

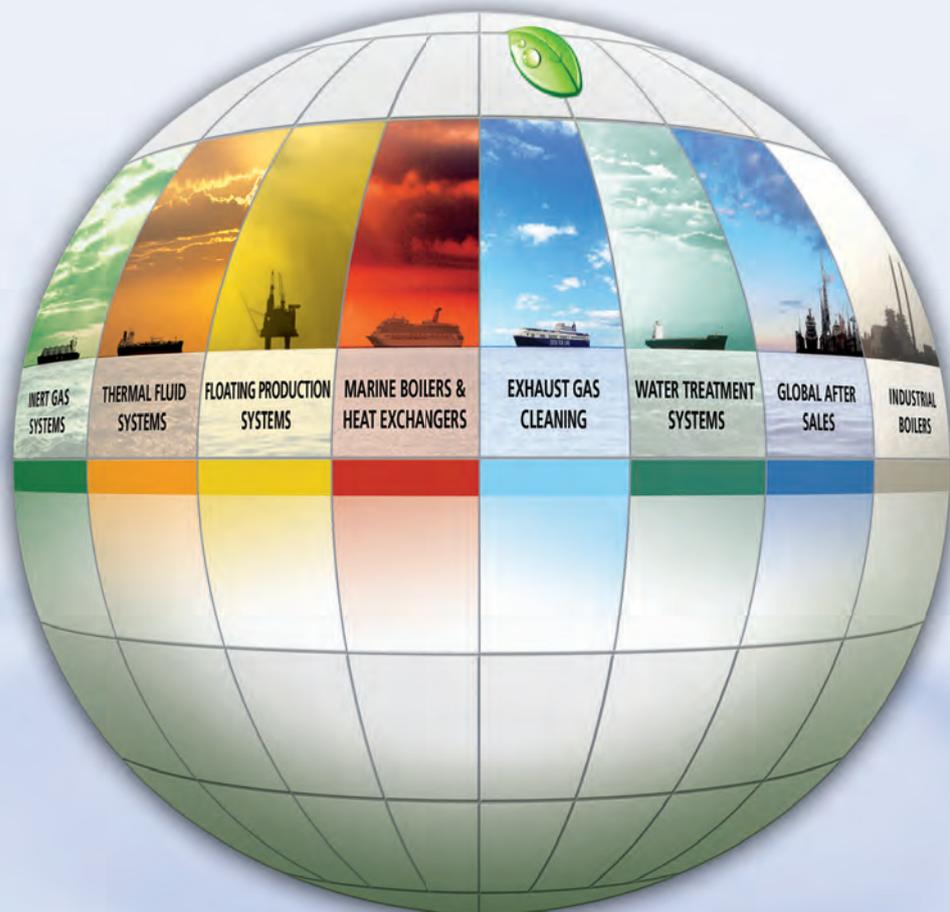


# THE NAVAL ARCHITECT

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Classification / Japanese maritime progress /  
Paints and coatings / Bulk carriers / **June 2010**



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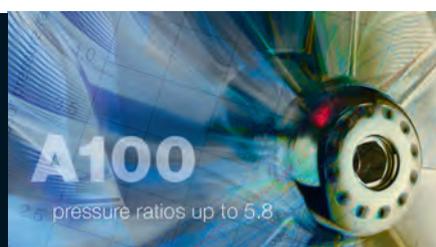
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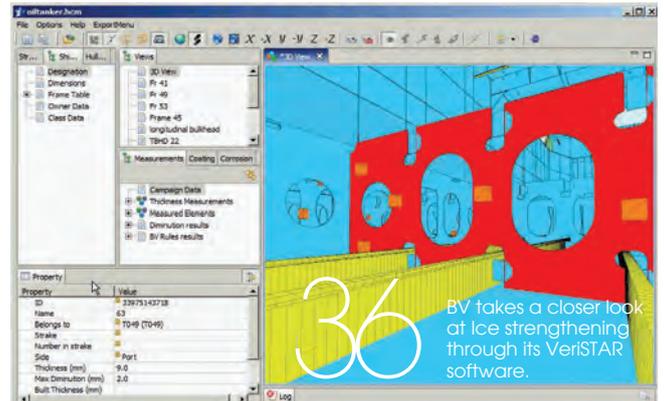
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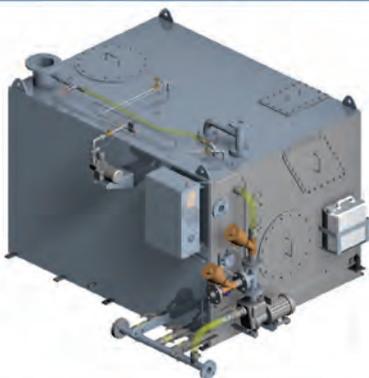


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## Slick executives

The ice breaker *Arctic Express* operating in the comparatively unspoilt Arctic region is part of the technological rush to exploit regional mineral resources.

Anyone watching the pictures of the oil slick in the Gulf of Mexico cannot fail to be alarmed at the disaster unfolding in those waters. The failure of the oil companies and the USA Government to ensure that the environment is properly protected is a salutary lesson.

Just as valuable a tutorial is the sight of senior executives from multinational companies passing the buck. Responsibility for the catastrophe unfolding off the American coast will certainly be apportioned later, for now the question remains how to stem the flow of oil from the damaged well.

Technology in this instance has failed. The funnel expensively built by BP and expected to channel oil to a waiting barge could not be put into place following either the failure of the blowout protector or the cement oil well casing, depending on which executive you believe.

Reportedly some 5000 barrels, or 750,000 litres, of oil are gushing into the ocean daily from the well which is around 1.6km beneath the surface. Visibility at this depth is virtually zero and work to plug the leak is being carried out by remotely operated vehicles from the surface. A second attempt to stem the flow is expected as *The Naval Architect* goes to press, either by filling the hole with tyres and golf balls or using a smaller funnel, known as a top hat.

