being smaller is that restrictions of deadweight and space requirements at ports have been

the focus of the design of these vessels. Along with the bulk heads the vessels will have a full body and the general internal design of the cargo, engine and accommodation space has been designed for meeting the requirements for the correct deadweight.

The vessels will also be fitted with shore connections, allowing them to turn off the engines and run from shore power, more commonly known as "cold ironing". With this facility the vessels will cut emissions in port as well as saving fuel. All the systems onboard the vessels will have back up generators to supply them, including the HVAC system that will also be installed onboard both vessels. The vessel's power management system, which will be installed also by Wilhelmsen Callenberg AB, will start the emergency generators should there be a power failure for the shore side supply.

Wilhelmsen is hoping to install more of its HVAC solutions in more newbuild vessels in the future; with newbuilds becoming better designed the systems should be able to be integrated into a vessel more easily, with full training being supplied for the system. **NA**

TECHNICAL PARTICULARS

FKAB Bitumen tanker

Length,oa	99.9m
Length,bp	96m
Breadth mid	15.86m
Depth mid	9m
Draught design	6m
Draught santling	5.5m
Deadweight at	
design draught	4700tonnes
Speed	14knots
Cargo capacity	4300m³
HFO tanks	350m³
DO tanks	75m³

Chamber favours trading

The UK's Chamber of Shipping is backing plans for an Emissions Trading Scheme due discussion at the end of 2009.

A proposal that would see shipping subject to the same kinds of carbon emissions trading that have already been put in place in other industries has received support from The UK's Chamber of Shipping. The scheme is aimed at complementing existing rules that are in place to reduce emissions.

Martin Watson, president of the Chamber of Shipping said that he believed the scheme was, "bold and far reaching" and was needed to bring shipping in line with other industries.

How such a scheme would be applied; either globally or locally to each country, required further Chamber study, he said.

The Chamber is supported by WWF-UK. Peter Lockley, head of transport policy, WWF-UK said: "I'm very pleased that the UK shipping industry is advocating an emissions trading system for ships and I look forward to working

with them to refine and build support for the proposal. If designed well, the scheme would put a price on maritime carbon emissions, speeding up the drive for cleaner ships and helping to pay for low-carbon development in poorer countries. It would position shipping as a progressive and responsible industry, and I very much hope that it will be part of a global climate change deal next year in Copenhagen."

Rob Ashdown, environmental affairs manager from the Chamber of Shipping gave an example of what type of contribution the shipping industry would be looking at in today's emissions scenario, estimating a carbon charge of €11 billion globally.

However, even with this announcement the idea is still "a concept", added Chamber of Shipping director general Mark Brownrigg. **NA**

Lighthouse lights the way

Research project Lighthouse, run by Chalmers University in Gothenburg, Sweden, looks to the future of eco-friendly shipping.

Run by Chalmers University in Gothenburg and funded by the Swedish Maritime Association, with smaller amounts of funding coming from other companies, the total cost for the Lighthouse project runs to SEK235,000,000 (€22,799,990.50). The goal of the project is to produce a report defining the ideal 'Eco ship' within five years. The main focus of research is based around the shipping industry that operates around Gothenburg, but the project will look to transpose knowledge gained to the world's shipping industry.

For students, the research project offers a professional qualification at the end, which is run to the standards of a PHD course; after

which they present their research project and are awarded a PHD upon completion.

Lighthouse also contains other strands: 'Ergo ship' deals with the human factors onboard a vessel; 'Cargo ship' looks at how to make the design of the vessel more efficient to operate; while 'Safe ship' is an amalgamation of Ergo ship and Cargo ship, looking at the safety features of the vessel as a whole.

To support the research, the project runs theme days on each section throughout - it has already run days on Eco ship and Ergo ship. The theme days allow the students to come together and talk about what they have researched. **NA**



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Maximum squats for Victoria

Up to November 2008, Dr Bryan Barrass* had collected a database of 104 vessels that had recently gone aground, attributable wholly or in part to ship squat. Here, Dr Barrass offers his views on what could happen, on the basis of what has happened, in the case of a particular ship - *Queen Victoria*. Forewarned is forearmed.

It has been said that the problem for a naval architect is to design a new ship that will carry a certain deadweight, at a reasonable rate of stowage, in a seaworthy vessel, at a predetermined speed, on a given radius of action, as cheaply as possible, all in conjunction with a General Arrangement suited to the ship's trade.

Not my words, but those of Ross Munro-Smith (senior lecturer at Newcastle University) in the mid-1960s. But what happens when the new ship moves from a deep-water situation to shallow waters?

Once a new ship is designed, built and delivered, the ship-handling challenge for retaining her seaworthiness becomes the responsibility of officers on watch on the vessel's bridge.

Ship design and ship performance must be closely interlinked. Ship performance can become an issue where shallow water



Queen Victoria.

conditions exist in open water and in confined channels. Especially in this new Millennium, the phenomenon known as ship squat becomes much more important to consider.

Up to November 2008, I have a database of 104 vessels that have recently gone aground, attributable wholly or in part, due to squat. This warns not what could happen, but what has happened. It could happen with the *Queen Victoria* (delivered in December 2007). Forewarned is to be forearmed.

Squat exists when a 3-D body (the ship) proceeds through a 3-D medium (the water). They are connected by a 3-D coefficient (the block coefficient or CB). Consequently, most of my squat formulae contain the component of CB.

First, may I point out that it is not my intention or aim to advise harbour masters and ship pilots how to handle ships. My background, as a humble Naval Architect, certainly does not permit me to even think about it. However, I wish to offer some guidance on the problems of ship squat in shallow waters.

Throughout this article, the ratio of the water depth (H) to the ship's static draught (T) at amidships is for a range of 1.10 to 1.40. Above an H/T of 1.40 there is a great deal

less risk of a foreign-going vessel grounding. Because of the danger of grounding, below H/T values of 1.10 there are very few recorded measured squats for full sized ships.

The main aim and objective of this article is to help prevent ships going aground because of ship squat effects. Based on my 36-plus years research on this topic, it is to give readers of *The Naval Architect* an awareness and understanding of the dangers of ship squat.

Recent evolution

The 334m length passenger liner *QM2* delivered in 2003, is longer than the Statue of Liberty, the Tower of London and the Coliseum in Rome.

In April 2006, '*Freedom of the Seas*' was delivered. She has an Lbp of 303.2m and a breadth moulded of 38.6m with a draught moulded of 8.50m.

On 10 October 2007, Internet search engines gave information that a new 92,000 tonne cruiseship would be entering service on the high seas in Autumn 2010. Her name is to be *Queen Elizabeth*. She will carry 2092 Passengers, with over 1000 Crew. Her first cost will be of the order of \$700 million.

Even larger will be the Genesis project ships for the Royal Caribbean Shipping Line. The order was placed in 2006 and delivery is due in the fall of 2009. Here, length is to be 360m with a beam of 47m. The complement is to be 5400 passengers, plus officers and crew: certainly a mammoth ship.

Back to the present day: consider now the phenomena of ship squat for the *Queen Victoria* in shallow waters, by way of text, tables and graphics. Table 1 gives the general particulars for this vessel.

What is ship squat?

When a ship proceeds through water, she pushes water ahead of her. In order not

*Dr Bryan Barrass worked as a ship draughtsman for 11 years at Swan Hunters Shipyard in Wallsend. In 1963, he then became a lecturer in naval architecture in Sunderland. From 1967 to 1993, he worked at Liverpool John Moores University, lecturing to maritime degree students, masters, mates, and marine engineers. In 1993 he retired from full-time work. He became a visiting lecturer and writer of six books on ship stability, ship design and ship performance. His interest in ship squat began in April 1972, starting on research for his Ph.D. degree.

Dr Barrass has supplied squat information and details to 21 countries worldwide. He has worked with many Port Authorities, including PLA, Milford Haven PA, Liverpool PA, Humberside PA, Tyne PA, Truro PA, Newhaven PA, Bordeaux PA, Klaipeda PA, Nantes PA and Hamburg PA.

He has expressed his gratitude for the help and encouragement given by: Captain Frank L Main, head of Maritime Studies Department, Liverpool Polytechnic; Dr Richard B Whittington, reader in Civil Engineering Department, Liverpool University; Captain Sergio Batters, vice chief (retired) pilot, Co-operation of Venice Port & Estuary Authority.

Keel laid	May 2006
Floated out	January 2007
Delivery date	December 2007
Owner	Cunard Shipping Company.
Builder	Fincantieri Shipyard, Marghera, Venice
LOA	294.0m
LBP	265.0m
Breadth Moulded	32.30m
draught Moulded	8.00m
Block co-efficient at draught Moulded	0.600
Fully loaded displacement	42,050tonnes
Deadweight	8,300tonnes
Service Speed	23.90knots
Gross Tonnage	90,000
Brake power	63,400kW
Diesel oil fuel consumption per day	240 tonnes
Number of propulsion pods.	2
Number of Passengers	2,000+
Number of Crew	900+
First cost of the Queen Victoria.	£300 million

Table 1. *Queen Victoria* - General Particulars.

thus is made up of two components, namely mean bodily sinkage plus a trimming effect. If the ship is on even keel when static, the trimming effect depends on the ship type and block co-efficient (C_b) being considered.

Ship squat thus is the overall decrease in the static underkeel clearance, for'd or aft as she moves forward through the water. It is not the difference between the draughts when stationary and the draughts when the ship is moving ahead.

If the ship moves forward at too great a speed when she is in shallow water, say where this static even-keel underkeel clearance was 1.0m to 1.5m, then grounding due to excessive squat could occur at the bow or at the stern.

For full-form ships such as supertankers or OBO vessels, grounding will occur generally at the Bow. For fine-form vessels such as passenger ships (similar to the *Queen Victoria*), the grounding will generally occur at the stern. This is assuming that when stationary, they are on even keel.

If C_b is > 0.700 , then maximum squat will occur at the bow.

If C_b is < 0.700 , then maximum squat will occur at the stern (like the *Queen Victoria*).

If C_b is very near to 0.700, then maximum squat will occur at the stern, amidships and at the bow. Squat will consist only of mean bodily sinkage. There will be no trimming effects.

When static, if a ship has trim by the stern, then when underway she will develop further trim by the stern. The dynamical trim will add to the static trim. Maximum squat will occur at the stern.

Likewise, when static, if a ship has trim by the bow, then when underway she will develop further trim by the bow. The dynamical trim will add to the static trim. Maximum squat will occur at the bow.

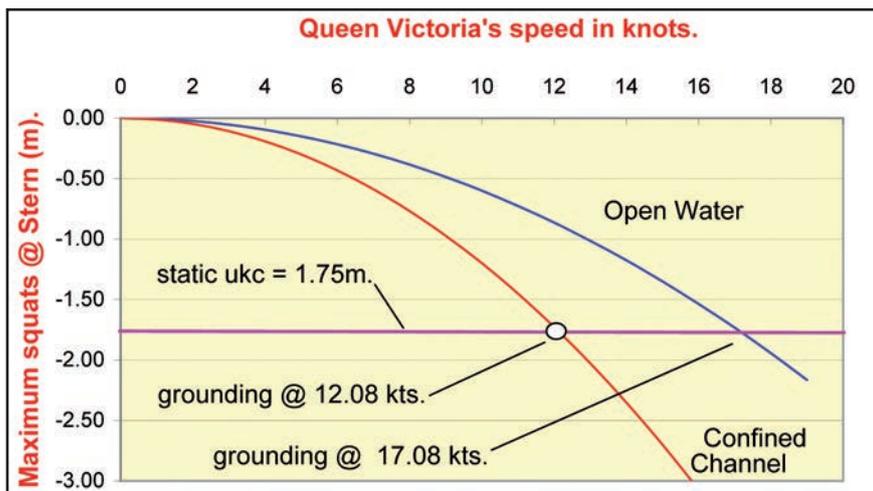


Figure 1 (includes Table 2). Squats for *Queen Victoria* in open water and confined channels.

to leave a 'hole' in the water, this volume of water must return down the sides and under the bottom of the ship. Streamlines of return flow are speeded up under the ship.

They cause a drop in pressure resulting in the ship dropping vertically in the water.

As well as dropping vertically, the ship generally trims forward or aft. Ship squat

Open or confined

When a vessel is operating in water with no breadth restraints such as riverbanks or canal sides, she is said to be in open water conditions. Shipping personnel



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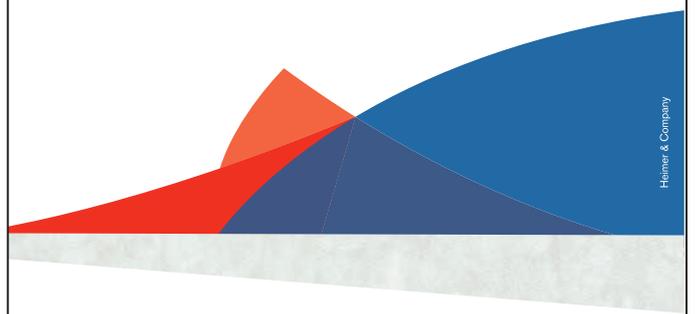
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Ship Speed (knots).	Maximum squats in Open Water (m).	Maximum squats in Confined Channels (m).
0	0.00	0.00
1	-0.01	-0.01
2	-0.02	-0.05
3	-0.05	-0.11
4	-0.10	-0.19
5	-0.15	-0.30
6	-0.22	-0.43
7	-0.29	-0.59
8	-0.38	-0.77
9	-0.49	-0.97
10	-0.60	-1.20
11	-0.73	-1.45
12	-0.86	-1.73
13	-1.01	-2.03
14	-1.18	-2.35
15	-1.35	-2.70
16	-1.54	-3.07
17	-1.73	
18	-1.94	
19	-2.17	
20	-2.40	

Table 2

H/T value.	1.10	1.20	1.30	1.40
Squats @ 10 kts (m)	-0.600	-0.550	-0.508	-0.471
Ship Speed (kts)				
0	0.00	0.00	0.00	0.00
1	-0.01	-0.01	-0.01	0.00
2	-0.02	-0.02	-0.02	-0.02
3	-0.05	-0.05	-0.05	-0.04
4	-0.10	-0.09	-0.08	-0.08
5	-0.15	-0.14	-0.13	-0.12
6	-0.22	-0.20	-0.18	-0.17
7	-0.29	-0.27	-0.25	-0.23
8	-0.38	-0.35	-0.33	-0.30
9	-0.49	-0.45	-0.41	-0.38
10	-0.60	-0.55	-0.51	-0.47
11	-0.73	-0.67	-0.61	-0.57
12	-0.86	-0.79	-0.73	-0.68
15	-1.35	-1.24	-1.14	-1.06
18	-1.94	-1.78	-1.65	-1.53
23.90	-3.43	-3.14	-2.90	-2.69

Table 3

sometimes refer it to being in restricted waters ie. restricted in water depth only.

When a vessel is operating in water with breadth restraints such as riverbanks or canal sides, she is said to be in confined channel conditions. As a ship proceeds along a river or canal the forces will be reflected from these banks back onto the vessel. Squat in confined channels can be over twice that measured in open water.

The width of influence is where the ship changes from being in a confined channel to being in open water conditions. It can be given as a multiple of the vessel's breadth moulded, perhaps later transposed to a distance in metres. Width of influence

changes with ship type and block co-efficient. See later notes.

Victoria's squat curves .

Figure 1 shows parabolic squat curves for when the *Queen Victoria* is in open water and in confined channel conditions. See maximum squat values in Table 3. The (Cb) used is 0.600.

It was assumed that when static, there was a 1.75m under-keel clearance even keel, extending from her Bow to her Stern.

There are many complicated detailed formulae suggested by researchers for predicting maximum ship squat. However,

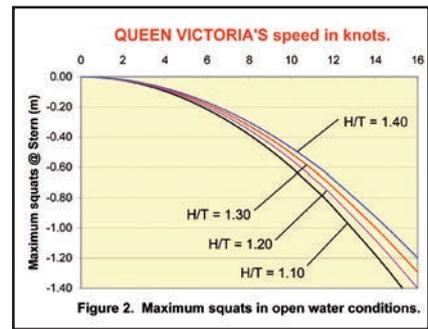


Figure 2. (includes Tables 3 and 4) Maximum squats in open water conditions.

there also are a few user-friendly short-cut formulae.

Figure 1 indicates that she would go aground at the stern in open water at a forward speed of 17.08knots. The equation that I used is:

$$\text{Maximum Squat} = (CB \times V^2) / 100\text{metres in open water conditions.}$$

My short-cut formula over-predicts a few cms on the high and therefore safe side.

Figure 1 indicates that *Queen Victoria* would go aground at the stern in a confined channel at a forward speed of 12.08knots. This lower speed when grounding shows the influence of adjacent riverbanks producing greater squats.

$$\text{Maximum Squat} = (CB \times V^2) / 50\text{metres in Confined Channel conditions.}$$

Again, this is a short-cut formula that I have developed. It errs a few cms on the high and therefore safe side.

Figure 1 portrays how the squats at each forward speed in a confined channel produce twice the squats for when *Queen Victoria* is in open water.

Because the Cb < 0.700, all these maximum squats are at the stern,

Figure 2 illustrates what happens if the H/T was changed to 1.20, to 1.30 and to 1.40 in open water conditions. See maximum squats in Table 3 and Table 4. The higher the value the H/T, the less will be the corresponding squats. Maximum squats will vary directly with the inverse of H/T. Again, the Cb is 0.600.

Figure 3 portrays the maximum squats between the conditions of open water and confined channels for the *Queen Victoria*. This time H/T is 1.20, for example say (water

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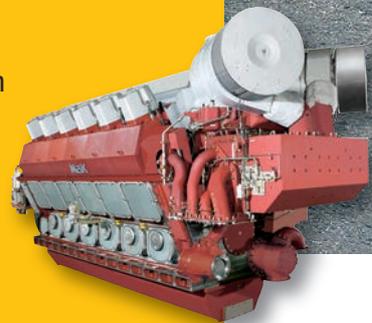


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Ship Squats applicable for:

Amidships Draft (m)	7.00	7.20	7.40	7.60	7.80	8.00	8.20
H @ H/T of 1.10.	7.70	7.92	8.14	8.36	8.58	8.80	9.02
H @ H/T of 1.20.	8.40	8.64	8.88	9.12	9.36	9.60	9.84
H @ H/T of 1.30.	9.10	9.36	9.62	9.88	10.14	10.40	10.66
H @ H/T of 1.40.	9.80	10.08	10.36	10.64	10.92	11.20	11.48

Table 4.