Technology that will allow the exploitation of oil reserves in the environmentally very sensitive and currently largely untouched Arctic region is now being developed. No doubt this technology will be very sophisticated and beautifully engineered.

Class society the Russian Maritime Register of Shipping (RS) is rightly proud of its new vessels currently under construction. One is a multipurpose salvage ship intended for salvage and rescue operations, rendering assistance in areas dangerous for navigation, underwater engineering operations and inspection of the sea bottom at a depth of up to 1000m. The ship has been assigned the ice-strengthening notation Arc5 testifying its independent navigation capability in Arctic ice of up to 1m thickness.

The ship has a high-speed workboat on board for delivering salvage party and salvage supplies, as well as for rescuing people in the water following an accident. Two diving complexes are to be installed onboard; the first one is designed for operation at a depth of up to 60m and is fitted with an underwater video system and underwater cutting and welding equipment. The second one is designed for underwater engineering operations, which will enable divers to work for long periods under pressure at operating depths of up to 300m.

Moreover, the ship is fitted with special oil spill emergency response equipment, including two booms of 250m each in length and two boom-handling boats. The target completion date for this vessel is November 2010.

Director General Nikolay Reshetov said that RS is also involved with a research ship for the Russian Antarctic expedition. The design of this ship is challenging from an engineers' point of view, since it will combine the functions of an icebreaker, tanker, dry cargo ship, passenger ship, scientific research

facility with laboratories and a helicopter carrier.

The area of navigation is unrestricted, including independent navigation and drifting in the Antarctic ice and navigation in tropical seas. The ship has been assigned an ice-category notation Arc6 testifying to its independent navigation capability in ice of up to 1.3m thick.

The ship's laboratories will be fitted with modern equipment for processing the oceanographic and air sounding data. Comfortable working conditions are foreseen for the crew and expedition members.

Scientific research and safety may well go hand in glove, but the understanding from the lecture that is currently being given in the USA Gulf is that unless technological development is properly tried and tested we will find that a situation like the one unfolding now will destroy millions of years of evolution in a few months.

Are we properly prepared to allow those that drill in environmentally sensitive regions the freedom to do so without the technology to protect the ecology if and when an accident occurs? Moreover, questions must be asked about how involved government should and has been?

With the slick executives currently in Congress telling senators 'please sir it was his fault' it is important, not only that the technology is right to protect the Arctic region, but that governments do not allow multinationals loose with this technology without some very stringent controls. *NA*

Australia

## Austal launches latest ferry

Austal has launched its latest 107m high speed vehicle-passenger catamaran *Jean de la Valette*, scheduled for delivery in August this year for Maltese owner Virtu Ferries.

Intended to address increased heavy cargo traffic between Malta and Italy, the vessel has the capacity to carry 800 passengers and 156 cars at a speed of approximately 39knots.

Virtu Fast Ferries Ltd, managing director, Francis Portelli said the company was impressed with the speed of construction and quality of workmanship.

“The level of communication that we have experienced with Austal throughout the build process so far has also been outstanding,” said Mr Portelli.

“As a repeat customer, the quality that we have come to expect from Austal is evident. We are confident that the versatility, speed and all-round efficiency of this vessel will deliver the best possible solution for the proposed route.”

The vessel’s vehicle deck has the capacity to carry up to 156 cars or 45 cars and 342 truck lane metres. Vehicle loading and unloading will be achieved via ramps installed on both the stern and port-side. Powering the vessel will be four MTU 20V 8000 M71L diesel engines producing 9100kW each and driving Rolls-Royce Kamewa waterjets.

The catamaran is 106.5m in length overall, a beam (moulded) of 23.8m, hull depth of 9.4m and a deadweight of 850dwt.

The vessel is being built in accordance with the requirements and under the survey of Det Norske Veritas, conforming to International Maritime Organisation HSC Codes and Malta Flag State and Italian Port State Regulations. Registration will be under the Malta Flag. The vessel is on track to commence sea trials in June.

Austal is also nearing completion of its 102m vehicle-passenger trimaran ferry, which is currently



available for purchase. The vessel recently exceeded performance expectations during sea trials, achieving a speed of 39knots at 90% MCR with 340dwt. Construction is also underway on Austal’s largest ever catamaran a 113m vehicle- passenger ferry for Denmark due for delivery in mid-2011.

Shipbuilding

## Fincantieri gets contract for cruise vessels

Carnival Corporation has announced that it has awarded contracts for two new cruise vessels for its Princess Cruise brand, to Italian shipbuilder Fincantieri. The two 3600-passenger Princess Cruises vessels are scheduled to enter service in 2013 and 2014.

The vessels will each have an all-in cost of approximately €155,000 per lower berth and are estimated to be 141,000tonnes, the as-yet-unmanned ships will be the largest in the Princess Cruises fleet.

The ships’ design will include new features and innovations, for example, all outside cabins will feature balconies, bringing the percentage of balconies on the ships to 80% of all staterooms. The vessels will also feature Carnival’s signature Piazza, also at the ship’s central atrium featuring dining, entertainment and retail, which will be expanded, as will the popular Sanctuary, spa, and restaurants.

“We’re pleased that in this challenging economic environment, the order for these new ships is a testament to the confidence in the growth potential of the Princess brand,” said Alan Buckelew, president and CEO of Princess Cruises. “These new ships will include the features from our newest ships that have been so well received, and take them to the next level,” he added.

Giuseppe Bono, chief executive officer, Fincantieri, said: “We are grateful to the Carnival Group for this further vote of confidence in Fincantieri. We are proud to have met the requirements of Princess Cruises, one of Carnival’s most prestigious brands, with an innovative design both from a technical and architectural point of view.”