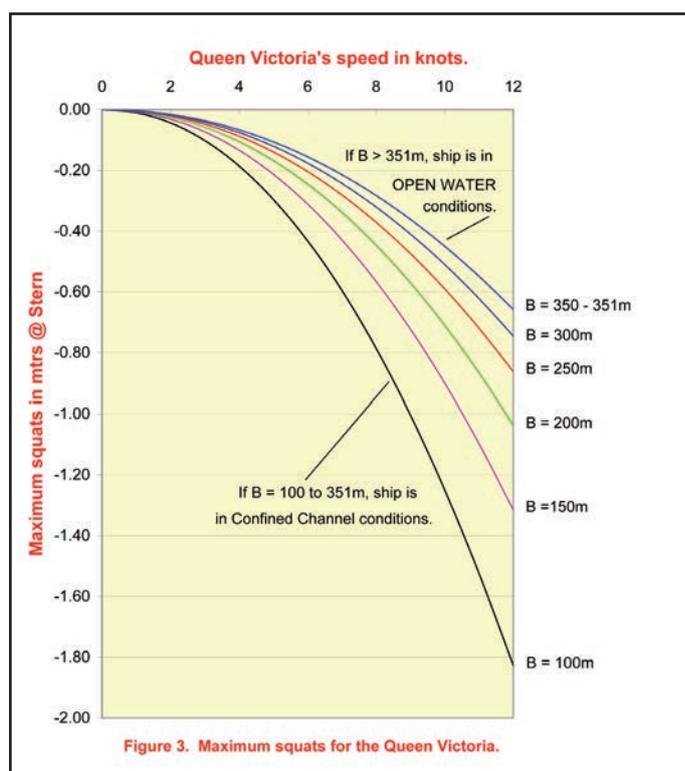


Figure 3. (includes Table 5) Maximum squats for Queen Victoria.

In the United Kingdom, over the last 40 years the Department for Transport (DfT) has shown its concern by issuing eight 'M' notices concerning the problems of ship squat and accompanying problems in shallow water. These alert all mariners to the associated dangers.

The signs that indicate a ship has entered shallow water are:

1. Mean bodily sinkage increases.
2. For the *Queen Victoria*, generally there will be trim by the stern.
3. The ship develops increases in squat.
4. Wave-making increases, especially at the forward end of the ship.
5. Ship becomes more sluggish to manoeuvre. A pilot's quote, 'almost like being in porridge'.
6. Draught indicators on the bridge or echo-sounders will indicate changes in the end draughts.
7. Propeller revs/min indicator will show a decrease. If the ship is in 'open water' conditions ie. without breadth restrictions, this decrease may be up to 15% of the service revs/min in deep water. If the ship is in a confined channel, this decrease in revs/min can be up to 20% of the service revs/min.
8. There will be a drop in speed. If the ship is in open water conditions this decrease may be up to 35%. If the ship is in a confined channel such as a river or a canal then this decrease can be up to 75%.
9. The ship may start to vibrate suddenly. This is because of the entrained water effects causing the natural hull frequency to become resonant with another frequency associated with the vessel.
10. Any rolling, pitching and heaving motions will all be reduced as ship moves from deep water to shallow water conditions. This is because of the cushioning effects produced by the narrow layer of water under the bottom shell of the vessel.

depth/static draught) of 9.60m/8.00m. Again, the C_b is 0.600.

For Figure 3, the river is assumed along its length, to range in width from 100m up to and beyond 351m. See Table 5. For the *Queen Victoria*, a width greater than 351m constitutes a confined channel. Beyond 351m, water width is akin to an open water situation. See later, specific widths of difference for several ship types.

40 years of ship squat

Ship squat has always existed on smaller and slower vessels. These squats have only been a matter of centimetres and thus have been considered inconsequential.

However, from the mid-1960s and into this new Millennium, ship size has grown steadily, until we have supertankers of the order of 450,000dwt and above. These

supertankers have almost outgrown the ports they visit, culminating in small static even-keel under-keel clearances of only 1.00m to 1.50m.

Alongside this development in ship size has been an increase in service speeds. Modern passenger liners and cruiseships can have service speeds of up to 25knots to 30knots.

As the static under-keel clearances have decreased and as the service speeds have increased, ship squats have gradually increased. They can now be of the order of 1.50m to 2.00m. Today, these squats are no longer inconsequential!

Recent incidents

To help focus the mind on the dangers of excessive squat one only has to recall the grounding of the 14 vessels shown in Table 6 over recent years.

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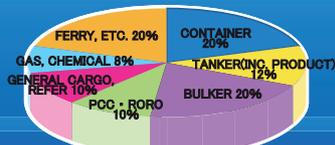
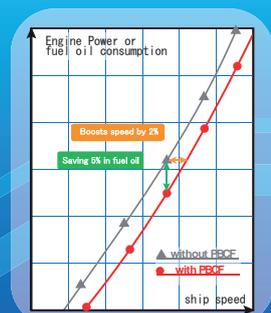
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11. The appearance of mud could suddenly show in the water around the ship's hull say in the event of passing over a raised shelf or a submerged wreck.

12. Turning circle diameter (TCD) increases. TCD in shallow water could increase 100%.

13. Stopping distances and stopping times increase, compared to when a vessel is in deep waters.

14. Effectiveness of the rudder helm decreases.

15. Width of the wake increases considerably.

Factors governing squat

The main factor governing ship squat is ship speed V . Squat actually varies as speed to the power of 2.08. However, we can say that squat varies approximately with the speed squared. In other words, we can take as an example, that if we halve the speed we approximately quarter the squat. Put another way, if we double the speed we quadruple the squat.

In this context, speed V is the ship's speed relative to the water. Effect of current/tide speed with or against the ship must therefore be taken into account. Squat will vary directly with V^2 .

Another important factor is the block coefficient C_b . Oil tankers will therefore have comparatively more squat than passenger liners and cruiseships. Squat varies directly with C_b .

Blockage factor 'S' is another factor to consider. This is the immersed cross-section of the ship's midship section divided by the cross-section of water within the canal or river. Range of 'S' is from 0.100 to 0.250. squat will vary as $S^{0.81}$.

If a ship is in open water, the width of influence of water can be calculated. This ranges from about 8.25b for supertankers, to about 9.50b for general cargo ships, to about 11.75 ship-breadths for containerShips. For the *Queen Victoria*, her width of influence in open water is about 10.87 times ship breadths, amounting to 351m.

Water depth (H) / ship's draught (T) also affects ship squat. Approximately, we can say squat will vary as the reciprocal of H/T. Range of H/T is from 1.10 to 1.40. Squat will vary as T/H.

The presence of another ship in a narrow river (passing, overtaking or simply moored) will also affect squat, so much so,

Table 5

water width B (m)	100	150	200	250	300	350	>351
Max.squat @ 10 kts	-1.25	-0.90	-0.71	-0.59	-0.51	-0.45	-0.45
Ship speed (kts).							
0	0.00	0.00	0.00	0.00	0.00	0.00	
1	-0.01	-0.01	-0.01	0.00	0.00	0.00	
2	-0.04	-0.03	-0.02	-0.02	-0.02	-0.02	
3	-0.10	-0.07	-0.06	-0.05	-0.04	-0.04	
4	-0.19	-0.13	-0.11	-0.09	-0.08	-0.07	
5	-0.30	-0.21	-0.17	-0.14	-0.12	-0.11	
6	-0.43	-0.31	-0.25	-0.20	-0.18	-0.16	
7	-0.60	-0.43	-0.34	-0.28	-0.24	-0.21	
8	-0.79	-0.57	-0.45	-0.37	-0.32	-0.28	
9	-1.00	-0.72	-0.57	-0.47	-0.41	-0.36	
10	-1.25	-0.90	-0.71	-0.59	-0.51	-0.45	
11	-1.52	-1.10	-0.87	-0.72	-0.62	-0.55	
12	-1.83	-1.32	-1.04	-0.86	-0.75	-0.66	
15	-2.91	-2.09	-1.65	-1.37	-1.19	-1.05	
18	-4.24	-3.06	-2.41	-2.00	-1.73	-1.53	
Squat values applicable for:						Draft Mid	
Draft (m) even keel	7.00	7.20	7.40	7.60	7.80	8.00	8.20
Water depth (m).	8.40	8.64	8.88	9.12	9.36	9.60	9.84
Static ukc (m).	1.40	1.44	1.48	1.52	1.56	1.60	1.64

that squats can double in value as they pass/cross the other vessel.

Reducing ship squat

1. Reduce the mean draught of the vessel if possible by discharge of water ballast. This causes two reductions in one:

- At the lower draught, the block co-efficient C_b will be slightly lower in value. For the *Queen Victoria*, it will not make for a significant reduction. This is because of the boot-topping depth being a lot less than for many other ship types.
- At the lower draught, for a similar water depth, the H/T will be higher in value. Higher H/T values lead to smaller squat values.

2. Move the *Queen Victoria* into deeper water depths. For a similar mean ship draught, H/T will increase, leading again to a decrease in ship squat.

3. When in a river if possible, avoid interaction effects from nearby moving ships or with adjacent riverbanks. A greater width of water will lead to less ship squat. This will be so, unless the vessel is in water greater than her width of influence.

4. The quickest and most effective way to reduce squat is to reduce the speed of the *Queen Victoria*. Halving ship speed will quarter the squat values.

Conclusion

It can be stated that if we can predict the maximum ship squat for a given situation then the following advantages can be gained:

1. The officer on watch or ship pilot will know which speed to reduce to in order to ensure the safety of his or her vessel. This could save the cost of a very large repair bill. In May 1997, the repairs to *Sea Empress* were completed at Harland & Wolff Ltd of Belfast, for a reported cost of £20 million. Rate of exchange in May 1997 was of the order of £1 = \$1.55.

2. Ship-officers could load the ship up an extra few centimetres (except of course where load-line limits would be exceeded). If a 100,000dwt tanker is loaded by an extra 30cm or an SD14 general cargo ship is loaded by an extra 20cm, then the effect is an extra 3% onto their dwt. This gives these ships extra earning capacity.

3. If the ship grounds due to excessive squatting in shallow water, then apart from the large repair bill, there is the time the ship is 'out of service'. Being 'out of service' is indeed very costly. Loss of earnings can be well over £300,000 per DAY. How much per day would it be for a vessel like the *Queen Victoria*?

4. When a vessel goes aground there is always a possibility of leakage of oil resulting in compensation claims for oil pollution and fees for clean-up operations following the incident. These costs may ultimately have to be paid for by the shipowner.

5. Any ships grounding in a busy river are a constant worry for harbour masters. Any vessel blocking the passage of ships in and out of a river causes serious loss of income for the port authority. On 31 July 2008, this actually occurred. *Iron King* went aground at Port Headland in Western Australia and closed the river traffic for 12 hours.

6. Being able to safely predict ship squat at any speed could mean that a cruiseship like the *Queen Victoria* could visit more

ports on their Itinerary. Ports previously thought initially to have inadequate depths of water might be shown to be acceptable ports of call. The more ports these vessels can visit, the better offers shipping companies can make to prospective passengers. Better offers could mean greater income and profit.

These last six paragraphs illustrate very clearly that not knowing about ship squat can prove to be very costly indeed.

Summarising, it can be stated that because maximum ship squat can now be predicted, it has removed the 'grey area' surrounding the phenomenon. In the past, ship pilots have used 'trial and error', 'rule of thumb' and years of experience to bring their vessels safely in and out of port: in other words, personal working experience.

Empirical formulae quoted in this study, plus squat curves modified and refined by the author give firmer guidelines. By maintaining the ship's trading availability a shipowner's profits margins are not decreased.

More important still, this presentation can help prevent loss of life as occurred with the *Herald of Free Enterprise* grounding, where 193 people lost their lives. In a marine court hearing, ignorance is not acceptable as a legitimate excuse.

It would be ironic for the *Queen Victoria* to go aground due to ship squat in shallow waters. Bridge officers must understand ship squat for this high prestige vessel, costing £300 million. Greater assistance can be given, via graphical laminated squat displays placed on the bridge. They are displayed on the *QE2* & the *QM2*. Why not on the *Queen Victoria*?

A final thought....

Turning circle diameters, stopping distance and stopping times information is regularly supplied to ships for onboard use. In the interests of safety, I strongly suggest that ship squat data is added to this list.

Above all, do not forget that the quickest method for reducing the danger of grounding due to ship squat for the *Queen Victoria* and any other vessel is to reduce speed. To return to the proverb -'Forewarned is forearmed.' **NA**

Ship	Type	Whereabouts	Date
<i>Herald of Free Enterprise</i>	Ro-ro vessel	Zeebrugge	06/03/1987
<i>QE2</i>	Passenger liner	Massachusetts	07/08/1992
<i>Sea Empress</i>	Supertanker	Milford Haven	15/02/1996
<i>Heidrun</i>	Supertanker	Nantes, France	10/09/1996
<i>Diamond Grace</i>	260,000tonne VLCC	Tokyo Harbour	02/07/1997
<i>Napoleon Bonaparte</i>	Passenger liner	Marseille	05/02/1999
<i>Don Raul</i>	37,000tonne Bulk carrier	Pulluche Canal, Chile	31/03/2001
<i>Neptunus</i>	Oil tanker	Malaren lake, Sweden	14/09/2002
<i>Eastern Honour</i>	100,000tonne VLCC	Marsden Point, New Zealand	27/07/2003
<i>Tasman Spirit</i>	87,500tonne Oil tanker	Karachi Harbour	27/07/2003
<i>Iran Noor</i>	Oil tanker	Ningbo Port, China	05/07/2004
<i>Desh Rakshak</i>	Oil tanker	Port Phillip, Melbourne.	04/01/2006
<i>Iron King</i>	Chemical carrier	Port Headland, W. Australia	31/07/2008
<i>QE2</i>	Passenger liner	Southampton	11/11/2008

Table 6

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ABB at the heart of *Solstice* celebration

Justly praised for her environmentally-friendly attributes, *Celebrity Solstice* is also an innovative ship from the electrical and propulsion systems point of view.

After four months in service, the Captain and chief engineer aboard Celebrity Cruises' first of class cruiseship, *Celebrity Solstice*, report that the state of the art vessel is exceeding expectations.

Amid the fanfare of delivery from Meyer Werft, in October 2008, attention focused on the environmentally-friendly aspects of the 122,000gt ship, whose owner says consumes 30% less energy than ships previously delivered.

No detail has proved too small in achieving this target. For a start, the 317.2m long *Celebrity Solstice* is distinguished from other cruiseships by virtue of the fact that her hull, rather than her interior spaces, provided the first block in the ship's design, with the aim being to create the most fuel efficient hull possible. Her long bulbous bow, combined with her sleek hull lines, and the low friction silicon paint from International Coatings imbue the ship with enhanced hydrodynamic performance.

Other energy-saving attributes include the sloped, aerodynamic forward superstructure, the waste heat recovery system, where energy recovered from the ship's four 16V46 common rail main engines is used to desalinate and heat water for hotel purposes, and the use of 4500 low wattage LED lights that save 150kW against an equivalent installation using conventional 25W lights



Celebrity Solstice, on her arrival after delivery.

Again, the 500m² area of solar panels mounted atop the ship's solarium generates the 75kW required to run the ship's eight lifts, while some 5700 sensors throughout the ship optimise heating, ventilation and air conditioning power consumption – the second biggest draw on ship's power, after main propulsion. Tinted double glazed windows developed in conjunction with 3M that do not allow ultraviolet rays through, further minimise HVAC power demand. *Celebrity Solstice* is reckoned to have the same AC power demand as the 2000-built *Millennium*, despite carrying 1000 more passengers.

But, what Captain Panagiotis Skylogiannis and chief engineer Evangelos Saliaris are driving at, are not the ship's environmental credentials, but its operational performance.

According to Captain Skylogiannis, who has 21 years of service as Captain of Celebrity Cruise vessels, the difference was apparent as soon as sea trials began. "From the first impression, the ship was very manoeuvrable and the diesel electric powering solution very quiet," he said.

Chief engineer Mr Saliaris has been a Celebrity chief engineer since 1996, and

his resumé includes a period onboard *Millennium*, the first Celebrity ship to feature podded propulsion. He added: "Straightaway, she [*Celebrity Solstice*] showed good stability at 2.7GM, and the pods performed well. Angles of list did not exceed 7degrees, even at 25knots. With the pods operating in reverse, the ship could be stopped in half of her required stopping distance."

Mr Saliaris said that, at her top speed of 25knots, *Celebrity Solstice* required the same horse power as that required to drive the 25% smaller *Millennium*.

Advantage Azipod®

The podded propulsors referred to are, at 20.5MW apiece, the largest power rated pods that ABB has ever installed. The 360degree rotating units are also the first ABB pods to grace a Celebrity ship. Mr Saliaris, who has worked with ABB pods aboard ships operated by Royal Caribbean International for the last eight years, said that after four months in service, "The pods have performed very smoothly, in very rough seas, and they are even better than we expected."

TECHNICAL PARTICULARS	
<i>Celebrity Solstice</i>	
Tonnage	122,000tonnes
Length.....	317.2m
Beam.....	36.88m
Draught.....	8.23m
Decks	19
Installed power.....	4 x Wärstillä 16V46
Propulsion	2 x 20.5MW Azipod
Speed	25knots
Capacity	2850 passengers
Crew.....	1500

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Significant modifications were made to hydrodynamic aspects of the podded propulsors installed onboard *Celebrity Solstice*. Pod redesign work done on this project has contributed to the development of ABB's 'next generation' Azipod, which is due to be fully available in 2009.

Tomi Veikonheimo, ABB lead engineer hydrodynamics, said that there had been substantial cooperation between shipbuilder Meyer Werft and ABB to optimise pod geometry. The profile of the strut has been changed to enhance drag performance, following CFD analysis, with the same section profile having been used in the modified fin section. Again, the after cone of the torpedo was redesigned to smooth flow separation.

Azipod propulsion units to the same design are being installed onboard the 360m long *Oasis of the Seas* and *Allure of the Seas*, Royal Caribbean's International's 'Genesis' project ships. In this case, and in an industry first, three azimuthing pods will be installed, where larger cruiseships to date have tended to feature two steerable pods and one fixed pod. Each pod will have a power rating of 20MW, and the fact that these ships will be 47m wide means that optimal positioning of the Azipod units can be assured, Mr Veikonheimo said, with the central unit being placed behind the centre line skeg. He added that model testing carried out at Marin in The Netherlands had confirmed that the configuration would confer new levels of manoeuvrability.

Also noteworthy is the fact that the pods installed on *Celebrity Solstice*, and indeed *Oasis of the Seas* and *Allure of the Seas*, will feature five-bladed propellers, confirming a growing trend among cruiseship operators first witnessed in the case of *Radiance of the Seas* a decade ago.

Mr Veikonheimo said that the five-bladed configuration had become essential to meet modern cruiseship performance standards, where noise and vibration limit requirements in the aft part of the ship, where huge theatres tend to be situated, dictate lower propeller excitations. Operating at 135revs/min, the inclusion of an extra blade did not lead to any loss in efficiency, he said, because, to achieve low noise and vibration using a four bladed propeller, it was necessary to work



The first of class, state of the art cruiseship, *Celebrity Solstice*.



ABB Azipod unit leaves ABB premises.

with extremely low loads at the propeller tip, which had severe consequences for efficiency. The same noise and vibration performance could be achieved with a five bladed propeller with higher loads at the propeller tip, compensating for the increased blade area.

Celebrity Cruises vice president of technical operation, Angelos Kokosoulis said: "These are the types of propellers first developed for submarines to achieve low noise, and it looks like it works – there is no cavitation to be transferred to the ship."