Bono continued: “This is a highly important order for us, especially as it comes in a period of economic crisis. We succeeded in securing these orders with assistance and support of the Italian export credit companies, in particular SACE S.p.A.”

Specific amenities and design elements for the new ships will be revealed over the coming months.

Virtue Ferries 107m catamaran gets launched at Austal.



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Ancillary equipment

## Hamburg Süd trims up

Eniram has signed an agreement with Hamburg Süd to supply its Eniram dynamic trimming assistant (DTA) to its vessels. The Agreement will be to install Eniram systems onboard 26 vessels for Hamburg Süd owned and maintained by Columbus Shipmanagement GmbH.

Eniram's DTA will assist vessel officers optimise trim at all times, minimising water resistance, decreasing fuel consumption, and reducing emissions by up to 5%, say Eniram. By bringing real-time data of the vessel attitude to ship's officers in an easy-to-read graphic form, the Eniram DTA will facilitate faster and better informed decision-making and allows timely action in changing circumstances.

"DTA gives us a relatively simple way to reduce fuel consumption across Hamburg Süd's fleet of vessels and reduce the impact on the environment," said Mr Fred Deichmann, managing director, Columbus Shipmanagement. "When the solution is installed on the first batch of 12 vessels, we expect to make savings of over US\$4 million in the first year."

The decision was preceded by an intensive trial period during which real savings of 3-5% on fuel were demonstrated with *Aliança Maua*, a midsized container ship measuring 272m by 40m. Based on the trial an annual reduction in costs of US\$375,000 per vessel can be achieved by actively using Eniram DTA.

"We expect to deliver substantial savings in fuel and environment based on the *Aliança Maua*," said Mr. Philip Padfield, CEO, Eniram Group. "Hamburg Süd is one of the longest established providers of ocean-going transportation and has shown real commitment to our future-driven technologies. We are delighted to extend the savings fleet-wide with further installations of DTA."



At the core of DTA is a multidimensional analysis model, which continuously calculates the key forces affecting the vessel attitude. DTA dynamically retrieves and analyses data of the prevailing trim, propulsion power and tank operations. The system combines the current conditions - such as waves, wind and speed - and determines the optimal trim for each situation.

Ancillary equipment

## Solar Solve gets second contract

Solar Solve has received an order for 75 SOLASOLV anti glare screens for a Very Large Multi-Purpose Offshore Construction Crane Vessel.

OSA *Sampson* is the second of two MP Offshore Construction Vessels being built at Drydocks World Pertama, the Batam Island shipyard, for Coastline Maritime and is due to be delivered in May of this year. The first vessel OSA *Goliath* was delivered in April last year and is currently operating in the Gulf of Mexico. Solar Solve Marine anti glare products will be also installed on that vessel.

Owner Scottish Highlands International Inc, is a subsidiary of Coastline Maritime Pte Ltd who designed OSA *Sampson* and OSA *Goliath*. Both are caterpillar diesel-electric powered with 17,168kW / 23,344 total horse power, 180m length, 32m beam and 12m depth. The 22,000dwt vessels are Panamanian flagged and equipped with 2000tonnes crane capacity.

A third vessel has just been ordered that will be larger than her sister ships and with a beam of 36m is sized to transit the Panama Canal following the planned widening of its lock gates. Like the OSA *Goliath* and OSA *Sampson* the vessel will be caterpillar diesel-electric powered and equipped with 4000tonnes crane capacity, doubling the capacity of the existing vessels.

Julie Lightfoot, Solar Solve's managing director, commented: "I was delighted to be in Singapore when the news of this order was announced. It meant we could celebrate by holding an official 'order presentation' ceremony at APM and I could congratulate the great team at Atlas Marine and thank them personally for all their hard work on behalf of Solar Solve." Mrs Lightfoot added: "The 75 SOLASAFE roller screens were made and dispatched from our South Shields facility to Indonesia before the exhibition ended, as they were required urgently."

Eniram gets tested on Hamburg Süd's *Aliança Maua*.



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## Communications

## SAM gets connected

SAM ConnectNet, a communication system designed to transform ship-to-shorelinks, has been introduced by Hamburg-based SAM Electronics, an L-3 Communications company. The system merges vessel communication systems into complete enterprise-wide IT networks, optimising supply chains and providing online reporting capabilities for monitoring purposes. Suitable for both new vessels and retrofits, it provides economical and efficient connections between land and sea.

SAM ConnectNet meets the maritime industry communication requirements by combining wireless LANs, 2G/3G mobile networks and satellite services such as Inmarsat, Iridium and VSAT into one transparent and secure system. Integrated capabilities include telephony, e-mail and messaging services in addition to file and data synchronisation; others are audio, video and information demand services, including chart updates, telemedicine and remote IT management.

SAM ConnectNet has a wireless port service, which will provide broadband connectivity between six and 100Mbps while a vessel is berthed, so ensuring significant savings in operational communications costs.

**Contact** SAM Electronics GmbH Behringstrasse 120 22763 Hamburg, Germany.

**Tel** + 49 40 88 25 - 0

**Fax** + 49 40 88 25 - 40 00

**E - Mail** info@sam-electronics.de

**www.sam-electronics.de**

## Engines

## Wärtsilä and ABB cut emissions

Wärtsilä and ABB Turbo Systems are working on a joint development programme for a groundbreaking application of two-stage turbocharging on large diesel engines. Advanced engine technology, together with the two-stage turbocharging, will offer significant advantages in fuel consumption and reductions in engine emissions.