Captain Skylogiannis said that a

GA of *Celebrity Solstice*.

particular regular cruiser, who had time and again preferred an aft berth, on this ship near the pods, had commented that she had never experienced such a quiet cruise.

The supply voltage to the Azopid propulsion motors is also higher than has previously been the case. According to ABB, a change in the overall drive type supplied (of which more later) has yielded a change in the pod's voltage range, to 3000V.

Mr Saliaris said that the new power capability had brought discernable performance gains. "There has been a development of the electrical system to drive the motor on the frequency converter. What we have is a smaller motor but larger power. The pod does not look bigger but, because of the developments on the electrical technology, more power is achieved. The completely new control system is also an advance, and it has made us feel both comfortable and confident."

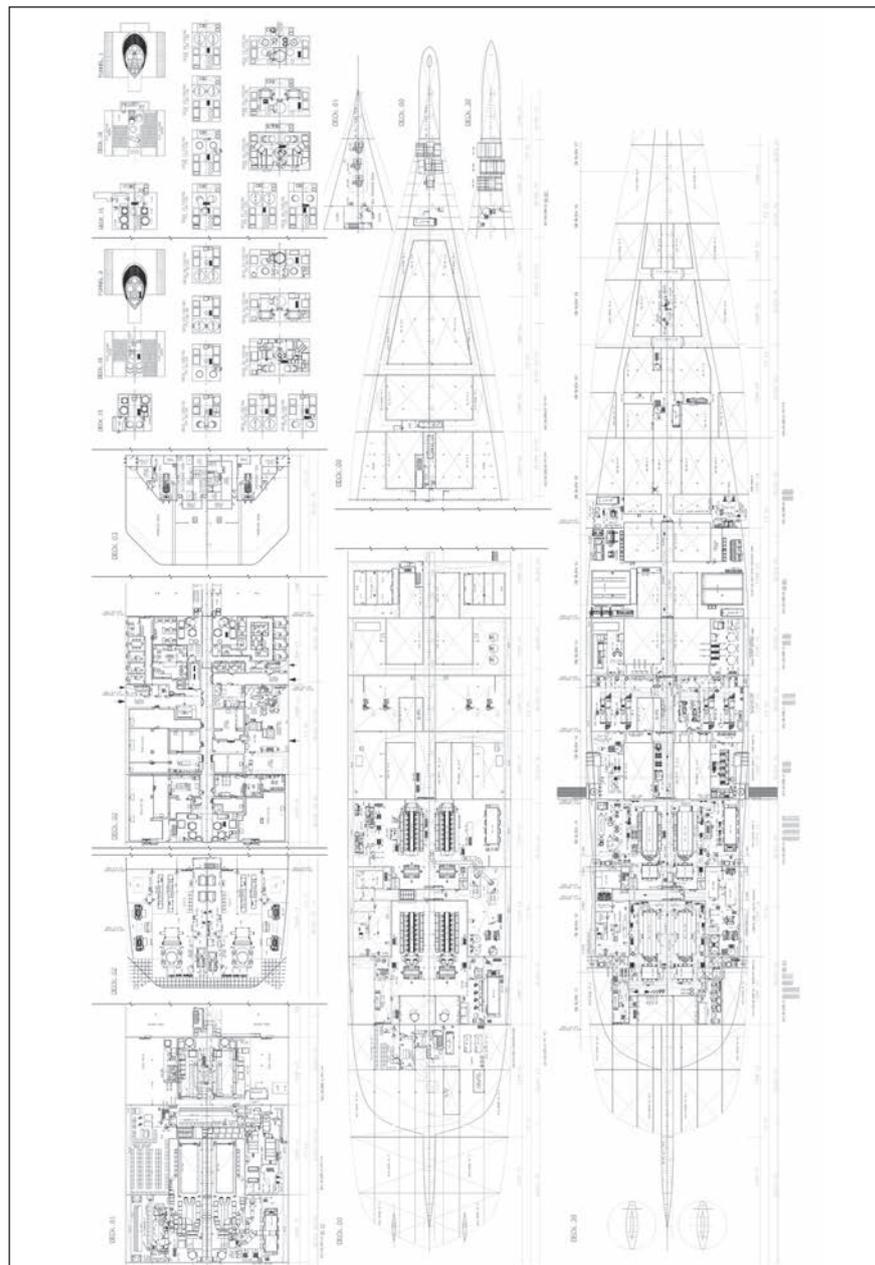
Deeper thinking

But ABB's contribution stretches far beyond its latest podded propulsors and, indeed, it is the wider electrical systems provided by the company that lie at the heart of the ship's global efficiency gains. ABB systems cover power production, propulsion and bow thruster, electrical motors and distribution, transformers and switchboards.

The scope of supply includes four ABB AMG 19312kVA main generators, with the same units producing power for both hotel and propulsion consumption, which allows minimal usage in each operational situation.

Heikki Bergman, ABB lead engineer, project design cruiseships, traced the advances being made in drive control to the wider application of integrated gate-commutated thyristors. In short, developments in semi-contactors has made it possible to increase the current through the drive in a more efficient manner. Because generators can now be designed with a high power factor, Mr Bergman said that they could be made more efficient, thus reducing fuel consumption of main engines. "The operator may design the ship's speed profile to match optimal engine loadings in each engine configuration."

In detail, the drive technology has been developed such that pulse width modulation is now available for higher power ranges.



From the technical point of view, the resulting lower total harmonic distortion means less additional dimensioning for heat losses. Lower THD values contribute to the lifespan of the equipment, due to lower electric stresses.

The advance also means that smaller, lighter and less costly generators achieve a higher power factor than was previously possible, and that these generators perform with less power loss.

From an operational point of view, according to Mr Saliaris, "The result is that we do not waste power at sea. We have greater control over propeller speeds. Because the new approach does not use capacitors, with voltage

controlled directly, we achieve greater speed of control over the motors."

Mr Saliaris concluded that the performance of the diesel electric propulsion used onboard *Celebrity Solstice* was a "big item" in its improved efficiency over other ships. "We can calculate a trip with a required speed and cut the power consumption in pieces. We can run three, two, or even one engine so that each runs at its maximum efficiency, with loads of between 83% and 85%, and because the propeller is not directly connected to the engine, we can run one engine for propulsion and another for the hotel side at maximum efficiency." **NA**



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Industry awaits scrubbing solution

The alternative means of meeting low sulphur emissions limits, gas scrubbing, appears technically feasible. So what is the industry waiting for?

Neville Smith reports.

4 April 2008 marked a watershed for the makers of shipboard exhaust gas cleaning systems. But, while the attention was focused on what the adoption of revisions to IMO's Marpol Annex VI would mean for price and availability of low sulphur and distillate fuel, scrubber-makers were quietly congratulating themselves on a lower-profile victory.

With exhaust gas scrubbing given its own guideline within the revised Annex VI, it became clear that the nascent industry had achieved a degree of respectability.

It was, as Wärtsilä's Torbjörn Henriksson notes: "a day of remarkable decisions", which made clear that "the return on investment in scrubbers will be very short", given the potential economic advantages of burning heavy fuel oil and scrubbing the exhaust gas over using distillate. Krystallon's Chris Leigh-Jones agrees the adoption of the amendments has proved to be "a tangible spur," which has prompted increased enquiry.

Today, shipowners might examine scrubber designs from Wärtsilä, Krystallon, MES, Clean Marine, Ecospec and Aalborg Industries. The first four have working products but all are still testing and fine-tuning to one degree or another. The concept, they say, is proven, but details remain to be resolved.

For Wärtsilä, the main focus is on providing sulphur reduction in sea areas of low alkalinity, using a closed-loop freshwater system with caustic soda as an additive. It claims the system will perform equally well in areas of high alkalinity but the advantage is clear in the low alkaline Baltic Sea region – site of the first IMO emission control area.

Drawing on its experience of land-based sulphur scrubbing, Wärtsilä is conducting tests onboard a tanker and says the resulting system will be available for newbuildings and as a retrofit.

It is also developing an integrated scrubber, using a single unit to clean the exhaust of all main and auxiliary engines including diesel-generators and oil-fired boilers. This has been developed to

satisfy low sulphur limits while sailing and future port regulations, with application targeted for ro-pax ships and tankers with high fuel consumption.

Krystallon has the only scrubber installation working in the cruise sector, onboard Holland America Lines' *Zaandam*, sailing in deep-sea Pacific, Alaskan and Hawaiian waters, achieving 'satisfactory' SOx removal at less than full capacity. Independent tests run on a two stroke unit at Mitsui Engineering and Shipbuilding's Tomano works have achieved 96-97% of sulphur dioxide reduction – the same range as Wärtsilä.

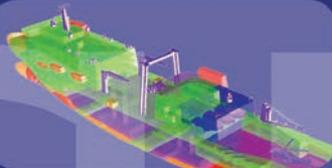
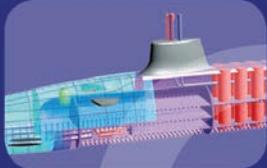
For Michael Crye of the Cruise Line Industry Association, scrubbing is "very much under development and still being proven". While the results for sulphur reduction are encouraging, he notes concerns over "compatibility with the selective catalytic reduction technology which may be needed to reach NOx reduction goals going forward".

Mr Leigh-Jones says the focus has shifted from the scrubber itself, and onto achieving wash water cleaner than that demanded by IMO criteria. "Irrespective of what IMO says, you need to achieve what the local ports and harbours say. If you wouldn't want it in your swimming pool then it can't go into the harbour."

Krystallon is already "well within" the IMO wash water criteria on ph, polycyclic aromatic hydrocarbons and turbidity but Mr Leigh-Jones says it needs to do a lot better if it is to have a future-proof technology. Working with cruise destination ports is essential since the US has been among the strongest advocates of the emissions control area concept. The fact that cruiseships spend most of their trading life within 200



The cruise industry awaits the full results of gas scrubber trials onboard the Holland America Line ship *Zaandam*.



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The gas scrubber installed on *Zaandam*.

miles of land is “a huge economic driver to do something,” he says.

The distillate option remains, but scrubber-makers point out that distillates still produce sooty particulates and the fuel itself is arguably harder to clean up in the event of a spill.

So why has there been no rush to scrubbing thus far? “Everyone is watching the *Zaandam*,” says Mr Leigh-Jones. “Until that is signed off and everybody is 100% happy, the rest of the industry are not going to do anything but we’re pretty close to that now”.

He admits the experience has been harder than expected – not least because of needing to work with the politics of the issue. “The emotions out there are strong but sometimes ill-informed. To handle that takes sensitivity and HAL has been pretty supportive.” The technical experience on

Zaandam has been about scaling up for high electrical demand from a floating hotel. Krystallon’s scrubber is attached to one of the ship’s five main engines and the next challenge will be how to design a system for the concentrated draw of a 70mW modern containership.

In the wider market, Krystallon has talked to “every major shipyard in Japan and Korea”, and Mr Leigh-Jones is cautiously optimistic that with cancellations threatening profitability, the yards might see scrubbers as a value-add to future orders.

The cost has fallen too – by about 40% in two years - though Krystallon is seeking a large industrial partner for additional leverage. “It’s never going to be a significant part of the cost [of a newbuilding] – perhaps \$2million-\$3million but never \$100,000. But if the

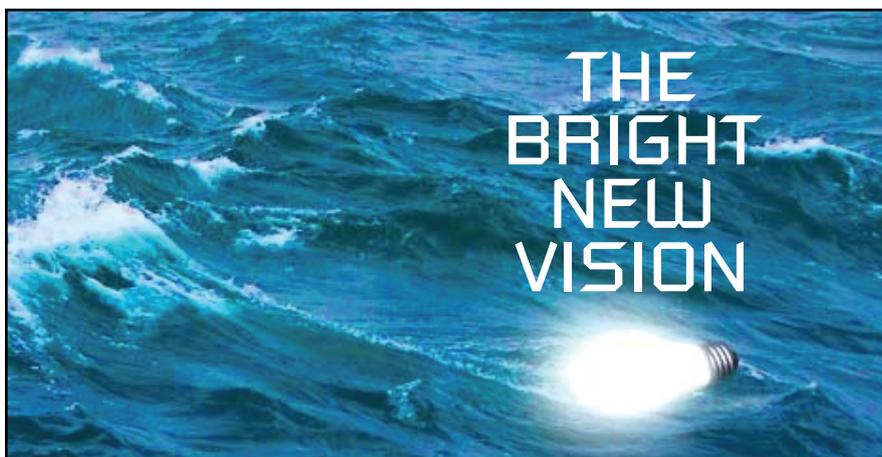
low sulphur fuel premium is above \$50 a tonne, then it’s worth fitting a scrubber.”

If the adoption of the Annex VI amendments has acted as a spur to the concept, the manufacturers have also taken steps to give the concept the best possible spin. Originally set up a year ago and prompted in part by the bad publicity exhaust gas scrubbing was receiving from non-governmental organisations and the press, the Exhaust Gas Cleaning Systems Association was initially intended as a forum for shared standards.

Now under the leadership of former BP Marine director of sustainability Don Gregory, the original mission has been trimmed back to the core issue of promoting the interests of the manufacturers.

The association includes Wärtsilä, MES, Krystallon and Clean Marine and hopes to add Aalborg soon. Outreach is centring on spreading awareness of the concept and its effectiveness among port authorities, thereby answering the concerns of owners. “The focus is on getting across the story that shipowners should not be afraid to put them on for fear they can’t be used in certain ports. There should be no reason not to scrub in port,” says Mr Gregory.

He admits the ‘perceptual battle’ still needs to be fought from time to time but says the focus on cleaning and recirculating wash water belies what has already been achieved on SOx reduction. “Being able to retrieve 90% of what comes out of the funnel is doing really well.” *NA*



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Aker Arctic takes pole position

Details have emerged of a concept for a newbuild cruiseship specifically designed for the burgeoning Polar expedition market.

Polar Star, built in Finland to serve in the Swedish Maritime Administration's fleet of icebreakers under the name of Njord, underwent a complete retrofit in 2000, becoming what owner Polar Cruise Enterprises claims is

one of the safest and most comfortable ice class cruise vessels in operation, with safety standards exceeding international requirements for several years to come. Capable of carrying 105 passengers on Polar expedition cruises that by definition are to remote destinations, the ship is equipped with 10 16-man zodiacs.

Now, Norway's Polar Cruise Enterprises, has been encouraged by market demand to step into the newbuilding market, and is working with ice-going ship research specialist Aker Arctic to develop the concept for a Polar vessel specifically designed for remote Polar cruises from scratch. The resulting ship is expected to surpass any of the passenger ships currently plying the Polar trades in terms of structural strength: Its stern section will be built to DNV Ice Class 05, one step up from Ice Class 1A. By comparison, for example, the well-known expedition ship *Fram*, was built to Baltic Ice Class 1B.

The Polar Cruise vessel will be designed to operate in Arctic areas off Norway, around the coast of Greenland, in the Canadian Arctic, in the Antarctic, in Atlantic and Pacific transit cruises, and possibly in the North-west and North-east passages to Alaska and the Bering Sea.

Aker Arctic managing director, Mikko Nini, said that Aker Arctic had reached the finishing point in developing the concept design for the new ship. "Currently, they [Polar Cruise Enterprises] run to both the Antarctic and the Arctic, so the company needs a ship that will be very seaworthy and economical running in open water, and that means that the bow form needs to be only moderate in its ice-breaking capability. The ship will feature a non-bulbous bow, with ice-breaking done on the basis of the double-acting principle [where the ship breaks ice moving astern, using azimuthing electric propulsion]. The ship will thus feature a double bridge, as well as completely independent engine rooms."

Aker Arctic project manager, Maximillian Vocke said that that the new ship would have capacity for 200 passengers, with 100 crew also onboard. Emphasising the need for safety considerations to be paramount, he said that all passengers would be able to avail themselves of 100% enclosed lifeboats.

He said that the bow form had been designed to move through broken ice, and that the plan was for the ship to be able to move astern through ice astern at 2knots, although this element of the design was yet to be finalised.

TECHNICAL PARTICULARS	
Polar Cruise Enterprise	
concept Polar newbuild	
Length O.A.	135.5m
Length at water line	127m
Beam at water line	17.68m
Beam hull	17.8m
Gross tonnage	10,950
Double occupancy	202
Pax cabins	101
Max number of pax	242
Crew	76
Deadweight	2395dwt
Main engines	4 x MaK 6M32C
	engines generating 11.52MW
Propulsion power	2 x 3.5MW
Service speed	13knots
Height of bulkhead deck	7.2m
Life saving appliances	318
Lifeboats	2
Mob boats	2
Class DNV Ice Class	05



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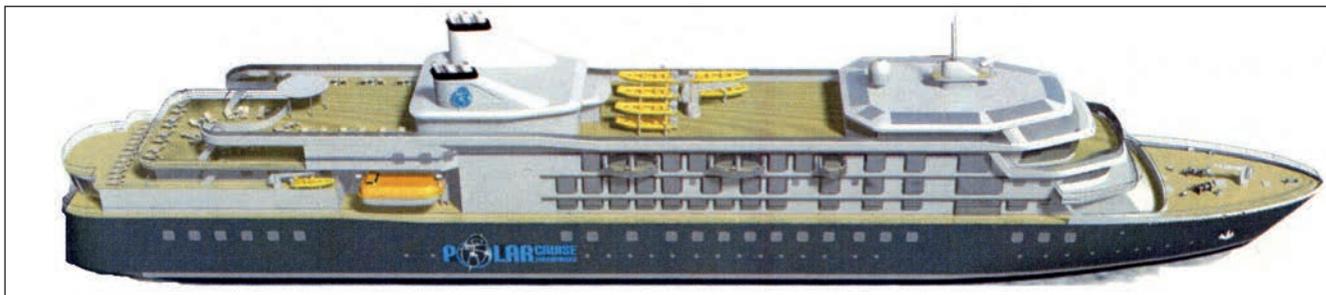
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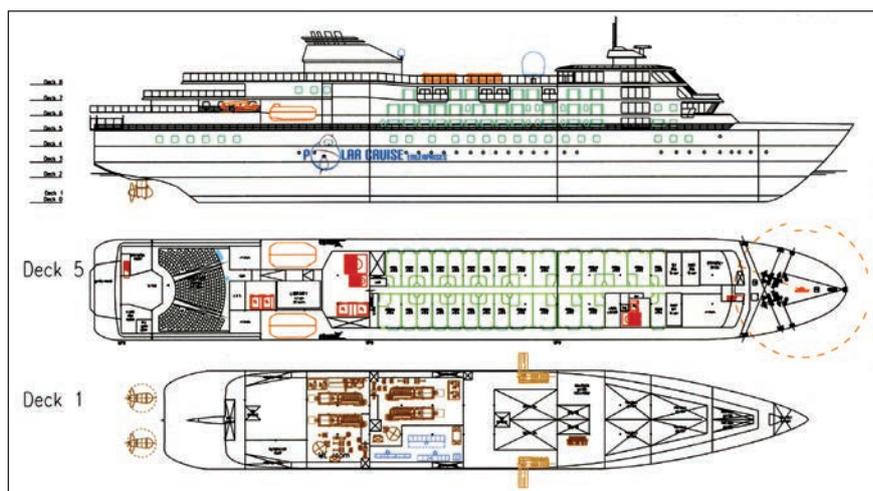
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Concept for a dedicated Polar cruisehip newbuild.



Lay-out for the proposed Polar Cruise Enterprises ship.

He said that most of the ships being used for Polar expedition cruises had been converted from ships formerly operating in the Baltic Sea, or were ships designed to operate in open water that had been structurally strengthened. As far as moving astern was concerned, he said that the stern section would be strengthened to DNV Ice Class 05 standard, where the ship was intended for

service in winter ice and no ramming was anticipated. DNV defines Ice Class 05 vessels (and Ice Class 10 and Ice Class 15 ships) as those that are “intended for ice-breaking” but have been “built for another purpose”. The Polar Cruise vessel will thus be capable of breaking “first year ice with pressure ridges” (DNV definition), according to Mr Vocke of up to 0.5m thickness.

Because the ship would always be operating over the Polar summer months, Mr Vocke said that the need for winterisation characteristics was limited. However, he added that thought was being given to limiting ice-gathering on aspects of the ship’s exterior superstructure.

Mr Vocke said that the design for the new ship envisaged a mechanical podded propulsion system, also strengthened in its shell to DNV Ice Class 05.

Again, he said that a double hull would be added in certain parts of the ship, especially around critical compartments, such as the engine rooms. The ship would also benefit from safe return to port notation, by virtue of its completely redundant engine rooms and separated podded propulsor control.

Because of the fragility of the Polar environments, Mr Vocke added that the ship would certainly benefit from selective catalytic reduction, while water treatment studies were ongoing to determine the best ways of storing grey water to limit the need to pump out contaminated water in sensitive areas. *NA*



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G.A.P. closes on *Expedition* safety

A 1970s ferry is set to become the latest ship converted for use as a luxury Polar exploration cruiseship. Owner G.A.P. Adventures, which owned the infamous *Explorer*, offered thoughts on operating safely and cleanly in the remote environment.

The 1969-vintage Ice Class 1A expedition cruiseship *Explorer* - one of the first to carry fare paying passengers to Antarctica - sank in the Bransfield Strait on 23 November 2007, after hitting ice. Although all 91 passengers, 54 crew and nine expedition staff were subsequently rescued, the episode brought the growing Antarctic exploration cruise market under massive mainstream media scrutiny.

Now, the owner of *Explorer*, G.A.P. Adventures, is set to take delivery of another ship - the 1972-built Ice Class 1B ferry *Expedition*, which is being converted for expedition operations in both the Antarctic and the Arctic at STX Europe's Rauma yard, at a cost of US\$15 million. Formerly the Viking Line ferry *Alandsfarjan*, G.A.P. bought the 6172tonne ship in mid-2008.

With operations due to start in April, *The Naval Architect* asked G.A.P. about the



The spirit of adventure - 34,000 passengers are reckoned to have undertaken Antarctic cruises in 2007/2008.



The ferry whose conversion will see the emergence of the Polar cruiseship *Expedition* is due redelivery in April 2009.

TECHNICAL PARTICULARS	
<i>Expedition</i>	
Built:	..... Helsingor Skibsværft, Denmark 1972
Ice class:	..... Swedish/ Finnish 1B
Length:	..... 105.23m
Breadth:	..... 18.63m
Max Draft:	..... 4.71m
Gross Tonnage:	..... 6336grt
Cruising Speed:	..... 16knots
Stabilizers:	..... Fins, Type Brown/AEG
Passenger Capacity:	..... 120 passengers max
Crew:	..... 53 crew
Current Life saving & Rescue equipment:	..... Covered motor lifeboats 4 pcs capacity of 192 people. Life rafts total capacity 260 people.
Communication:	..... Telephone, fax, email, GMDSS, satellite C, B & M.

conversion, and steps taken to enhance safety and protect the marine environment.

With the contract formerly signed last June by the then Aker Yards Lifecycle Services unit, the conversion work includes building of new cabins on former car decks, and the former tax free area being converted into luxury cabins and suites. The main restaurant is being totally refurbished, and new service facilities created.

Originally built in Denmark, *Expedition* is 105m long and 18.6m wide and will operate under Lloyd's Register Class. After the conversion the vessel will offer cabins and

large public areas for 120 tourists joining the vessel's travels in Polar waters.

STX Europe confirmed that, as far as the ship's hull structure was concerned, the conversion work did not include any further strengthening for ice.

William Bennett, G.A.P. Adventures director of marine operations, explained: "This ship was built to Ice Class 1B, classed and thoroughly inspected by Lloyd's Register. She has operated year round in the Baltic and her hull has recently been extensively tested for thickness and wastage. It has been determined that the hull is in exceptional

condition and still meets the criteria for Ice Class 1B. The operational guidelines of our vessel are designed to avoid ice when possible. The only encounters with ice we will permit is to break thin first year ice. There will be no contact with multi-year ice.”

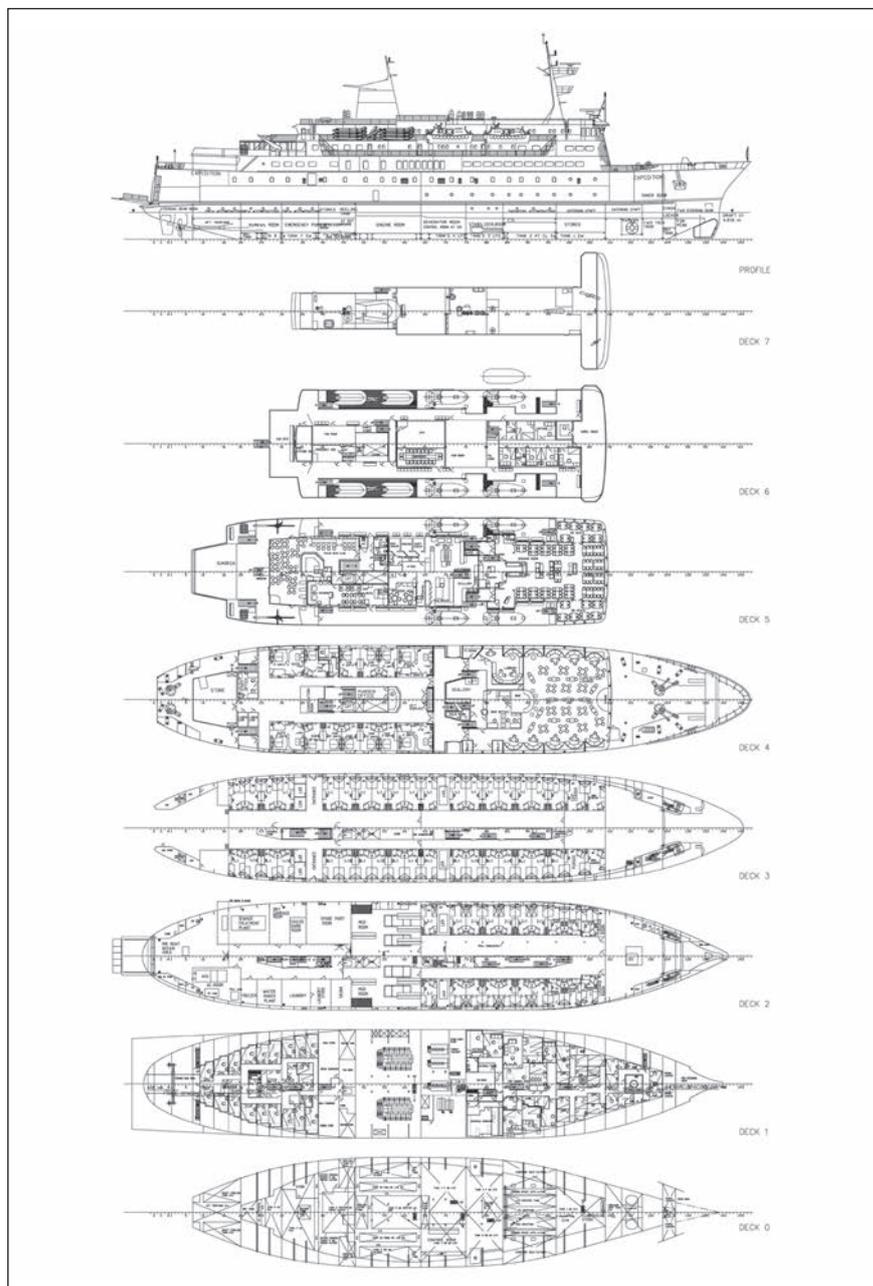
Safety first

One of the focuses for concern around the *Explorer* evacuation, by contrast, was the fact that passengers and crew disembarked to open lifeboats. In calm sea conditions they spent six hours afloat in the lifeboats, with no protection from the elements. Had ships willing to assist been further off, the consequences could have been far graver than was the case: four of those rescued suffered moderate hypothermia.

Asked what lessons had been learnt from *Explorer* when it came to lifeboat provision, Mr Bennett said: “*Expedition* is fitted with four new 46 person partially enclosed lifeboats (PELB). These are fitted with diesel engines, which are supported by two starting batteries on constant trickle charge. We are supplying immersion suits for all crew and passengers onboard, which goes beyond regulatory requirements. The Public Address and Fire Detection systems have been totally upgraded with state of the art technology. The radio station has been upgraded to comply with world-wide operating regulations.”

Work has also been done with the fragile Antarctic environment in mind. According to Mr Bennett: “In her life as a ferry she used holding tanks for grey water and ballast water, and pumped them ashore during the evening while not operational. We have installed a new SOLAS/MARPOL approved sewage treatment system and a fresh water treatment plant. We will also make use of a garbage compactor, cooled garbage storage room and recycling programmes onboard, depending on the facilities of the various embarkation ports. All waste streams will be mandated by our company’s operating procedures and strictly enforced onboard.”

More generally, Mr Bennett said that passenger accommodation would be spread over six decks, including three decks of new cabins. “Deck two has 14 cabins each with the ability to have triple bunk capacity,” he said. “Deck three has 36 cabins, double occupancy. Deck four has four suites and nine superior cabins. There is a spacious mud room and a sauna on deck two for passengers returning



GA of G.A.P. Adventures' latest ship, *Expedition*.

from shore or Zodiac excursions, Deck four has a lecture hall, library and bar. Deck 5 has a dining room and panoramic view pub. Deck six has a new gym facility.” Mr Bennett said that, to date, steel work for decks and bulkheads had been completed and the car decks had already been converted into cabin decks. The crew of 55 would each benefit from their own cabin.

Meanwhile, the main engines and one of the generators have been overhauled. The main engines (2) are 4400kW MAK BNW U45 V 10-Cylinder. The generators (3)

are MAN GV 35.5/33A 380volt 625KVA Generators. They are on a ‘continuous machinery survey’ with Lloyd’s Register and up to date with all maintenance and overhaul, Mr Bennett said.

He added that the ship had been inspected while she was operating as a ferry and it was determined that “nothing was needed to improve her manoeuvrability. With over 10,000 horsepower, twin-screw controllable pitch propeller systems and bow thruster, she is as manoeuvrable as could be desired.” **NA**

STX in cruise debut

December 2008 saw the first cruiseship delivery to be made under the STX Europe banner, when *MSC Fantasia* departed from the company's Saint Nazaire yard, in France, and was taken into service by owner MSC Cruises.

The biggest cruiseship ever commissioned by a European shipowner, *MSC Fantasia* was delivered three years after her first basic design was arrived at. At 138,000gt, the 18-deck *MSC Fantasia* is 333.33m long, 37.92m wide and 60m tall. She includes 1637 cabins to host a total of 3274 passengers onboard (the ship has 1325 crew). Featuring dynamic positioning and fin stabilisers, the ship is notable for its environmental and energy-saving aspects, as witnessed by the *Clean Ship 2AWT* certification conferred by Bureau Veritas.

The builder draws attention to:

- treatment and recycling of waste and aluminium
- treatment of discharge water through

an AWT (Advanced Water Treatment) system

- guaranteed energy saving through the optimising of its air conditioning and electrical systems
- the use of special fuels with a lower sulphur content
- the use of special polymeric paints for the hull which reduce friction with the water.

The development of the *MSC Fantasia* plans was assigned entirely to Studio De Jorio Design International, of Genoa. Marco De Jorio, son of company founder Giuseppe, acted as project leader. By 2010, the naval architecture company will see further designs take form, in



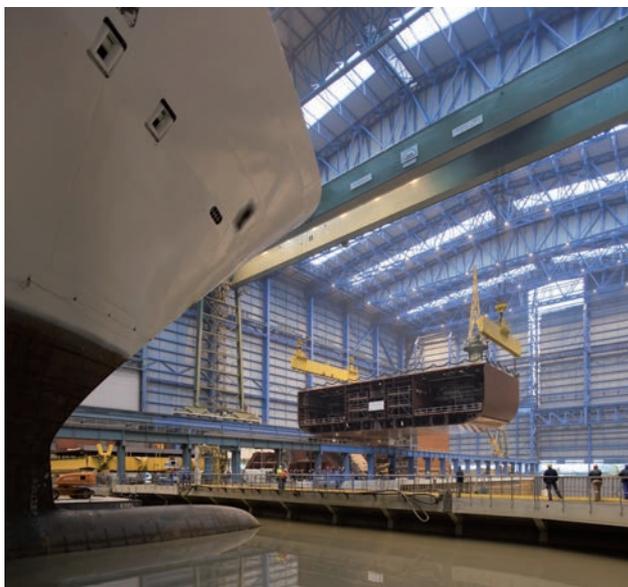
MSC Fantasia, delivered in December 2008.

the shape of: *MSC Splendida* and *MSC Magnifica*. [NA](#)

Eclipse on the horizon

Late January saw the first block laid out of a total of 72 of the new 122,000gt passenger cruise vessel *Celebrity Eclipse*, for Celebrity Cruises in Meyer Werff's covered building dock II, which has been lengthened by 120m.

Harri Kulovaara (executive vice president maritime and newbuilding), Christer Schoug (vice president newbuilding) and project director Jarmo Laakso of Celebrity Cruises put down the traditional 'lucky cents' in this new part of the



dock of the shipyard before the first block of the new ship was lowered by an 800tonne capacity crane. This first block weighs around 550tonnes, is 16m long, 36.80m wide and approximately 8.00m high. Meyer Werff was represented by Bernard Meyer (managing partner), Lambert Kruse (managing director) and Uwe Wulff (project manager). *Celebrity Eclipse* is the third ship in a series of five luxury cruiseships for Celebrity Cruises.

Delivery of the ship is scheduled for 2010. *Celebrity Eclipse* will have a length overall of 317m, a breadth of 36.80m, and will be able to operate at a speed of more than 24knots. More than 2852 passengers will be accommodated in 1426 cabins.

Keel-laying of *Celebrity Eclipse*.

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Minimax out of sight

Largest ever river cruise vessel to operate on the Elbe hides a little secret when it comes to fire protection.

Scenic *Emerald*, the largest freshwater cruiser on the river Elbe, is also breaking safety records, with the inclusion of what is said to be a unique fire protection solution for ships of this type - the GL-certified 'undercover' sprinkler system from Minimax.

At 135m long by 11.45m across the beam, the river cruise giant from Saxony-Anhalt's Tangermünde Ship Building and Developing Company (SET) offers 20% more capacity than the average cruiser. Her four decks offer 86 luxury suites, a restaurant, a lounge and bar area and spacious viewing areas.

Modified GL and SUK regulations now demand new levels of fire protection for German river boats. In order to ensure complete integration of unsightly nozzles, the cabins and all public areas of *Scenic Emerald* have been equipped with undercover sprinklers. This system is fitted into the ceiling, thus ensuring discreet safety.

With a maximum height of two metres, the ceilings on *Scenic Emerald* are comparatively low. Thanks to the integrated undercover sprinkler system, valuable centimetres are also gained.

The GL-certified sprinklers consist of both tried and tested hanging and rapid-response umbrella sprinklers as well as a new-style casing. The undercover solution is also said to be less susceptible to collecting dirt than conventionally fitted sprinklers.

For an optimal surface finish, *Scenic*



Scenic Emerald, the largest river cruiser ever to be built for the Elbe.



The Minimax undercover sprinkler system in its different positions.

Emerald's undercover sprinkler was covered with a fine-mesh screen: the inconspicuous covers have been especially adapted to the different ceiling tones onboard the cruiser. When in use, the water jets are strong enough to force off the screens. Nevertheless, in order to prevent any hesitation over when the sprinkler is triggered, Minimax also equipped the covers with its patented CoverDrop eject mechanism, which exposes the sprinkler head before the nominal trigger temperature is reached.

The CoverDrop eject mechanism is based on two redundant working mechanisms. A coil spring locked with a fusible link is immobilised within the fine-mesh screen. When the nominal trigger temperature of the soldered strut lying below the trigger temperature of the sprinkler is reached, the coil spring is released and the cover is dropped. If, for some reason, the sprinkler is triggered before it drops out of the cover, the cover is released by the escaping water and even water distribution is guaranteed. **NA**

ESD gets Florida approval

The Florida Department of Health has approved marine waste compaction equipment supplied by Ocala, Florida-based ESD Waste2Water, Inc for use in the marine industry.

Furthermore, in a third party validation, nationally-recognised testing bodies TUV RHEINLAND and UL laboratories have endorsed the product as compliant with safety code regulations covering use and manufacture. Their new guidelines coincide with OSHA requirements for worker safety.

The product line has been named "Green Squeeze" and was developed for all industrial applications to streamline the handling and costs associated with waste removal. The process uses aircraft grade aluminum to reduce equipment weight, UV lamps and HEPA (high efficiency particulate air) filters to contain and treat odours.

In operation, waste will be "unseen", because it will be moved through common areas compacted in its container. One employee can move 500lbs of waste through the facility. The ESD point of generation waste removal systems can be retrofitted to any ship.

Marlink stays connected

Maritime satellite communications integrator Marlink has secured a new five year contract with German cruise company AIDA Cruises to supply its Sealink(T) satellite communications system.

Sealink(T) will be provided to five existing cruise vessels and three planned newbuilds for AIDA Cruises, the first of which will be in operation from spring 2009 with the others in commission in 2010 and 2011.

The new agreement extends an existing relationship. Marlink will provide VSAT bandwidth capacity to facilitate both business critical applications for the cruise line as well as the provision of passenger services.

Sealink(T) is a full service broadband satellite solution developed by Marlink which offers “always-on” voice, Internet access and Local Area Network (LAN) communications. The system is currently used by a number of the leading maritime businesses, including commercial shipping companies.



AIDA Cruises has extended its relationship with Marlink through a new five year agreement.