In the programme, Wärtsilä will focus on developing advanced engine technology, which with the turbocharger, is able to reach the highest possible performance and become a cost-effective commercial solution for its customers. ABB Turbo Systems will deliver its turbocharging technology with



The 2-stage turbocharging technology being tested on a 20-cylinder Wärtsilä 32 engine in the laboratory in Vaasa, Finland.

defined performance in terms of airflow, pressure ratios and efficiency.

In the latest engine design, two turbochargers are arranged in series to generate increased air pressure, airflow and a superior turbocharging effect. This results in an efficiency rating of up to 76%. The increased air pressure, combined with the advanced engine technology, improves the engine output and power density by up to 10%. At the same time, both fuel consumption and CO<sub>2</sub> emissions are reduced.

Tests have taken place at Wärtsilä's test facility in Vaasa, Finland, and the targets for the development programme have been successfully met. Wärtsilä and ABB Turbo Systems are planning to initiate a major pilot project with a customer in the near future.

**Contact** Wärtsilä Corporation, John Stenbergin ranta 2, P.O. Box 196, FI-00531 Helsinki.

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**Fax** +358 10 709 5700

**www.wartsila.com**

## Lifesaving

## Viking releases its chute

Viking LifeSaving Equipment A/S has launched a chute-based automatic evacuation system. Aimed at small and medium-sized (doubled-ended) ferries sailing in protected waters, Viking's MiniChute system is a lightweight, compact solution that can be installed almost anywhere on deck. Each container features two 153-person open liferafts that come ready-installed on the chute, enabling the entire system to be remotely released by one crew member. "This is a new solution that's going

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to make vessel owners feel much more confident about their ability to successfully handle emergencies,” says Viking’s CEO, Henrik Uhd Christensen. “It’s based on the effective design of the full-size Viking Evacuation Chute, an exceptionally stable system that can handle the toughest conditions. And at 306 people, it provides the market’s greatest capacity on the water with a single chute.”

The Viking MiniChute system has DNV-approved evacuation capacity of 306 people within 17 minutes and 40 seconds (High Speed Craft). The new system is neutral at 10deg trim and 20deg list conditions, and features high-specification electrical bowing winches and a 4.2 to 14.5m reach. Many passengers find it much easier to jump down a chute,” says Viking’s CEO, Henrik Uhd Christensen. “The impression of an enclosed environment is more comforting than going down a slide where you can see everything. It can really make a difference, especially in heavy weather.”

A simple slip hook pull is all that is needed to release and operate the Viking evacuation system, freeing up crew to assist evacuation flow elsewhere. One winch creates just the right pull in just the right places to ensure the liferaft is swiftly, safely and easily pulled into place ready to receive passengers.

**Contact** Viking Life-Saving Equipment A/S, Saedding Ringvej 13, 6710 Esbjerg V, Denmark.  
**Tel** +45 76 11 81 00  
**Fax** +45 76 11 81 01  
**E-mail** VIKING@VIKING-life.com  
**www.viking-life.com**

Ancillary equipment

## MacGregor seals the deal

Cargotec has received two MacGregor cargo access equipment orders. The equipment is destined for four deepsea ro-ro vessels and two pure car truck carriers (PCTCs), which will be built in Korea. The orders were booked in the first quarter 2010 order intake and are worth €15 million.

The contract was signed with Daewoo Shipbuilding & Marine Engineering (DSME) for the design and delivery of key components for four deepsea ro-ro vessels for an Italian owner. The contract comprises one jumbo quarter ramp, one stern door, two ramp covers and several internal bulkhead doors. The jumbo quarter ramp is the biggest ever ordered from Cargotec. The delivery of the ships starts in 2011.

The other order was received from Hyundai Mipo Dockyard (HMD) for an Israeli owner. Cargotec will design and manufacture one quarter ramp, one side



Two 3500 unit pure car and truck carriers fitted with MacGregor cargo access equipment.

ramp, hoistable car decks including internal access ramps and several bulkhead doors for two 3500 unit car carriers. The ships will be delivered in 2011.

**Contact** Cargotec Corporation Marine, Sörnäisten rantatie 23, PO Box 61, FI-00501 Helsinki, Finland.  
**Tel** +358 204 554 299  
**Fax** +358 204 554 66  
**www.macgregor-group.com**

Communication

## Jotron Group launches SatCom

Jotron Group announced the launch of Jotron SatCom A/S, which will be responsible for the group’s new SatCom products Maritime Products, Phontech Communication Systems, Consultas Maritime Software and Ground to Air & Coastal Communication as the Group’s 5th product group.

At present Jotron SatCom A/S is primarily staffed with management and R&D resources in order to focus on the development and industrialisation of a new VSAT stabilized antenna product, other support functions are handled by the mother company Jotron A/S.

Jotron SatCom A/S main product will be an innovative and high performance stabilized Ku-band antenna, which is a key product for broadband at sea with global coverage. The product will be introduced in the market during the 2nd half of 2010.

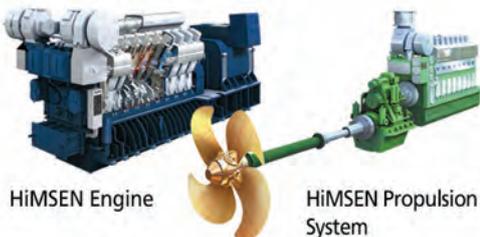
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# Common data model for total ship lifecycle data management

David Thompson, principle consultant, AVEVA NET Solutions expands on the future of data lifecycle management in shipbuilding and the AVEVA NET solution.