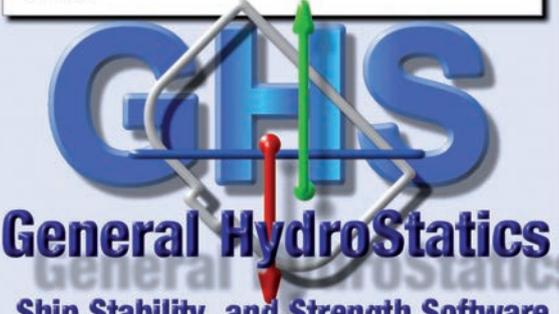
Operating in the Mediterranean, Northern Europe, Caribbean and Asia regions the AIDA vessels will be equipped with Sealink(T) C-band services VSAT technology - each with technical solutions providing bandwidths from 384kbps

to 768kbps. The cruise line also has the option to move to shared solutions from Marlink by 1 May, 2009. The options are based on either Vipersat multicast SCPC or IDirect technology, subject to final testing and requirements. [NA](#)

Version 11.50 ready for 2009

New probabilistic oil fuel outflow and updated probabilistic damage stability will be helping GHS users address the latest regulations in 2009. The new, rewritten Part Maker is also included in the 11.50 release. The high priority we give to making our software as clean and reliable as possible will be evident as well as the dozens of minor new features provided in response to user requests.

GHS Load Monitor (GLM), the onboard stability configuration, is also offering several new features. With the GLM-Maker wizard, naval architects enjoy their ability to provide the right combination of features for every type of vessel.



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Waste not, want not

International launch for the latest energy-saving waste management system from innovator Deerberg Systems.

Deerberg Systems GmbH is taking its latest integrated dryer for food, wet waste and biosludge to a wider market, following its official launch at the Shipbuilding Machinery and Marine Technology trade event in September 2008.

The “intelligent combined system for drying solid and liquid wastes”, such as food waste, oils and sludges, was presented at the first SMM Istanbul event, a spin-off of the main SMM show, taking place between 21-23 January, 2009. The system uses the waste heat from the ship’s waste incineration process as its return energy source.

Jochen Deerberg, owner and chief executive of Deerberg-Systems, said: “This is not about green image; it is about responsibility for the environment.”

Advanced waste water treatment plants have been introduced on a growing number of vessels over recent years, but their initial interface with the waste consisted of a decanter separating solids from liquids by adding a polymer to the waste water stream, and a stream-heated dryer to dry the bio-waste before it was fed into the incinerator. Such dryers have tended to consume extra energy, and thus generate additional emissions.

Deerberg’s new integrated bio-waste dryer, which is installed outside the incinerator, uses energy recovered from the incineration process itself. A part of the ‘off-gas’ caused by the incineration of burnable waste or sludge oil is directed into the dryer, in order to dry the bio-waste. Where the off-gas stream has an initial temperature of 350°C, this is reduced

to 250°C before entering the dryer, in order to prevent extreme heat loads.

A cruiseship carrying 5500 passengers would demand two 2400kW incinerators and a total of four integrated dryers, to ensure full redundancy. In this configuration, with no diesel oil or steam production, the Deerberg solution would save up to 619tonnes of diesel oil per year when compared to forerunner systems. This, in turn, saves 7652tonnes in terms of CO₂ emissions.

The SMM Istanbul overseas launch was part of an initiative to encourage Turkish shipyards engaged in the superyacht sector to engage with the green agenda. Deerberg said that SMM Istanbul was “not a bad place” to launch the initiative, in view of the changes in regulations for waste water processing in superyachts from 2010 onwards. *NA*

Evac brings quiet relief

Helsinki-based Evac Oy, which supplies around 75% of toilets onboard cruiseship newbuildings worldwide, has developed a new, low noise vacuum toilet for cruiseships, in the shape of the Evac 910..

A new patented ‘quick relief’ valve cuts discharge noise by around 4dB(A) and peak noise by approximately 8dB(A), when compared to the previous generation vacuum toilets. Recent testing carried out by an independent research centre has demonstrated that the sound level of the Evac 910 is around 5-8dB(A) lower than other vacuum toilets on the market.

According to Markus Peltola, Evac director, European sales: “The Evac 910 is now clearly the quietest vacuum toilet available to marine customers, with a sound level comparable to gravity toilets. With this toilet a major source of annoyance to passengers has been eliminated, and we are sure this will make a big difference to their enjoyment of the onboard experience.”



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Voyager Maritime features 16 realistic contemporary plank and tile designs that have

been specifically developed for front of house marine environments, including retail, leisure and general public areas where design is a prominent requirement.

Widely specified for “back of house” crew quarters, corridors, stairs and storage areas, the Voyager sheet vinyl ranges and Voyager Polysafe Stud Tile collection comprise of over 60 bright, attractive and hardwearing colour and style options.

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Bolidt on deck

Five years of business for well-known deck supplier.

Confirming its continuing special relationship with Meyer Werft, deck supplier Bolidt is to be responsible for the complete deck finish to Celebrity Cruises' forward looking Solstice class cruiseships.

Celebrity Solstice, the first in what will eventually be five 317.5m long cruiseships, came complete with 11.000 m² of Bolideck Future Teak, covering outside decks, pool decks and all of the ship's balconies. Some of the inside decks were also fitted with Bolideck Future Teak, which the supplier said stimulated the 'welcome aboard'. Bolidt also provided the athletic tracks and sports fields with Bolideck Select Soft. Finally, the helicopter deck was provided with the Bolideck system as well

Last year, Bolidt secured a five year contract from Meyer Werft, which on top of the Celebrity ships, takes in remaining AIDA ships, two Disney cruise vessels, and a passenger ferry due delivery to Indonesia.

As well as its newbuild business, Bolidt reported that a number of cruiseships would be converted to the Future Teak system in the coming months. **NA**



Bolidt Future Teak onboard *Celebrity Solstice*.

Api down on the floor

Protective coatings and sealants supplier, Api SpA, says it has witnessed continuing growth in demand for its soft Flexigel Decoro, and its hard Flexisecurit deck coatings, as owners continue to demand finishes that bring out the best in wood supplied.

Api says that demand from cruiseship operators has been particularly high for the Flexigel Decoro-Synthetek product, developed to replicate the feel of a teak deck. Different technical solutions have also been applied in the internal areas where characteristics like mechanical strength and reduced slipperiness are required.

Lately, the company has been targeting the super yacht market.

Flexigel Decoro-Synthetek - a coating developed to give the feel of real teak.



Voyager in luxury

New colours and styles of wood and stone effects have been introduced for the Voyager Maritime Collection of luxury vinyl tiles from Polyflor.

Featuring 16 plank and tile designs, Voyager Maritime has been specifically developed for front of house marine environments, including retail, leisure and general public areas where design is a prominent requirement.

Widely specified for crew quarters, corridors and storage areas, the Voyager sheet vinyl ranges now feature the Voyager XL, Voyager PU and Voyager PUR collections plus the Voyager Polysafe Stud Tile collection, totalling over 60 colour and style options.

Voyager Maritime and Voyager PU include a polyurethane surface treatment, providing a foundation for ongoing

maintenance. UK-based Polyflor says that cleaning cost savings of up to 24% are yielded using Voyager PU, which involves a relatively simple polyurethane surface coating, based on tests on PU coated, treated vinyl floors and untreated vinyl floors. This rises to 48% in the case of Voyager PUR, which features a more complex polyurethane surface reinforcement, and is marketed as offering 'polish-free maintenance'.

Polyflor says that all Voyager floorcoverings have a guaranteed life of 10 years, "but in practice useful life far exceeds this". The Voyager collection of floor coverings conforms to all relevant IMO Resolutions on the marine environment. **NA**

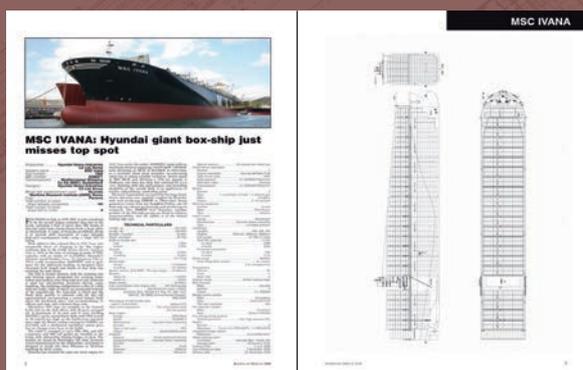
Estillon floors cruise market

Carpet underlay specialist Estillon has launched Fenix Base, its first underlay designed specifically for the cruise and mega yacht market.

Meeting IMO standards, the Dutch company said that Fenix Base had been designed to provide for easier application through its double stick method, also requiring less adhesive than other backings. In being aluminium-backed, the product offered better thermal isolation than other solutions.

Fenix Base itself is made from Polyurethane, which Estillon said provided a very high compression recovery capability and durability, in comparison to equivalent foam systems. Estillon uses new rest polyurethane material, to eliminate pollution from reused materials.

Fenix Base is available in thicknesses of 4mm, 6mm and 8mm.



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The year of consolidation

With Finnish shipowners collected under a single umbrella organisation, and the nation's marine equipment suppliers rapidly internationalising, Finland's shipyards were also subject to consolidation over the last 12 months, falling prey to an unexpected predator. A report by Henrik Segercrantz.

According to the second Finnish Maritime Cluster Report published last year, updating information from a first study made in 2003, there are some 2900 companies in the Finnish maritime cluster, which directly employs 43,400 people, and up to 500,000 indirectly. The combined turnover of these companies, includes the marine industries, shipping and port operations in the private and public sectors, was €13.2 billion. The study was coordinated by Tekes, the Finnish Funding Agency for Technology and Innovation.

While highlighting the significance of the maritime sector to the national economy, the study also draws attention to the way Finnish maritime businesses have internationalised over the last five years, both through partnering and expanding operations abroad, but also through acquisitions.

In June last year, meanwhile, the employer and trade organisations the Finnish Shipowners' Association, the Aland Shipowners' Association and the Cargo Ship Association merged to become a single group. The new association, which simply adopted the Finnish Shipowners' Association as its combined identity, represents 27 shipping companies controlling 110 vessels operating under Finnish flag, with combined net sales of €2.5 billion and 7000 seafarers in employ.

The new association consolidates the ability of shipowners to address economic policy, legislation and the labour market, and will bring a unified voice to international tasks within the EU, the IMO and other organisations. One aim of the new organisation is to promote actions by the Finnish Government that increase the competitiveness of Finnish vessels internationally.

The share of Finnish flagged vessels in the Baltic trade has decreased during the last years and, on the issue of renewing and expanding their fleets, Finnish shipping companies have for many years sought tonnage tax reform. They were rewarded at the end of August 2008, when the Finnish Government announced it would introduce a new tonnage tax scheme this year, and also support the shipping sector in Finland through some other means. The Finnish Shipowners' Association noted then that Finland will have one of the most competitive tonnage tax legislations in Europe, and said that it was very satisfied with the proposals.

As of mid-January, the new tonnage tax was yet to be implemented, but the aim is to introduce it within the first quarter of 2009, with final details now being discussed, according to Tero Jokilehto at the Finnish Shipowners' Association.

Recession proof?

Strong forward orderbooks have so far insulated Finnish suppliers of maritime equipment to the current global recession. For example, Wärtsilä Corp expects its current orderbook will result in continued improvement in its financial results for the full year 2009 (see pp64-65) although beyond that the picture is uncertain. Vacon, the Finnish AC drives manufacturer recently expanded its operations and production facilities, through capacity expansion in Finland completed in the autumn of 2008, and through the acquisition of the AC drives business of TB Wood a year ago, which brought production facilities in the United States, Italy and India. In



Oasis of the Seas was floated out from the drydock of STX Turku shipyard in November.



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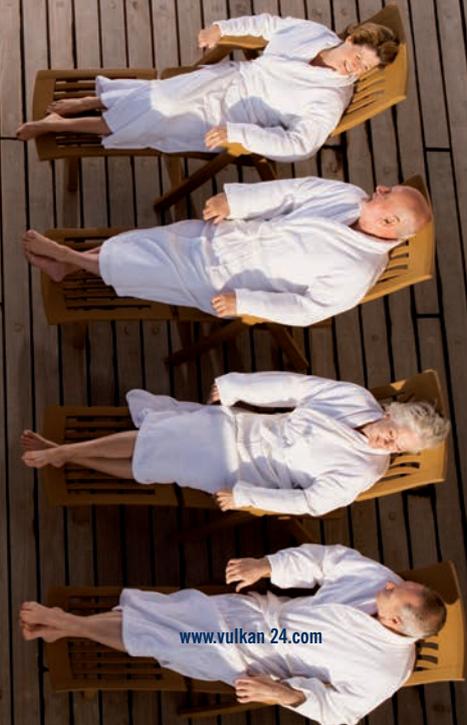
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The 8500gt ropax ferry *Armorique* for Brittany Ferries was due for delivery in January from the Helsinki shipyard.

the first nine months of 2008 revenues grew by nearly 30%, operating profit by almost 25% and orders received by nearly 40% compared to the same period of 2007.

ABB Marine has been busy manufacturing Azipod units at its new Azipod assembly plant, located next to the new Port of Vuosaari in Helsinki. Last summer, the 200th Azipod unit order was placed. At the end of September last year, 167 Azipod units had been installed on 74 ships, with some half having a power rating exceeding 14MW. The company recently delivered its most powerful units to date, two 20.5MW units for Celebrity Cruises' *Celebrity Solstice*, delivered last autumn in Germany (see pp36-38). The technology used differs from previous cruiseships in that the vessel uses Voltage Source Inverter - (VSI) type propulsion frequency converters, improving efficiency.

STX steps in

Internationalisation of a different sort also hit the Finnish maritime sector in 2008, when Aker Yards ASA became part of South Korean yard group STX in August. STX controls 92.46% in the old Aker business. In November, Aker Yards became STX Europe. The head office of the major shipbuilding group remains in Oslo.

The new management model of the Cruise & Ferries business area was implemented from the beginning of September, when Martin Landtman, now back in the industry, became president of the entire Finnish operations, Aker Yards Oy, while Jacques Hardelay continues as president for Aker Yards France SA. Olli Jantunen has been appointed sales manager in Finland. The yards in Finland and France continue to coordinate their cruiseship and ferry businesses, as before, although the French state acquired, in November, a 33.34% shareholding in STX France Cruise SA (STX France) and its shipyards in Saint-Nazaire and Lorient.

The orderbook of the Cruise & Ferries business area of STX Europe is valued at



around €5.3 billion. It includes, as of late December, seven cruiseships, of which two for Royal Caribbean, are being built in Finland, and four vessels for MSC Cruises and one for Norwegian Cruise Line that are being built in France. The second disputed F3 vessel for NCL was cancelled in December.

Seven ferries are on order. In Finland a cruise ferry is being built for Tallink, as are two car-passenger ferries for P&O Ferries, and a passenger ferry for Brittany Ferries. The French contribution amounts to three coastal LNG ferries for Tide Sjo.

The Cruise & Ferries business in Finland employs some 3800 people, including those from STX Finland Cabins Oy, the cabin module manufacturer. The yard in Turku has been focusing on building the two 225,000gt cruiseships for Royal Caribbean Cruise Line - *Oasis of the Seas*, which floated out from the drydock in November and is due delivery in November 2009, and the sistership *Allure of the Seas* in autumn 2010.

Last spring, the yard delivered the smaller (but still the world's biggest cruiseship to date), 160,000gt *Independence of the Seas* to the same owner. The vessel is the third vessel in the Freedom-class.

Last year, the Finnish yards also delivered the two ropax ferries *SuperSpeed 1* and *SuperSpeed 2* for Color Line from the Rauma yard. The fast 34,000gt ropax ferry *Viking XPRS* for Viking Line and the 48,300gt cruise ferry *Baltic Princess* for Tallink were delivered from the Helsinki yard. The 8500gt ropax ferry *Armorique* for Brittany Ferries is due for delivery in January, from Helsinki.

The ferry orderbook includes a 48,000gt cruise ferry, project, Cruise Ferry 5, *Baltic Queen*, for Tallink, due in April 2009 from Rauma. In August, a contract, worth €360m, was signed with P&O Ferries for building two large car-passenger ferries at the Rauma yard. The vessels are scheduled for delivery in 2010 and 2011. At 49,000gt, the vessels will be the biggest operating in the English Channel. The yards in Helsinki and Rauma have, in addition, some conversion orders.

In these turbulent times, however, a note of caution is called for. The letter of intent for the fourth vessel in the Independence series has not yet been confirmed, while the STX Europe Turku yard announced plans to lay off 1060 workers in January.

Last autumn RCCL chief executive Richard Fain told analysts no immediate new orders were envisaged under prevailing economic circumstances. **NA**

The rub of the green

The Baltic will be one of the most effected areas for SO_x, NO_x and Greenhouse Gas limitations. Green aspirations are welcome but, for Finnish interests, the timing of proposed changes may be difficult.

Last year, new limitations on sulphur oxide emitted due to burning ship fuels were agreed on by the IMO.

The revised Marpol Annex VI, agreed at MEPC 57 last spring, with the schedule somewhat revised by MEPC 58 in the autumn, will result in a progressive reduction in sulphur oxide (SO_x) emissions from ships, with the global sulphur cap reduced initially to 3.5% (from the current 4.5%), effective from 1 January, 2012; then progressively to 0.5%, effective from 1 January, 2020, subject to a feasibility review to be completed no later than 2018.

The limits applicable in Sulphur Emission Control Areas (SECAs) will be reduced to one per cent, beginning on 1 July 2010 (from the current 1.5%); being further reduced to 0.1%, effective from 1 January 2015.

Progressive reductions in nitrogen oxide (NO_x) emissions from marine engines were also agreed on, with the most stringent controls placed on the so-called "Tier III" engines, i.e. those installed on ships constructed on or after 1 January 2016, operating in Emission Control Areas. New engines are subject to NO_x emission reductions in two steps. Tier II standards will apply to engines installed on ships constructed on and after 1 January 2011. The reductions are between 15.5% and 22% from the Tier I NO_x limits. Tier III standards will apply, only in Emission Control Areas, to ships built after 2016. The NO_x limits are set at 80% lower than Tier I limits.

Outside ECAs, Tier II limits will also continue to apply after 2016. Tier I NO_x requirements are to apply for existing pre-2000 engines, for ships built after 1 January, 1990, with a displacement ≥ 90 litres per cylinder and rated output ≥ 5000kW, subject to availability of the approved engine upgrade kit.

The revised Marpol Annex VI will allow for the designation of Emission Control Areas for SO_x and particulate matter or NO_x, or all three types of emissions from ships, in which more stringent controls would apply. The revised Annex VI will enter into force

on 1 July 2010, under the tacit acceptance amendment procedure.

Some IMO administrations have also let it be known that they aim at having measures in place to control Greenhouse Gas GHG emissions from international shipping before

“The good goal is to achieve a cleaner Baltic Sea. The Shipowners’ Association fully supports this goal. But the problem is the schedule.”

the first commitment period under the Kyoto Protocol expires at the end of 2011. Secretary General Efthimios Mitropoulos has spoken in support of such moves. Further work on the limitation and reduction of GHGs from ships will continue at an intercessional meeting early in 2009, for presentation to MEPC 59 in July, which will benefit from the findings of the second and final part of the update of the 2000 IMO study. The outcome of MEPC 59 will, in accordance with the Committee’s established action plan, be presented to the United Nations conference on climate change to be held in Copenhagen in December 2010.

Green comes with a price

The Naval Architect talked to Tero Jokilehto, an adviser to the Finnish Shipowners Association, on the implications of these new agreed and proposed regulations. The Helsinki Commission, HELCOM, recently established a correspondence working group, with members from all the Baltic countries, aiming to establish the potential of making

a 2010 proposal to IMO that the Baltic Sea should become a NO_x Emission Control Area from 2016. Currently the Baltic and North Sea are SECAs.

“There are two important matters related to this,” said Mr Jokilehto. “The good goal is to achieve a cleaner Baltic Sea. The Shipowners’ Association fully supports this goal. But the problem is the schedule. We cannot cope with the 0.1% sulphur oxide limitation by the year 2015, and in addition the planned Tier III by 2016 in the Baltic. The technology is not there yet to achieve these emission limits at a reasonable cost.”

In September 2008, the Finnish Shipowners Association handed over a study on the cost effects of the new sulphur oxide limits to the Finnish Government. Reducing the SO_x limit from current 1.5% to one per cent by using low sulphur fuel would raise the total annual fuel bill for all vessels trading to and from Finland by some €300 million. The cost of switching to MGO gas oil to achieve the 0.1% SO_x limit by 2015 would in total cost €838.22m, the shipowners say. The report also notes that, as fuel oil with SO_x content of 0.1% does not exist, it has used MGO in the calculations. The figures are calculated based on real traffic and ship machinery data for a 12 months period, from March 2006 to end of February 2007, using the fuel consumption of the main engines only. The fuel price as of August 2008 was used in the calculations. This differs greatly from the price at time of writing, but it is fair to say that, as 2015 fuel prices are unknown, it is as good a yardstick as any.

Surprise in SO_x

“No one believed that the suggested time schedule for the reduced level of SO_x emissions would pass in IMO”, said Mr Jokilehto. “It came as a real surprise for us. We concentrated on achieving a solution where technical solutions would be allowed to cut these emissions. In this we succeeded. The mistake, which took place last spring, was not the level but the tight time schedule.



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There will be difficulties with implementing the technology in this time. The financial crisis does not help us either.”

An investigation on all Marpol Annex VI decisions, also including those on NOx, is being carried out by The Ministry of Transport and Communications, with some results expected before summer 2009. “The limitation of nitrogen oxides will be an even bigger problem,” Mr Jokilehto said. “Tier II enters into force soon and Tier III will affect us if the Baltic Sea will become a NECA (nitrogen oxide emission area) in 2016, now aimed at by the correspondence group set up by HELCOM. If this happens and if the North Sea area did not also become a NECA, the Baltic shipping companies and the industry would be in an even worse competitive situation when they trade outside the Baltic, as they carry the higher investment costs for the lower emissions, in addition to the costs of ice strengthening. Of course, any ship trading in the Baltic would have to use the required technologies.”

According to Mr Jokilehto, though, there are also technical problems associated with lower emissions limits. Reducing SOx by washing it results

for example, which makes it difficult to reduce the NOx level when using a catalytic convertor to Tier III levels. “It is not enough for us if the manufacturers say ‘We should be capable of achieving this by then’. It would mean, that, with this time schedule for implementing the revised Marpol, sulphur oxides would have to be cut by using low-sulphur fuel, with huge cost implications.”

“No one believed that the suggested time schedule for the reduced level of SOx emissions would pass in IMO.”

Currently, a consortium of experts, headed by CE Delft, is preparing a proposal to the European Commission on the methods and technologies to cut greenhouse gases in shipping. In early

these. The consortium is then, by October 2009, to prepare a more detailed study on the effects of the selected methods. “One of these will certainly be emission trading for shipping. According to an optimistic schedule, the decisions regarding CO₂ emissions would be implemented in 2013-2014, or 2015; that means all restrictions would be implemented almost at the same time, which would be very difficult for us, with all the cost implications coming at the same time,” Mr Jokilehto noted. “This is the first time for us when we really get to see the cost implications for environmental protection, which in itself is a good thing.”

“Concurrently IMO tries to work on a global solution on greenhouse gases, but the developing countries want to solve the issue through the Kyoto Protocol. The practical implementation of the plan can start only after the next ‘Kyoto’ conference to be held in Copenhagen in December. This time schedule will probably not be sufficient for the European Union. An IMO decision would be the best solution for global shipping,” Mr Jokilehto said. *NA*

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Wärtsilä aims to side-step crunch

Wärtsilä adapts its business model to the changing demands it perceives from its customers.

The last decade has seen engine suppliers evolving into 'propulsion chain solution providers', but it is clear that the process is far from over. Wärtsilä continues to broaden its offering, having taken over three ship design companies in the last two years, in the shape of Germany's Schiffko, Norway's Vik-Sandvik and Singapore's Conan Wu.

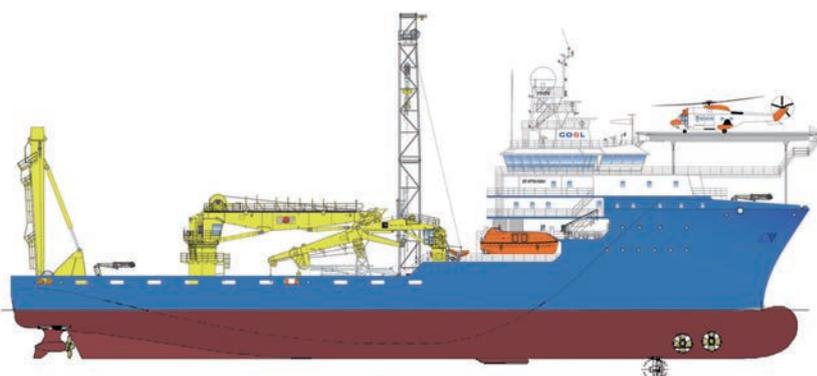
But the Finnish company's broader strokes should not obscure the fact that, at the detailed level, its integrated approach also offers opportunities for greater reach. At the company's capital market day in late November 2008, Jaakko Eskola, group vice president, Ship Power, noted that there were several areas within automation where the company had opportunities to broaden its scope of products. Bridge automation systems will likely be future area for the company, in addition to further investments in ship design and services.

The prospect of a shipbuilding downturn is now looming large. Ole Johansson, president of Wärtsilä Corp said that the company estimated that 10% of its of current total orderbook could be at risk - all related to Ship Power. "Year 2009 is probably clear but when going into 2010 this is an issue," he said. He also noted that all the company's manufacturing units are currently running at full capacity, as are its suppliers' - "a somewhat schizophrenic situation when looking at the current situation in the world," he said.

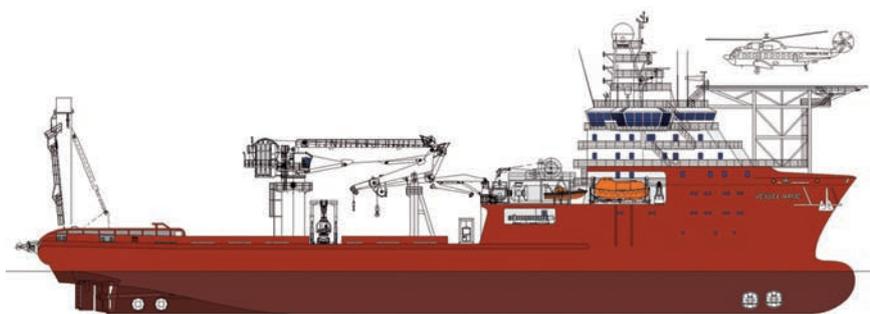
The cautionary tone validates a separate company strategy that should be beneficial in the result of any impending downturn. Increasingly, Wärtsilä's has pursued service business over recent years. For the first nine months of 2008, service provided 43% of the group's entire net sales, and this is expected to rise to 50% for 2008 as a whole. The Service sector is to be built up further, step by step, with acquisitions of service companies, according to Mr Johansson.

Green opportunities

Wärtsilä sees tightening requirements on emissions as an opportunity, with a resulting



Deepwater Engineering Survey Vessel design for China Oilfield Services Limited (COSL). Length 105m.



A 123m multipurpose support vessel for China's state-owned Shanghai Salvage Company. The key requirement is for multi-purpose flexibility since the vessel will be required to carry out a multitude of different operations, including salvage, offshore engineering services, diving and ROV operations, fire-fighting, anchor handling, ship supply, environmental protection, and route clearing.

demand for higher technology products with added performance requirements. In addition to new regulations for SOx and NOx, clients are also asking for reduced CO₂ emissions.

"Any serious shipowner wants to reduce CO₂, if not for other reasons at least for reducing fuel consumption," Mr Johansson pointed out, noting the strong correlation between CO₂ emissions and fuel consumption in denoting the efficiency of a vessel.

"We have decided to bundle this sector into one single division, Delivery Centre Ecotech, which began operations at the beginning of 2009," said Mr Johansson. "The unit will focus on developing and delivering environmental technologies, as

well as on products for emissions reduction and efficiency improvement (see *The Naval Architect* January 2009, p36).

Investments in Ship Design

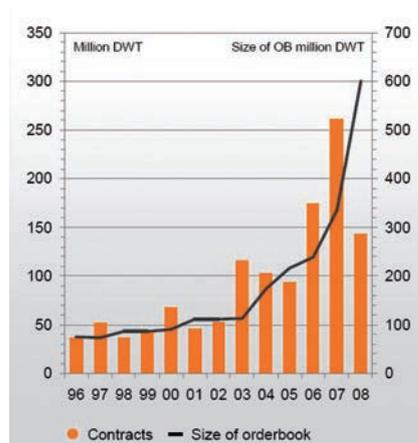
Within ship design, Wärtsilä is now among the top three, in offshore service, tug and boats, special vessels and targeted sub-segments within merchant vessels, Eskola noted. "In the future we will be the number one in certain ship types; in environmental ships, in efficient ships, and in extreme ships, an example being a research vessel for Arctic areas. We provide design services for non-commodity vessel categories, not bulkers and tankers," he said. Wärtsilä's sales strategy allows the owner the

possibility to choose the equipment provider for their vessel, although the products and services of Wärtsilä are promoted. If the owner considers somebody else's product to be better for a particular application, Wärtsilä will allow this. "That is different to Rolls Royce's strategy. They have a ship design company also within their portfolio, but request the customer to only have Rolls Royce products," Mr Eskola said.

Wärtsilä provides products and services for five segments; merchant vessels, offshore vessels, cruiseships and ferries, navy ships, and special vessels - the last including tugs and dredgers. These are markets that, according to Mr Eskola, will continue to perform despite the prevailing financial crisis. Some. 49% of the current Ship Power orderbook is within the merchant vessel sector, with 36% contributed by offshore, 7% by the cruise and ferry sector, 7% by special vessels, and 2% by navy ships. Bulk carriers represent just 8% of the total orderbook.

Different strokes

On the two-stroke side, Wärtsilä enhanced its operations in China in 2008 by signing a



The current orderbook at Wärtsilä is at a record level, but contracting slowed markedly in 2008, and the threat of cancellations looms. Of the total orderbook of €7.6billion extending until 2010 and 2011, €3.8billion is allocated to 2009.

production contract with one more licensee, and is building a joint venture two-stroke engine factory in Qingdao Qiyao with China Shipbuilding Industry Corporation (CSIC) and Mitsubishi Heavy Industries (MHI). The new factory will be ready for production in the second quarter of 2009. Here the strategy has changed, as Wärtsilä has decided to be a producer of two-stroke engines itself, and not only to handle production through licensees. Wärtsilä's share in the business is 27%.

The latest development on the four-stroke side has been on the DF50 dual-fuel engine, where the Finnish company established a 50/50 joint-venture with Hyundai Heavy Industries, of South Korea in 2007. A new Korean factory started delivering engines for the LNG sector two months ago, but it should be noted that this plant is also geared up to produce for the land-based power plant sector. *NA*

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VTT remains leading light

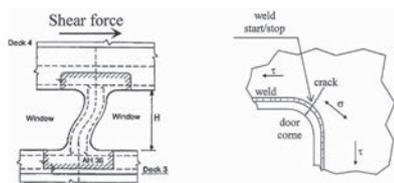
Among the recent stand-out research projects at VTT are a new passenger vibration analysis and new work on fracture mechanics procedures.

After several years of systematic study on ships' hull loads and dynamic behaviour, VTT Technical Research Centre of Finland has developed its own methods for global vibration analysis of passenger vessels.

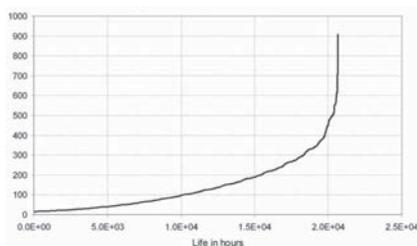
Seppo Kivimaa, technology manager at the Vehicle Engineering unit at VTT told *The Naval Architect* that the research had included numerical calculations, model tests and full scale measurements of wave loads and hull response at sea. Typically, for the dynamic analysis of a complicated construction, such as passenger ship's hull, a 3-D finite element model of the hull is made first, including necessary structures and masses. Then the natural frequencies and modes are calculated.

The calculation of vibration response for harmonic impulses, such as those from propellers, is rather straightforward. However, there are still challenging areas of study, including the modelling of the added mass caused by the surrounding water in free vibration, or the calculation of hull vibrations for wave impact loads.

VTT's solution has been an approach where impact loads are simulated from model scale pressure measurements, and are fed into the simulation model, including the dynamic characteristics of the hull, over a period of time. VTT has also developed methods to calculate



Fatigue assessment of welded joint in door corner with detected cracks using fracture mechanics and design material data.



Fatigue assessment of a welded joint in a door corner with detected cracks using fracture mechanics and design material data.

passenger comfort indexes, which are visualized in different colours based on how passengers feel the vibration (see picture below).

VTT is systematically gathering full scale data measured on cruiseships, to verify the accuracy of the calculations,

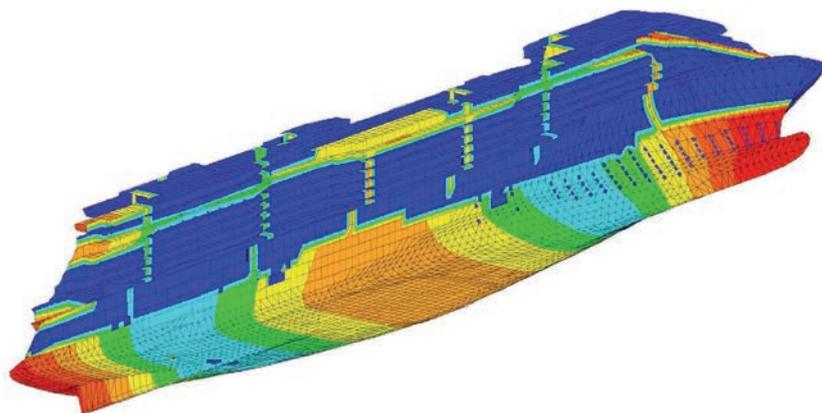
and to improve the predictability of the calculation model and structural analysis. Some 10 to 20 transducers are needed to measure and analyse global vibrations on a cruiseship properly. "The regulations for noise and vibrations induced by the propeller and onboard machinery are clearly specified, but there are no clear norms for the level of vibrations induced by wave impacts. This is the area we are focusing on," Mr Kivimaa said.

Fracture Mechanics

The methods and models developed by VTT are also used for strength and fatigue calculations for cruiseships. The work is done together with owners and shipyards.

Mika Bäckström and Mr Kivimaa at VTT Vehicle Engineering completed a study on the development and utilisation of fracture mechanics procedures in fatigue life assessment of ship structures. The work was performed within the scope of the project MARSTRUCT, Network of Excellence on Marine Structures, (www.mar.ist.utl.pt/marstruct/), which has been financed by the EU through the GROWTH Programme.

In general, the fatigue assessment of ship structures within the rules of classification societies is based on design S-N curves and the Palmgren-Miner's Rule for consideration of variable amplitude loading. Germanischer Lloyd's rules refer to the usage of the fracture mechanics in cases where cracks have been already initiated or welds are only partially penetrated. Additional principles of fracture mechanics and different fracture mechanics procedures are used to assess the residual strength and residual life of cracked structures in aircraft,



Passenger comfort index on a recent cruise ship newbuilding. The index is visualized in different colours based on how passengers feel the vibration.

pipelines, bridges, and offshore structures. However, these procedures have seldom been applied to ship structures due to the complexity of the ship details, the uncertainty of operational loads and of welding residual stresses and redundancy of ship structures.

VTT's study concentrated on the development and utilisation of fracture mechanics procedures in fatigue life assessment of ship structures with main focus on ship structures like large openings, e.g., window and door corners (see Figure above). The analysis was made for a ship's door corner, with the door placed in the area of maximum shear forces of the ship's hull. The loading of the door corner was generated by applying measured nominal shear stresses of the associated bulkhead. The measured stresses corresponded to 1500 hours of data of a passenger ship in normal operation in different wave conditions.

Fracture mechanics calculations were applied in order to estimate the growth of cracks at a passenger ship's door corner for two cases. First, fatigue assessment was made for the case where no visible cracks have been detected in structures. The second assessment was conducted for the case where cracks have been detected during inspections. The main purpose of this study was to get an overview of critical crack size and growth, and their influence on the remaining fatigue life of the door corner and the associated bulkhead. In general, the results obtained in the calculations of initial crack formation were in line with the observations made onboard the target ship after 10 years of operation. Using the design material data, fatigue assessment for the growth of the detected cracks gave the time period that the ship could operate before maintenance was required for the cracked door and

bulkhead. The graph above shows the relationship between the number of hours and predicted crack length (c). It was estimated that a critical crack size of 1000mm was relevant for actions to adjust the remaining fatigue life of the bulkhead, before the crack propagated to the deck. Thus, in this case, the cracked door and bulkhead should be repaired in $2.1E4 / 24 / 365 = 2.4$ years after the first visible cracks have been detected.

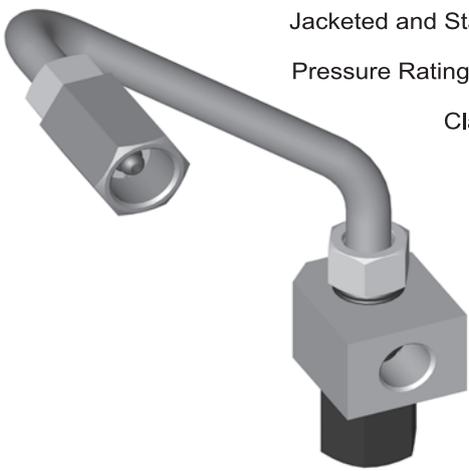
Overall, the study showed that the application of fracture mechanics in estimating the fatigue life of welded ship structures seems promising. In particular, the study concluded that it was important to find new methodologies to analyse remaining fatigue life of structural components, such as bulkheads, after the detection of the first cracks. Fracture mechanics is a useful tool which can improve the planning of maintenance and drydocking schedules. *NA*



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Vision at the cutting edge

More power to production claimed for Vision robot system.