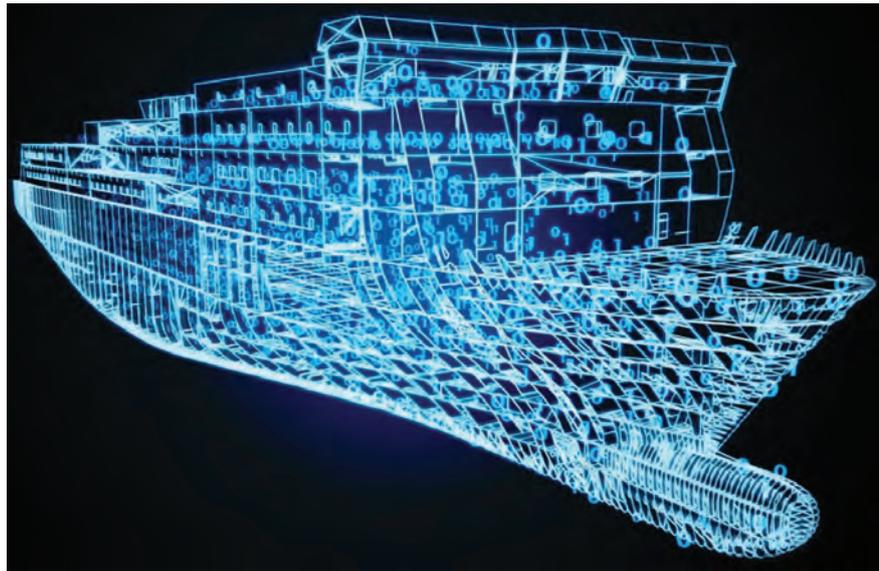
Until now, the digital ship model has remained the intellectual property of the design offices that produce it for their automatic production instructions and drawings. However, as the other players in the ship lifecycle make more and more use of information technology, the re-use and sharing of the data it contains becomes ever more important and valuable to the cause of ship lifecycle management.

## Key phases of data production and consumption.

During the initial definition of a vessel the critical data to be managed is in the form of electronic documents, where the key communication of contract and technical specifications are made. This information is highly change sensitive as the impact of any change made at this stage is at a maximum. In addition to change control the documents at this stage must be shared with the relevant parties but in a very secure way. Data re-use is a key issue at this stage, access and analysis of previous ship data, with the ultimate aim to take the relevant data, be it specifications, system diagrams drawings or even whole portions of a design model and re-use it as the basis for a new vessel can save many man-hours and reduce errors.

## Engineering and procurement of major equipment

In the very early stages of ship definition, engineers and procurement personnel have typically invested huge amounts of time and effort to find documentation and drawings to allow the design and coordination of the machinery spaces to be started as early as possible. In the days of paper documentation this was more often than not based on historical data, such as data sheets and drawings stored



The digital ship model.

in filing cabinets and shelving in the design office, resulting in late changes to engineering when newer drawings and data was received after the purchase of an equipment item.

Today, equipment suppliers readily offer electronic data, sheets, 2D drawings and increasingly 3D CAD models, meaning engineers can now request documentation via email and receive the latest drawings, data sheets and other technical documentation in a few hours.

However this availability of electronic documentation has created its own data management problems as the industry has no standard way to communicate the various attributes and commercial data associated with an equipment purchase or engineering negotiation, meaning a variety of supporting systems are required to manage and view the data.

## Exchange of data with classification societies

It is the approval process itself that

provides the most challenges regarding management of data for class societies. Approvals are required at various levels across the engineering domain of shipbuilding, at each of these levels there is a variety of documents and data that needs to be transferred back and forth between shipyard, suppliers and class society.

The data model handling this information must be able to understand the multi-dimensional nature of engineering documents. For example, a Pump can exist as a single component, which will have a specification, its own engineering documentation, and its own approval certificate. Yet that same pump can exist as an element of a system, and, therefore, be found on a Piping & Instrumentation Diagram (P&ID) or electrical diagram (considering the electrical motor as an integrated part of the pump) and in the same way that pump will be installed an commissioned and maintained, each lifecycle phase

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generating its own documentation and approval requirements.

Moreover, a data model should be designed to minimise the amount of data re entry in the execution of the approval process. Meaning that product structures, and attributes originally entered in the supplier side would be recognised by the shipyard and class and easily transferred to other stakeholders.

### Design and production

The digital ship model's main purpose is to serve as a record of the design intent and thus is the basis for the creation of production instructions and documentation. The more accurate and detailed the model, the better the deliverables that can be derived from it.

The digital ship model initially needs to capture engineering intent in the form of lists of key components or as system specifications, the data model thus needs to understand the content of these document types and be able to extrapolate the key engineering data from them. Today design offices practice highly concurrent design processes, the data model for data management therefore must be tightly integrated with the design system. When this is the case designer can continue to work on the creation of diagrams and drawings while a parallel checks can be made on the data produced during the design process.

The closely integrated data model also becomes very important when considering change. At the most basic level having the original specifications of a system or latest regulations readily available will make the designers work more efficient. In more advanced scenarios, designers would make an impact analysis when considering a change, and if all of the impacts are captured in the data model the decision making will be more accurate.

Due to the highly concurrent way of working and the huge number of changes taking place at any one time it is very difficult to get an overview of what is going on in the design process. This is most evident when walking around a design office, where there is an almost constant stream of phone calls between departments to gain information about why something was or was not done,

or where something is. The data model not only needs to capture the network of information created during the ship design and build process, but also needs to facilitate better communication on the basis of this information.

### Handover and operation

Design offices and shipyards are legally committed to handover the certain documentation pertaining to a new vessel, to its owner. Recent moves by suppliers toward electronic handover documentation have been slow to gain adoption by owners, as having paper copies is often a legal requirement. However the advantages of having searchable documents and even drawings are beginning to outweigh the reliability of a paper hard copy. Recently a new standard for ship documentation has been established, Shipdex works in principal by deconstructing electronic documents into data modules, which offer a higher degree of change management, and configurability.