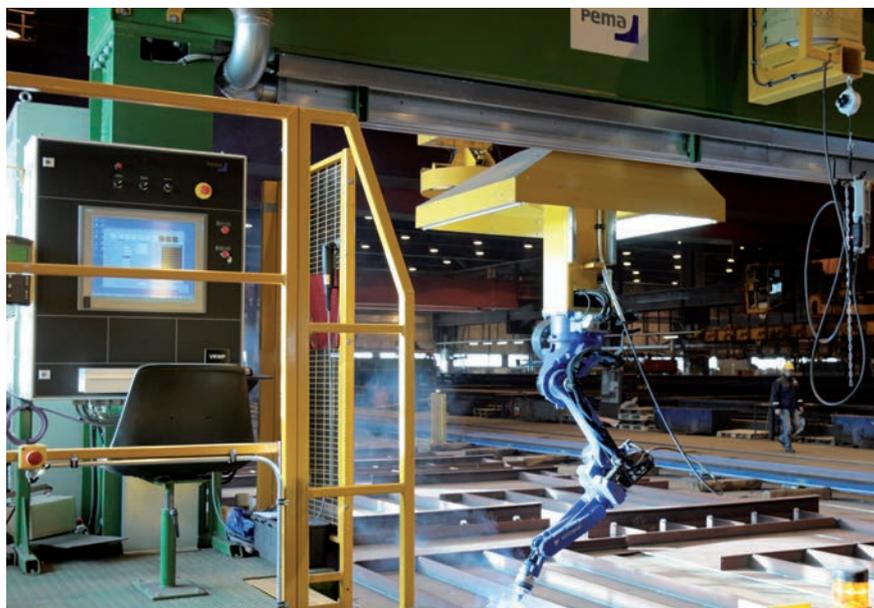
Industrial work-piece handling, welding mechanisation and automation specialist Pemamek Oy Ltd says that its 'Vision' robot system is finding growing favour among shipyards willing to invest in a cutting edge technology designed to offer consistency of weld and higher productivity.

Maintaining a competitive edge at shipyards requires efficient production, the Finnish company says. "Improvement in cost effectiveness frequently means an increase in automation. Pemamek can offer complete, modern and productive production lines for manufacturing of flat panels, double hulls, subassembly panels or just sections of them." The "Pema" shipbuilding production automation range is comprised of:

- plate- and profile prefabrication systems
- flat panel production lines
- double-bottom production lines, vertical welding
- subassembly production lines (micro, bulkhead)
- robotised panel lines or production cells for welding, "Vision" systems
- robotised profile cutting lines, milling and shot blasting systems for profiles
- production logistics and data collection software.

The patented machine vision-based Vision robot system represents "the very cutting edge" of Pemamek welding automation solutions, the supplier says. "Vision practically demonstrates how the job description for welders is moving more toward that of an operator and how this change enhances productivity in processes, where the form, type and number of a given workpiece requires easy and flexible programming."

Key characteristics claimed for the Vision approach are user- friendliness and fast workpiece programming. The programming required for an entire 8 hour welding shift can be done in 30 minutes. During a single shift, one Vision robot makes approximately 160metres in welds and based on testimonials from shipyards it can even be programmed to continue welding during the night shift. In addition to this, the quality of welds is consistent.



The 'Vision' robot system is best suited for the welding of panels that are largely similar, yet still individualised. Pictured: a VRWP-8000/1 robot portal at the STX Europe Turku shipyard.

Pemamek says it has placed a special emphasis on the ease of system programming. Professional welders trained as operators can use the system independently after just a few days of training.

The "Vision" system is based on camera scanning of the workpiece. All the necessary data on the scanned workpiece is obtained. This is an especially significant advantage over an offline system, says Pemamek, which requires an in-house programmer to do labour-intensive CAD modelling. The Vision system operator can independently handle the entire programming process, which results in exceptional production flexibility and efficiency.

"Vision's other advantages over an offline system include: ease of workpiece calibration; the absolute position of the panel is ascertained during scanning," the company says. Changes to the welding order or the addition of a new seam can be done easily. Furthermore, "Vision" produces an image of the actual workpiece that also shows the various support structures used by welders that do not appear in CAD images.

The Vision system is also said to improve work motivation, as the welder who assembled and tack-welded the workpiece is its operator. The system's high arc time ratio frees the operator to also take care of other production-related tasks which has a major impact on work productivity.

Customers for the Vision robot are typically shipyards which, build highly demanding cruiseships or warships. Italian shipbuilder Fincantieri Riva Trigoso and Spanish builder Navantia el Ferrol have both purchased the Vision system. Fincantieri has also ordered one and el Ferrol two new Vision robot portals. A similar application has also been delivered e.g. to Croatian shipyard 3 May.

STX Europe's Turku shipyard has improved its production efficiency with a Vision robot systems. It currently has several Vision robot portals in use and among others a bulkhead line with two twin-robot welding stations. STX Europe' head of robots, Tommi Reponen, says: "The ease of robot programming that the Vision system provides saves on resources and enhances productivity in panel welding." **NA**

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Vacon gives thrusters a boost

Until recently, the 70,000tonne *LNG Abuja* needed its main turbines running in order to start up the motors to power its bow thrusters. However, a replacement drive from Vacon demonstrates a more effective way of generating this significant mechanical load.

An 800kW drive produced by the Finnish-based Vacon used in conjunction with bow thrusters is making the manoeuvring of the 1980-built liquefied natural gas carrier *LNG Abuja* significantly easier, particularly in port.

Bow thrusters create a very large mechanical load on a vessel's power network, with attendant wear on mechanical components, being remote from main switchboards, and also produce a significant voltage drop on the network.

On investigating the problem onboard the 285m long by 44m across the beam *LNG Abuja*, engineers from Wärtsilä Automation, of Montrose, Scotland, discovered that auxiliary generators onboard the vessel had sufficient power output for the bow thruster drive motors whilst running, but could not supply the initial large current needed to start the motors.

The motors originally fitted were equipped with conventional electromechanical star-delta starters that had an inrush of around 300% of the motors' running current; also causing



Vacon drive system.

another current peak during the star to delta transition. To control the inrush, Wärtsilä concluded that a variable speed drive could be fitted to limit the inrush current to that of a normal running

current of the motors. Vacon's drive offered a further operational advantage, according to Wärtsilä, in that it included a synchronisation facility to bypass the motor when the bow thruster motors reached full speed.

LNG Abuja has two bow thruster motors mounted on a common shaft. The variable speed drive is used to control the acceleration of one of these, so that the maximum current demand never exceeds 110% of the motors normal running current - well within the capacity of the ships auxiliary generators.

Once the motor has reached full speed, which is confirmed by the synchronisation facility built into the drive, a contactor closes to bypass the drive and connect the motor directly to the supply. No special cooling facility is needed with this drive as it will be used for short periods only.

With the bow thrusters system running under the power of one motor, the second motor can then be switched directly onto the supply. This switching will produce a minor power peak as the second motor is mounted on the common shaft.

Ian Gordon, of Wärtsilä, said: "The bow thrusters can now be used whenever they are needed, and even started at short notice for maintenance operations, without having to worry about whether the main turbines are running. That's a big benefit for the ship's operators, and it has been delivered at a very modest cost." **NA**



LNG Abuja, where the Vacon drive has been installed.

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Emerson gets with the marine programme

The development of a discrete marine-focused business unit by US\$24 billion a year turnover, 130,000 staff strong corporation Emerson Process Management.

Process automation giant Emerson Process Management is now a player in the marine market, following the 2007 acquisitions of Sweden's Rosemount Marine (the developer of the TankRadar STaR gauging system), Finland's SF-Control (the developer of the LevelDatic remote tank level gauging, water ingress detection and draft measuring systems) and Denmark's Damcos (the developer of valve remote control systems).

These businesses are now bundled together in Emerson's Marine Tank Management System offering, which purports to be a complete, integrated solution for the monitoring and control of all tank-related functions on any type of ship.

The Marine Tank Management business is now 600 staff strong, with operations continuing in Denmark, Finland and Sweden, and manufacturing plants also based in China and South Korea, as well as sale offices in Poland, Germany, The

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Netherlands, and Croatia.

According to Ville Parpala, EPS sales manager Marine Tank Management, based

in Helsinki: "We have developed a new approach, where we let the customer choose which systems he wants. We bring a range of expertise, and we can offer standalone products or combined systems".

Thus, a customer may wish to install hydraulic actuators and valve remote systems under the Damcos brand, complete with an hydraulic power pack and a communications unit to interface with the loading computer. Alternatively, EPS itself could supply the loading computer itself, as well as the alarm control monitoring system. This could be augmented by the Rosemount tank level gauge, and the electro-pneumatic LevelDatic tank level gauge, or the transmitter type MAS2600 gauge.

In 2009, the range of available products will be further extended. EPS is close to launching a new draught measurement system, augment its LevelDatic range, and unveil a new "3 in 1" tank radar gauge. [NA](#)

MacGregor supplies flexible solution

Total cargo handling solution for heavy lift ships designed by MacGregor.

SE shipping Lines Pte Ltd and Polarkonsult has awarded MacGregor a contract to supply its total cargo handling solution for its latest heavy lift vessel design, with four ships due in 2010. The vessels are being trailed as more flexible in terms of handling over-length project cargoes than has hitherto been the case.

"We are looking for an environmentally-friendly, cost efficient and reliable solutions to transport project cargo, with a focus on servicing and the wind energy market with our new ships. Working in close cooperation with MacGregor...at the early stage will ensure that the cargo handling will be functional and most efficient for our needs and demands," said Gaurav Bansal, chief

executive of SE Shipping Lines.

"MacGregor has spent considerable time working with the customer, with its design consultant, Polarkonsult, and with JKL-Shipbrokers AS of Norway who is acting as brokers for the Owner to develop this concept vessel", MacGregor sales manager, Svante Lundberg, added.

The cargo handling systems will be installed onboard four 25,000dwt heavy lift vessels being constructed for SE Shipping Lines Pte Ltd at Wenzhou Zhangou, China. MacGregor will also supply hatch covers and its latest 450tonne SWL cranes. The delivery of the system is due in 2010 with the first of the four vessels going in to service in late 2010.

The cargo-handling shipsets will include; two electro-hydraulic GLH deck cranes, which will have a lifting capacity of up to 450tonnes, a maximum hoisting speed of 36m/min, a luffing time of 150-220 seconds, and a maximum slewing speed of 0.65rpm.

Fourteen folding and rolling type hatch cover panels will be operated by external hydraulic cylinders and manually cleated and weathertight. Sealing between the hatchcover and the coaming will be achieved through rubber packing, which is fitted on the panel and tightened against the coaming. The packing will be of the sliding type, acting directly on the stainless steel mating plate on top of the coaming. [NA](#)



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Fibres get near to the knuckle

MacGregor says it has introduced new technology that will transform ultra deepwater operations.

In January, Cargotec subsidiary MacGregor delivered what is said to be the world's first subsea knuckle-jib crane equipped with a system for fibre rope handling, for installation onboard the Havila subsea vessel *Havila Phoenix*. The 250tonne Hydramarine active heave-compensated (AHC) offshore crane is designed with a 250tonne/3000m single-line winch and is prepared for a 250tonne single-line fibre rope.

“MacGregor’s technology for handling lightweight fibre rope rather than traditional steel wire rope offers several advantages that will meet the ever-increasing demands of the offshore industry as operators move further into deeper and more remote territories,” says Øystein Bondevik, sales director in MacGregor’s offshore division. “For example, due to the neutralisation of the weight of the fibre rope in the water, much heavier loads can be handled without strain to the crane at unlimited depths. Consequently, overall safety is improved due to the lighter equipment, which can still carry out heavy work operations.

“The new generation of MacGregor Hydramarine subsea technology with operational capacity of up to 600tonnes at depths down to 10,000m ensures indispensable precision, efficiency and safety in extreme conditions during



Special composite 250tonne wire sheaves prepared for fibre rope.

year-around operations,” Mr Bondevik says.

As world demand for energy increases while current oil resources of oil-producing countries are depleting, the offshore industry is being forced to unlock access to sources of world oil supply

that have been untapped to date. The renewed focus of the offshore industry on exploration and exploitation due to the decrease in current oil supply deposits has resulted in the rapid development of subsea technology for both oil and gas procurement. **NA**



Aker bags offshore loading systems

Aker Solutions has secured contracts to supply offshore loading systems and deck machinery for two shuttle tankers and a floating production and storage offloading unit (FPSO), worth NOK70 million (US\$10.1million).

The contracts, awarded by Teekay Corporation, Cosco Nantong Shipyards Co. Ltd and Hyundai Heavy Industries Co. Ltd, are for offshore loading systems and deck machinery. The Cosco Nantong contract is for the supply of bow loading systems and deck machinery

for two shuttle tankers that are being built for Knutsen OAS Shipping. Another offloading system is to be supplied to HHI for the Usan FPSO, which will be located offshore Nigeria and operated by Elf Petroleum Nigeria Ltd.

The offloading systems will consist of

mooring and offloading equipment at the stern/bow of the FPSO that will allow for the offshore transfer of crude oil from the FPSO to shuttle tankers. The system will operate at rate of up to 10,000m³/hr.

“The three shuttle tankers will be fitted with Aker Solutions bow loading systems, which enable a safe and secure connection for the hose to the shuttle tanker, said Leif Haukom, president of Aker Pusnes AS. “This connection can be quickly and safely disconnected in the event of an emergency without creating surge loads in the hose. Two of the shuttle tankers will operate in Brazil.”

Delivery of the offshore loading equipment will be within the third quarter of 2009, with the second bow loading system for Cosco Nantong to be delivered in the second quarter of 2010. **NA**



Aker Solutions bow loading systems onboard Knutsen OAS shuttle tankers, operating outside Newfoundland and Labrador, Canada.

Langh Ships cradle thrown into the deep

First deepsea outing for new cradle designed to handle steel coils.

Langh Ships Cargo Solutions, says its innovative tweendeck cradle has broken out of the shortsea market, with a first order covering deepsea operations. The system has been specified by Finnish company Raahe for transporting coils across the North Atlantic.

The solution - currently used for shortsea shipping between Northern Finland to Central Europe - is to be used onboard *Marjatta*, chartered by metals company Ruukki, to transport large steel coils between Finland and New Orleans. Cradle cassettes will be fitted on the ship's tank top and also in the tweendeck,



situated in the upper part of the cargo hold, to hold the steel coils. As the vessel's centre of gravity rises, the 'over stability' of the steel load decreases.

Cradle cassettes will be fitted on *Marjatta's* tank top and also in the tweendeck, situated in the upper part of the cargo hold, to hold the steel coils.

“It's absolutely much more pleasant to depart for transporting steel coils across big seas, when one knows that they remain securely on their places in the cradles,” said master mariner Harri Viljarharju. “In addition, due to the cradle tweendecks, it is also possible to optimise the stability of the vessel to a much higher degree compared with loads that are loaded conventionally, when it is necessary to stow all the steel coils on the tank top.” **NA**

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On-site bearings replacement

TTS Marine has completed an offshore replacement project onboard the *Sendje Ceiba* Floating Production, Storage and Offshore (FPSO) vessel, to replace bearings in cranes without needing any shoreside assistance.

An FPSO in need of crane bearing replacement, owned by US oil and gas producer Hess Corp, and anchored off Equatorial Guinea, West Africa, presented a challenge to TTS Marine as the vessel is permanently anchored and cannot go alongside.

“This adds complexity to the project, because it’s difficult to get help from outside to do the job,” said Leiv Håland, service manager for TTS Marine Cranes division. “To bring out a floating crane would cost an enormous amount of money, not to mention the losses incurred if the ship went off-hire.”

The bearings that were replaced were the largest that TTS has supplied. Commenting on the conditions that the work was carried out under, Leiv Håland said: “We replaced the main parts of the cranes out at sea without any help from shore cranes. The supports we needed at both ends of the crane foundation, for sliding the old bearings out and the new ones in, had to be bolted on. We weren’t able to use hot work, so the team had to do a lot of manual drilling, as well as a considerable



Bearings replaced onboard FPSO *Sendje Ceiba*.

amount of climbing. It was a very interesting and very complicated job.”

The project involved the lifting out of the old bearings and replacing them with new ones, whilst at sea was - a first for TTS.

“It took about four weeks to replace the bearings, one for each of the two cranes,

mainly because we needed to avoid disrupting the vessel’s operation,” said Mr Håland. “We had to work during routine breaks from production. We were therefore able to save a considerable amount of money, avoiding the risk of an off-hire period during the entire installation.” **NA**

Explosive warning for shipping

London Club warns on the dangers of chemical cargo misdescription.

The London P&I Club has reported one its members suffered an onboard fire due to the misdescription by shippers of a chemical cargo.

The cargo being transported was calcium hypochlorite, a chemical mainly used in the purification of water. The chemical contains properties that make it extremely dangerous when it get too hot or is contaminated, which can then lead to fire or explosion.

In its latest issue of *StopLoss Bulletin*, the Club said: “Given the nature of modern transport logistics, there is a strong

likelihood of further such misdescriptions occurring, either intentionally or inadvertently, particularly since international rules to ensure transportation of chemicals are not applied universally.”

Several incidents occurred in the late 1990s, some involving explosions in onboard containers, resulting in extensive damage to large ocean-going ships. In reaction to this the International Maritime Organization (IMO) issued guidance on the carriage of calcium hypochlorite, and the IMDG code was amended. A number of carriers went further, and simply refused to carry calcium hypochlorite cargoes.

The Club added: “Voluntary schemes do exist, however, to promote safe practice in the carriage of chemicals. One such is the Chemical Distribution Institute (CDI) Marine Packed Cargo scheme, which has already been adopted by major shipping lines, terminals and freight forwarders. The scheme, which is shortly to be renamed the International Marine Packed Cargo Audit Scheme, provides audit reports on each category of service provider in the distribution supply chain. It includes shipping companies, ships, tank container operators, container freight stations, freight forwarders, ship agents, and container terminals.” **NA**

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By Joe Stiglich

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About the Course Leader: Joe Stiglich is a retired Naval Officer, qualified NAVSEA Docking Officer and holds a Masters Degree from MIT in Naval Architecture and Marine Engineering. He has been responsible for over 250 safe docking and undocking operations. He currently runs a series of conference and training courses for personel involved in all phase of the drydocking industry and acts as a consultant for ship repair companies.

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From here to uncertainty

Gujarat shipyard Memoranda of Understanding raise numerous questions.

A report by Shirish Nadkarni, in Mumbai.

Amazing as it sounds in these bleak economic times, a total of 39 memoranda of understanding (MoUs) valued at over Rs410 billion (US\$8.33 billion) in the chemicals, petrochemicals and shipbuilding sector were signed by the end of the annual two-day Vibrant Gujarat Global Investors' Summit, held recently in Ahmedabad.

These included over Rs100 billion (\$2.05 billion) worth of MoUs in the shipbuilding sector, despite the recent downturn in shipping and the global economic meltdown that have combined to see a spate of newbuilding order cancellations, especially in China.

A number of existing and aspiring shipbuilders, including Bharati Shipyard, Dolphin Offshore, Pipavav Shipyard, Afcons Infrastructure, Assam Company, Jindal Shipyard and Tebma Shipyard, have committed to investing in shipyard projects in Gujarat.

The Narendra Modi-led state government has claimed that some 10 projects have been short-listed for investment in the shipyard arena, for which the authorities are planning shipyard clusters.

The signed MoUs reveal that Chennai-based Tebma is planning to pump in Rs10 billion to develop a shipyard in the Dahej Special Economic Zone (SEZ) region, while Dolphin Offshore, which has expertise in providing underwater services to the offshore oil and gas industry in India and abroad, is planning to pump in Rs4.5 billion for a shipyard project in Jaffrabad.

Assam Company, a diversified group with interests ranging from tea to oil and gas, is aiming to foray into shipbuilding and shiprepair by setting up a shipyard project at Dahej at an estimated investment of Rs7.5 billion. It had signed an MoU in an earlier Vibrant Gujarat summit for setting up a hydrocarbon SEZ in Kutch at an outlay of Rs20 billion.

Shri Mataji Ashapura Ports, in consortium with the Mumbai-based Allcargo Global Logistics and Infrastructure Leasing &



Ray Stewart, chief executive officer of Pipavav Shipyard.

cancelled a number of newbuilding orders at yards across the globe. It looks to build up its order-book to Rs100 billion.

Offshore flood

Indian yards have recently been flooded with orders for offshore support vessels (OSVs), a segment benefiting from the expansion of firms engaged in oil and gas exploration and production. Worldwide, offshore vessels make up 45% of the total order for new ships.

“The surge in demand for oil and increased exploration planned by oil companies has generated a huge demand for offshore vessels,” said Mr Datar. “We have estimated the demand in India for offshore vessels till 2012 to be 3.95 million dwt.”

This trend was confirmed by a Citi Asia-Pacific report which said: “Indian yards have recently announced new orders in the offshore services space, which is also their core area of strength. With huge order inflows last year, they are now comfortably placed for the next few years and are focusing more on execution of their capacity expansion.”

Bharati Shipyard, for one, is looking at offshore vessels as the most prospective area of growth. Around 70% of the company's orderbook consists of offshore vessels; and the company is planning an investment of Rs10-12 billion in building infrastructure over the next three years.

“Since we have operations at five locations, the synergy between these yards allows us to have a tremendous amount of flexibility and construct a large number of vessels in a limited time period,” said Bharati Shipyard's joint managing director P C Kapoor.

“While offshore vessels form the bulk of our orderbook, we are planning to build large vessels over 200m in length as well as oil exploration rigs, the first of which is already under construction at our shipyard in Dabhol (Southern Maharashtra).”

Financial Services (IL&FS), has signed an MoU for Rs20 billion for a shipyard project at Nana Laija.

In addition, construction group Shapoorji Pallonji, which has already confirmed Rs10 billion for developing a greenfield port at Sinar, is aiming to set up a shipyard at Mahuva through Afcons Infrastructure (in which the group owns a controlling equity stake of 51%) at a cost of Rs6 billion.

Bharati Shipyard has earmarked Rs6.20 billion for a shipyard project near Nava Ratanpur and Saratanpar. Dahej, which has been declared a petrochemicals and chemicals investment region, will see four shipyard projects, with Jindal Shipyard and Dahej Shipyard aiming to set their yards in the area.

ABG Shipyard has revealed plans to set up yet another greenfield shipyard in southern Gujarat, at an estimated outlay of Rs12 billion, on a plot of 300 acres.

“The yard will cater to the larger and more sophisticated genre of ships and offshore vessels,” said ABG's Chief Financial Officer Dhananjay Datar. “It will have a capacity of building six to eight vessels per annum, and ought to generate annual revenues of over Rs20 billion.”

The company is banking on offering its services to shipowners who have recently



The bulk carrier, *Clipper Tenacious*, alongside at Cochin Shipyard Limited.

The International Maritime Organization's (IMO's) stipulation that all vessels over 20 years of age will have to be retired by 2010, and all single-hulled tankers would have to be replaced with double-hulled ones, has led to new demand estimated at 62% of the current size of the international fleet.

"With huge order inflows until 2007-2008, Indian yards are in a reasonably comfortable position for the next three to four years, and are focusing on capacity expansions, despite the economic downturn," says a Mumbai-based shipping industry analyst.

A recent study suggests that 17% of the global orders for building new OSVs are with Chinese companies. But their deliveries are expected to be delayed, a happenstance that will put further pressure on offshore companies. A shortage of OSVs and increasing demand should put Indian shipbuilders on a reasonably good wicket.

The idea of building offshore vessels appealed so much to the state-run Cochin Shipyard Limited (CSL) that it approached the Shipping Ministry for permission to create a dedicated small ship division (SSD). The government cleared the idea in September 2008.

The SSD project will be set up at an outlay of Rs980 million, and is expected to be partially launched by mid-2009. The required equipment has already arrived; and, upon completion, the SSD would help CSL undertake the concurrent building of small commercial ships, alongside the aircraft carrier for the Indian Navy, that is presently under construction.

CSL chairman Commodore (Retd.) M Jitendran felt that small ships held out big promise, particularly since the joint venture between government-run explorer-producer Oil & Natural Gas Corporation (ONGC) and Shipping Corporation of India (SCI) would need several replacements in the near future for their offshore supply vessels.

"We propose to construct sophisticated offshore supply vessels, anchor handling tugs and other small craft of less than 2000dwt," the CSL chief said. "The small shipbuilding division will be fully operational by 2015, and should generate additional revenue of Rs5-7 billion annually. This will be possible because, depending on the demand, the division would have the capability of building up to eight vessels annually, after starting with three or four."

The yard has issued contracts for installing fabrication shops for heavy blocks. Setting up of other ancillaries such as electronics, hydraulics and accommodation out-fittings, etc., will be taken up soon.

CSL has been building platform supply vessels (PSVs) for a number of European and USA-based clients. All of them are of the popular UT-755-L design; and have been built to satisfy the demands of transport of deck cargo, pipes, liquid cargo, cement/barite, etc, and unloading to rigs, production platforms and pipe-laying barges.

CSL is in the process of constructing 20 other offshore vessels collectively valued at over Rs30 billion, for its overseas clients.

CSL happens to be one of nine shipyards run by the government out of 23 shipyards in India. Four groups – ABG, Bharati, Larsen & Toubro and Pipavav – between them own 14 yards that offer a variety of vessels, even as Pipavav Shipyard has concentrated on building the 74,500dwt Panamax bulk carrier.

Maybe so, but...

Yet, despite orders for mainly bulk carriers and offshore vessels, all is not well with the Indian shipbuilding industry. According to a



CSL chairman Commodore (Retd.) M Jitendran.

report by KPMG, shipbuilding in India is still in a nascent stage, unlike in Japan and Korea, where the respective governments have extended considerable support to the sector.

“Actually, it is quite amazing to find so many companies in the field of infrastructure coming forward to put up shipyard projects in Gujarat at a time when the Indian shipbuilding industry has not won a newbuilding contract in the course of the last two years,” said Ray Stewart, chief executive officer of Pipavav Shipyard, which is building a large shipyard in the state for the construction of 22 Panamax bulk carriers of 74,500dwt each.

“Agreed, that in the economic climate of 2006 and 2007, many companies came forward with shipyard projects after seeing the numerous incentives that the Gujarat state government offered by way of inexpensive land, support infrastructure and tax breaks. But in the wake of the international financial meltdown, coupled with the cyclical downturn in the fortunes of the shipping industry, it is hard to see all these projects bear fruit.”

There can be no doubting that shipyards could mean good business in India. But new projects have to be viewed in the context of global demand in the foreseeable future – and the prognosis there is hardly encouraging. At a time when Chinese shipyards are witnessing a spate of order cancellations and yard sales, and yards in Japan and Korea are barely holding their own, it would be sanguine to expect Indian yards, particularly greenfield ventures, to flourish.

The availability of shipping finance is a major stumbling-block. Saddled with a need to invest a massive \$20 billion over the next four years to replace a portion of their

ageing fleet and enhance cargo capacity in order to simply maintain their 13% share of India’s overseas cargo, Indian shipowners are finding it difficult to muster the funds needed for such an exercise.

A couple of the top Indian shipowners have not been affected by the financial crisis for their short-term plans, and are going ahead with acquisitions. State-run Shipping Corporation of India (SCI), Great Eastern Shipping and Essar Shipping have, between them, placed orders for 58 ships in Korea and China, collectively worth \$3.3 billion, and remain bullish on their future orders.

The major reason why these companies have not been impacted adversely for the liquidity crunch is that most of them have tied up their fund requirements well ahead of time, using the muscle of their respective strong balance sheets.

But Great Eastern has since cancelled orders for two Supramax bulk carriers from China’s Cosco Shipyard. Varun Shipping has decided to play it safe, and has temporarily shelved its vessel acquisition plans. Smaller players have postponed buying plans indefinitely.

This is bad news for Indian shipyards, whose wings were clipped in mid-August 2007 by the withdrawal of a 30% shipbuilding subsidy that had been in force for five years from 2002 to 2007. India’s Shipping Ministry is pressing for its reintroduction.

“We have prepared a note for reviving the subsidy; this will be circulated to the cabinet,” said Shipping, Road Transport and Highways Minister T R Bалу, while addressing a recent conference organised by FICCI, Shipyards Association of India and All India Shippers Council.

“We will get comments on the note, which would then be sent to the highest authority for taking a decision. My Ministry had tried extending the subsidy scheme last year itself after it was suspended, but the Finance Ministry had struck down the proposal.”

The subsidy had helped many more Indian shipyards to come up and to become more competitive at global level. It had allowed them to benefit immensely in the last couple of years from the overflow caused by the choked order-books of shipbuilders in the Far East.

The future, however, holds plenty of uncertainty for shipyards the world over. With the global economy going into financial meltdown, and shipping entering a recessionary cycle, the ability of shipowners to obtain easy finance for vessel acquisition has been adversely affected.

With scant business expected from shipowners from any country, Indian yards fear for their future unless the 30% shipbuilding subsidy, which was withdrawn by the government from 14 August, 2007, is re-introduced.

“We are not even certain yet of getting the subsidy for the ships we had started to build before 14 August last year, the last date notified by the Ministry for receipt of applications for eligibility for the subsidy,” says Mr Stewart.

“We had based our pricing after factoring in the subsidy...The governments of most Asian countries had fully supported their fledgling shipyards with subsidies in the initial years when they began competing at world level; the Indian government needs to do likewise.”

During the subsidy regime, the turnover of Indian shipyards had increased from Rs10.17 billion (\$208 million at current exchange rates) in 2002 to Rs36.57 billion in 2007.

Even so, the Indian industry’s share of the international shipbuilding market is just over one per cent, and the Shipping Ministry’s goal of taking it to 3% by 2012, and to 5% by 2015, appears to be a pipe dream as the country’s competitiveness has been on the wane.

On how the order book of Indian shipbuilders has been affected, following discontinuation of the subsidy scheme, V Kumar, secretary-general, Shipyards Association of India and managing director of Bharati Shipyard said: “In the 2002-07 period, Indian shipbuilders had received 220 orders. In the year 2007-08, just 22 orders have been received, which include eight optional orders. And since April 2008, there has been no new order.”

If the cabinet approves the proposals couched in the Shipping Ministry’s note, and the Finance Ministry concurs, the subsidy would be extended to ocean-going merchant vessels of over 80m in length if they were manufactured for the domestic market, while all ships being exported would be eligible for the sop. **NA**

The New Cunard Queens

Review by E. C. Tupper

The New Cunard Queens
Queen Mary 2, Queen Victoria,
Queen Elizabeth 2

Written by Nils Schwerdtner,
 published by Seaforth Publishing
 as a hardback, 2008, 192 pp. ISBN
 978 1 84832 0109, £25.



The author, who lives in Hamburg, has had a life long interest in passenger shipping. He has written three books and regularly lectures on passenger liners.

The book will be of interest to members of RINA not least because it describes the role of our current President, Stephen Payne, as the designer of *Queen Mary 2* the first true transatlantic liner for many years. It presents some interesting insights to the problems he faced, and the solutions he chose, in designing such a large (148,528gt, compared with *QE2*'s 65,863gt), important and innovative ship after such a long break in the building of ocean liners as opposed to cruiseships. The differences between liners and cruiseships, due to the different service required of them, are significant although the general public probably regard them as basically the same. The differences are well explained by the author.

The book begins with a general history of the Cunard Line, outlining the various famous ships it operated (starting with *RMS Britannia* and including the *Queen Mary* and *Queen Elizabeth*), and then outlines the rather complex history of mergers and takeovers as economic changes occurred. It goes on to deal at more length with the *Queen Elizabeth 2*, *Queen Mary 2* and *Queen Victoria*, which had their maiden voyages in May 1969, January 2004 and December 2007. The ships were built by John Brown & Co, Chantiers de l'Atlantique and Fincantieri respectively.

In September 2005 *QE2* became the longest serving Cunarder of all time. Also she spent more hours at sea per year than any other Cunarder. Like her sisters *Queen Mary* and *Queen Elizabeth* in WW2, she saw service as a troopship, in her case the Falklands campaign. One wonders if *QM2* will take these records (not, hopefully, though, the honour of serving as a troopship) in due course as she has been designed for a 40-year life and has the advantage of technological developments since *QE2* was designed. *QE2* will now become one of the major attractions at the Palm Jumeirah, Dubai, as *Queen Mary* has at Long Beach, California.

The Cunard ships have always been highly regarded, particularly on the North Atlantic run, and it has been important in designing and marketing the latest ships to ensure that links with the past are maintained. Anyone who has had the opportunity of travelling on one of the great Atlantic liners will agree that it is a memorable and unique experience. Apart from maintaining standards of safety and comfort, it is good to see that Carnival Corp, which took control of Cunard in 1998, has maintained other traditions such as trying to arrange important events in the new ships on dates that have significance in the history of Cunard. For instance, the

“keel laying” ceremony for *QM2* in 2002 was held on 4 July the date on which the *RMS Britannia* opened the North Atlantic liner service 162 years earlier. To mark the old custom of placing coins under each of a ship's masts, a £5 and a 100 franc coin were placed in the double bottom. The two currencies were to recognise that the ship was to sail under the British flag but was being built in France.

The reader is made to feel at home with both *QM2* and the *Queen Victoria* (designed as a cruiseship) by the author's descriptions of a “walk through” of each ship, describing the main public spaces and how they are linked. There is also a description of a typical trans-Atlantic voyage in the *QM2* starting with embarkation at Southampton and finishing in New York. These descriptions really bring the ship to life and will almost certainly encourage many to seek the experience of a voyage themselves. This bringing to life of the ship is aided by the many coloured photographs, including a number in which groups of “Queens” are to be seen together. Also of interest are some of the statistics quoted for *QM2*. Annual requirements include 1.35 million tea bags; 80,000 light bulbs; 1.728 million eggs; 346,000 gallons of fruit juice; enough toilet paper to circle the earth five times. And so on.

The Queens have always been very well received wherever they have gone, including the author's home city of Hamburg. Besides describing the welcome received in Hamburg the author describes the arrangements which must be made for, and authorities involved in, a visit including IMO's International Ship and Port Facility Security Code.

Finally our appetites are whetted by the promise of a new *Queen Elizabeth* to be delivered by Fincantieri in 2010.

The book is full of interesting facts and figures. It is very readable and can be recommended to all those with an interest in liners and the way of life they represent. **NA**

Monitoring requirements

Sir,

I refer to last September's presentation in 'The Naval Architect' where, "The MSC Napoli incident has shown us that rare events do happen and it is important that responsible stakeholders use this knowledge and experience".

In the book, entitled 'From T-2 To Supertanker', published in the USA in 2006, the chapter which deals with 'abnormal', 'freak' or 'rogue' waves, and 'how is wave height determined?' continues, "The probability of the occurrence of abnormal waves can in principle be estimated by statistics of rare events".

The point is, rare events do happen, and in the case of the *Napoli*, it was fortunate, there was no loss of life.

There is available, a Hull Stress Monitoring System that identifies the

actual longitudinal stresses impacting on the structure from massive hammering of the ship's hull from the environment.

The concept can make a significant contribution to ensuring the safety and integrity of the ship's hull under all operating conditions whether at sea or in dock. Keep in mind the VLCC "Energy Concentration" which broke its back while discharging at Rotterdam in 1980. There were no abnormal waves there, simply carelessness.

The monitoring system provides an instant and visible means of summarising the conditions of the ship's structure where the monitors display the stress levels, and alerts the ship's personnel to the stress which the hull is being subjected during a given period. This enables the ship's personnel to take the necessary action.

It is suggested, had *Napoli* been fitted with such a system, the ship would have completed her voyage to Portugal safely.

Should not such monitoring equipment be made a classification requirement for sea-going vessels?

It is realised, leading Class Societies do incorporate into their operational notations such installations under various guises.

Also, some owners see more to the concept than purely the safety aspect. These owners consider such an installation as helping to improve the owner's image as part of the overall commitment to the quality of the ship.

Andrew G. Spyrou
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Ship Manoeuvring in Shallow and Confined Waters: Bank Effects, international conference, Antwerp, Belgium.

Contact Conference Department, RINA, 10 Upper Belgrave Street, London SW1X 8BQ, UK.

Tel +44 20 7235 4622

Fax +44 20 7245 6959

E-mail conference@rina.org.uk

May 14-16, 2009

Glasgow Fishing Show, international conference, UK.

Contact Fishing News Events, Eldon House, 6th Floor, 2 Eldon Street, London, EC2M 7LS, UK.

Fax +44 20 7650 1050

www.fishingexpo.co.uk

May 25-28, 2009

Gastech, international conference, Abu Dhabi.

Contact dmg world media (uk) ltd, Westgate House,

120/130 Station Road, Redhill, Surrey, RH1 1ET, UK.

Tel +44 1737 855000

Fax +44 1737 855482

E-mail info@gastech.co.uk

www.gastech.co.uk

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RINA



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Design, Construction & Operation of Super and Mega Yachts

1-2 April 2009, Genoa, Italy

Second Notice



This international conference follows a continuing series of successful RINA conferences on the design, construction and operation of sailing and motor yachts. However, this is the first conference to focus on the unique aspects of super and mega yachts.

The growth of demand for luxury motor and sail yachts has increased rapidly in recent years. This has only been matched by the increase in size and complexity of vessels being designed and built. Existing definitions of what constitutes a super yacht seem outdated, with vessels in excess of 150m already built. This growth in size and complexity coupled with the new technologies becoming available bring new challenges requiring innovative solutions.



Today's clients are requiring ever greater levels of comfort and luxury, not only in terms of the vessel fittings and styling but also in the vessels behaviour whilst underway and at anchor. Many vessels are now used for charter and this has implications for the way in which the vessel is designed and classed.

RINA welcomes papers on all aspects of large sail and motor yacht design, construction, and operation, from designers, researchers, manufacturers, operators, and regulators. Topics may include the following:



- All Aspects of Design - Hull, General Arrangement, Interior, Features etc.
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