As the information a ship operator needs are generated and consumed through the ships lifecycle from conception to construction and delivery there is today a high level of inefficiency in the creation of this information. It will often be created by the supplier only to be recreated in one of the design offices systems, and more often than not re-created once more for onboard systems, for example planned maintenance. This increases the chance for human error and almost certainly destroys any traceability of data from its original source.

The obvious solution to this is to manage and maintain one master project repository during the engineering and construction of the ship, and to handover a filtered version of this to the owners.

However this concept poses several challenges; the intellectual property ownership of the model data, that need to add operation specific attributes to the original engineering data and integration with external systems focused on, for example, asset management and other operational activities.

### Technical solutions

The following sections summarise some of the technical solutions and concepts that

can be implemented to manage data for the total lifecycle of a vessel.

### The basic platform

Shipbuilding today is a very global business, relying heavily on the exchange of documents and data between international partners; therefore, any platform to manage data in a ships lifecycle must be globally accessible, and offer basic document management and collaboration functionality.

One example of such a platform is Microsoft's, Windows SharePoint Services (WSS) a web based document and content management system, which is available free as part of any Windows server implementation.

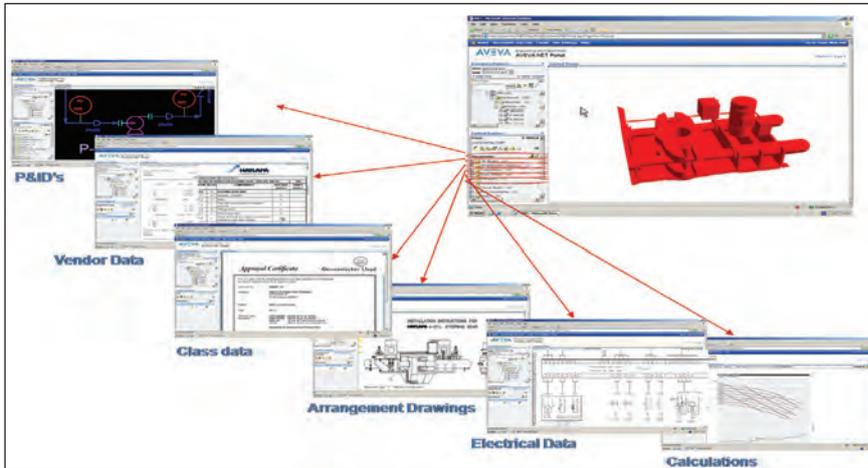
The SharePoint platform is the basis of AVEVA NET; a web based lifecycle data management system, which extends the capabilities of Share Point with a data model dedicated to capturing the multidimensional aspect of engineering data and documents, and adds solutions modules that support the business processes as stated above.

### A data structure for engineering objects

The wide ranging set of requirements for total ship lifecycle management demand a flexible data model capable of classifying objects in many dimensions and able to evolve as the maturity of an object progresses.

One such data model is the engineering information and workflow model (EIWM) data model of AVEVA NET. EIWM is an ISO 15926 compliant data model which represents engineering data via a master class and attribute library, also known as the reference data library (RDL) XML template files which capture the technical description of a document, and any data files used as representations i.e. drawings, documents, photos, 3D models and so on.

This data model is enhanced further by the use of datasets, which capture attribute data, for example, the attributes form the original system specification entered by the owner, the detailed technical parameters of the item delivered by an equipment supplier, the purchasing and logistics information form an ERP system,



Example of a document that has been automatically associated to an equipment item. (courtesy of Hatlapa and GL)

of a Service oriented architecture (SOA) approach far easier, and will be the key to automating data updates and cross enterprise data ownership and responsibility.

### The handover phase

The handover of data from shipyards to shipowners is a task that is often given less focus by the shipyard as it is not in line with their core business, and thus needs to be as automated and as efficient as possible to ensure good quality data handover.

A system like AVEVA NET could offer many advantages to this process, not only is AVEVA NET a place to gather all of the documentation associated with a project, but its document classification abilities allow the documents which must be handed over to be managed, in that workflow and rules will ensure that they are all accounted for. As AVEVA NET captures native CAD data in the form of 3D models and drawings, the shipyard has a fantastic resource, which can be the basis of many added value services to the owner.

the measurement from a hull condition monitoring survey and so on.

### Getting more out of documents

One key disadvantage of existing data management systems is the effort taken to enter data in the format required. In the ideal world, universal standards such as Shipdex would exist in all partners in the ship lifecycle and data entry would truly be of the create-once, then refine nature. However, the reality today is that the parties involved in the definition, construction and operation of a ship work with a multitude of data formats.

Systems like AVEVA NET offer data capture technologies called gateways. Gateways being a combination of software tools preconfigured to scrape or extrapolate

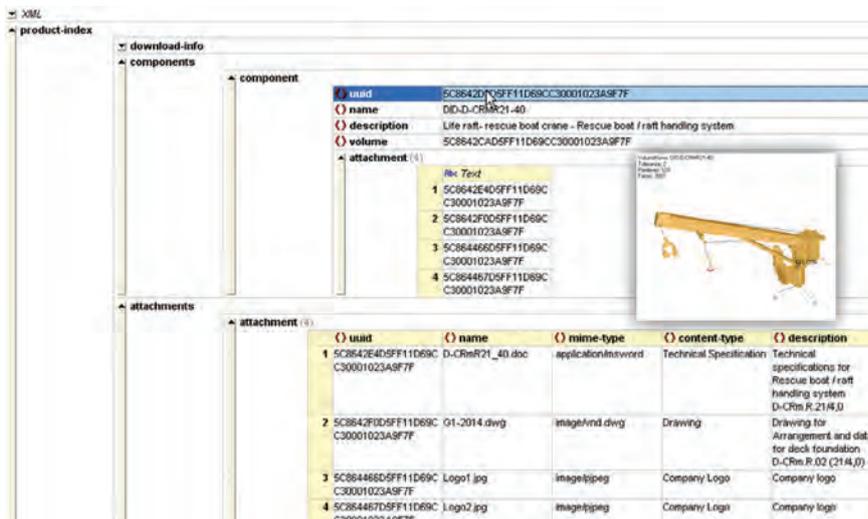
engineering intent from a variety of data formats and sources (including SAP, Maximo, etc.). The implementation of gateways can be automated thus saving many man-hours and again reducing the likelihood of errors.

### Unique for everyone

A key enabler to data reuse in the lifecycle of ship data is the use of a Universal Unique Identifier (UUID), by assigning a UUID to every engineering item of significance, i.e. major equipment, a safety critical valve, a watertight bulkhead, the data related to it can be managed with far more efficiency. The concept is that the originator of that Engineering object would generate a UUID for it, with an off the shelf UUID generator. This UUID would then be the sole identifier for that item. This makes the implementation

### Summary

The adoption of certain standards are key to operating an efficient total ship lifecycle management system, XML being a core part of that as well as initiatives like Shipdex, and ISO 15926. Combined with new concepts like a UUID for major components, SOA and web based information management systems like AVEVA NET we can see that a new era of data management and the digital ship lifecycle model is about to bring huge efficiencies to the way we all work in the shipbuilding and operating process. **NA**



Example of the UUID as implemented on a davit. (courtesy Archnav)



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# COMPIT offers food for thought

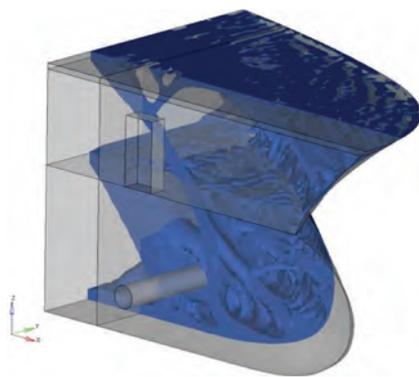
Fine food and fine wine at the Taverna del Lupo marked the end of the 9th COMPIT conference held in Gubbio, Italy. In some ways the multi-course dinner, served by mono-linguists, highlighted common threads found in many conference papers: uncertainty and communication, writes Patrick Couser.

**D**espite the wide variety of computer and information technology applications that were discussed in the 45 papers over the three days of the conference, a number of common themes were to be found in many of the papers. As mentioned above, these themes can be broadly categorised as uncertainty and communication.

## Uncertainty

A number of papers looked at the optimisation of a ship's general arrangement as a packing problem; that is: fitting the desired operational systems into the hull envelope with certain constraints on location and relative location of systems as well as centre of gravity, etc. In their paper, Anthony Daniels, Morgan Parker and David Singer, *Effects of Uncertainty in Fuzzy Utility Values on General Arrangements Optimization*, investigate the implications of uncertainty in the utility function on the optimal system arrangement. The utility function represents how well the constraints and optimisation goals are met. This is particularly pertinent to naval vessels where space is at a premium in most cases. Examining the implications of uncertainty in this way enabled the robustness of the solutions to be tested under increasing levels of uncertainty.

Kunihiro Hamada, Yoshifumi Takanobu and Kesavadev Varikkattu, *Development of Ship Design Support Systems in Consideration of Uncertainty in Product Information*, consider the effects of uncertainty in principal design parameters at the initial design stage. During initial design, estimates such as lightship mass can be quite uncertain. This can potentially lead to vessels with less deadweight than anticipated once the detailed design has been completed. The cost of change increases dramatically the further along the project timeline the changes are made, thus there are significant cost benefits to be realised if the effects of uncertainty can be addressed during initial



Optimised density distribution for ship bow structure: Ralf Tschullik, Hannes Prommer, Pentscho Pentschew and Patrick Kaeding, *A Concept of Topological Optimisation for Bow Structures*.

design. A new design paradigm is proposed to do just that.

Matteo Diez and Daniele Peri, *Two-Stage Stochastic Programming Formulation for Ship Design Optimization under Uncertainty*, put forward a method of dealing with uncertainty in design parameters that are beyond the control of the designer: environmental parameters; fuel costs; port handling rates; etc. To improve solution robustness and flexibility, a two-stage approach is used. The optimal solution is found by minimising the sum of the first-stage and the expected second-stage cost functions. The first-stage variables can be considered as design-level (for example overall dimensions, displacement, etc.) whilst the second-stage variables are more akin to operational-level (for example cruising speed). The idea behind the two-stage approach is that the second-stage variables can vary significantly in order to optimise the vessel performance under highly uncertain design parameters.

Isabelle Toulgoat, Pierre Siegel, Yves Lacroix and Julien Botto, *Operator Decision Modeling in a Submarine*, propose a method to account for operator decisions during naval manoeuvre simulations used to evaluate

the operational performance of submarines and warships. The model of the operator's decision is realistic in that it takes into account uncertainty and incomplete data, with the option of modifying the decision if additional data becomes available. This is done using non-monotonic reasoning with default logic (formalised behavioural rules).

## Communication

Communication issues, at many levels, were discussed by a surprisingly large number of authors and were a recurring topic throughout the conference: from the capture and documentation of the design process; to the dissemination and accurate retrieval of design information; to the transfer of information from designer and outfit provider to ship builder and on to ship operator. Today, the design of most vessels produces many gigabytes of information, however access to this data, at the required level of detail, by all stakeholders –throughout design, production and the operational life-cycle of the vessel– is not always as easy as it should be, often resulting in rework and associated cost penalties.

One particularly interesting application of optimisation to communication was described by Thomas DeNucci and Hans Hopman, *Optimization-Based Approach to Rationale Capturing in Ship Design*. Here the issue being addressed was the capture of design rationale from experienced designers for subsequent transfer to new designers. This knowledge transfer from experienced to new staff was a recurring theme in several papers. In the context of this paper, rationale was described as the reason and justification of a design decision; and although design rationale is extremely important, it is often poorly captured and transferred since the built vessel does not in itself express the design rationale (the ship is merely the consequence of the rationale).

This paper proposed a method of capturing design rationale by triggering design decisions

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Ship model courtesy of Wärtsilä Ship Design Norway AS



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Nupas-Cadmatic latest software version, V6, is an extremely powerful tool for ship design and engineering. The most eye catching feature of V6 is the introduction of a new user interface that will further ease work and bring new efficiencies throughout the ship design process.

The new user interface combines a modern Office 2007 look and feel with enhancements welcomed by both novice and experienced users. It will change the way the software is used and allow for faster and more efficient work. In V6 it is available in Plant Modeller with other modules to follow in due course.

The software's easy-to-use 3D modelling tools can be used for early and basic design, detailed engineering, and the production of workshop drawings and generation of ready-to-use production data for production machinery.

With Nupas-Cadmatic you can successfully carry out the entire ship design project, right from the early start, up to the detailed engineering and final production phase. It improves engineering quality and shortens design and construction times. Nupas-Cadmatic seamlessly distributes engineering projects globally between different sites while ensuring effective communication between project partners.

#### Version 6 highlights

**New GUI** For the first time in history an Office 2007 style User Interface has been applied to 3D software, making it easier and faster to learn than comparable systems. Nupas-Cadmatic's intuitive and efficient User Interface speeds up design projects. **Distributed design** Nupas-Cadmatic's CoDesigner technology is the most advanced and easiest tool to use for distributed projects. It does not require massive hardware or very fast internet connections. **Easy administration** Administration of 3D software has never been so easy. Nupas-Cadmatic has the most modern tools for library and catalogue management. **Internet-based technology** Nupas-Cadmatic was the first developer to launch an Internet-based 3D model viewer and data query tool on the market in 2003. Today eBrowser is the most advanced software to visualize 3D models, to walk through, to query data and to communicate design details interactively with other users and project parties. The internet-based technology has unlimited scope for easy integrations.

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from experienced designers. This was done by developing a tool which could suggest feasible design alternatives, then allowing the designer to comment on them and describe why one design alternative was better than another. Of particular interest was the relative spatial location of key ship systems. Optimisation was used to develop design alternatives with diverse relative positions of the systems of interest whilst maintaining almost identical relative positions for the remaining systems.

As the use of information technology and complex ship data models increases in new areas, particularly for operations, maintenance and hull condition monitoring by the ship owner/operator, several factors become very important: data transfer avoiding the need for manual re-entry; intellectual property; and rapid, accurate access to information.

David Thomson highlighted many of these issues in his paper, *Requirements of a Common Data Model for Total Ship Lifecycle Data Management*. In some ways, similar issues were discussed by Nick Danese, *Ship CAD Systems – Past, Present and Possible Future*. Nick Danese also highlighted the fact that a frequent misconception of the ship data model is that it consists mainly of CAD drawings and is primarily a geometric model of the vessel. In fact, in the ideal situation, this is far from true and a large proportion of the data contained in the model is non-graphical; for instance: mass and centre of gravity of items; product documentation (especially for outfit); object inter-relationships; etc. In most cases, access to this data is provided via a database.

The majority of the data contained in the ship data model is generated by the designer, shipyard and also outfit and machinery suppliers and contains substantial intellectual property. Providing global access to this data to the project stakeholders, in a secure manner, at the required level of detail, whilst protecting the owners' intellectual property is a challenging task. A natural gateway is through the World Wide Web.

David Thomson drew parallels between the style of data access described above and mainstream "social computing" – that is: any form of computing that supports or even enhances social behaviour, such as intra-group communication. He envisaged the possibility of a "Facebook" type

interface to the ship data model. Both Mr Thomson and Mr Danese highlighted the challenge of quickly and accurately finding and extracting information from the ship model database.

Rather than the information "push" methodology suggested by Mr Thomson's Facebook analogy, Mr Danese suggested improved search methods, such as those used by Google, to "pull" information from the database. The problem of data transfer between different systems is still far from resolved. Data is stored in many formats requiring different viewers. Neutral formats such as STEP have not been wholeheartedly supported by the industry and in many cases proprietary formats still dominate.

The theme of data transfer was also discussed by Benedict Boesche in his paper, *Improvement of Interoperability between Yards and Equipment Suppliers*. Product models arriving from outfit and machinery vendors are often generated in mechanical engineering CAD tools and contain far more detail than that which is required in the ship data model. The ship data model generally only requires a geometrical representation of the external envelope of the object, mass and centre of gravity, logical information about connections to the object (power, fuel, control, etc.) and perhaps also manuals and maintenance documents. The use of a third party to collate a catalogue of outfit components from various suppliers and to provide the required ship model information was suggested and a pilot project implemented to prove the concept. The suggested approach offers several advantages: the machinery suppliers' intellectual property is protected because the internal workings of the object are not needed in the model; and the geometric complexity of the model is greatly reduced.

In their papers, Christian Cabos, Uwe Langbecker and Wiegand Grafe, *Hull Maintenance based on a 3D Model*, and Marco Bibuli, Massimo Caccia, et al., *Robotic Tools to Assist Marine Inspection: The MINOAS Approach*, looked at how the ship data model could be used to assist with hull condition monitoring during the vessel's operational phase including adding the hull condition measurements and reports to the ship data model so as to provide a readily accessible historical record of the vessel's

condition and ultimately help with planned inspection in high-risk areas.

### And another thing...

Of course there were many other topics presented at the conference. It appears that simulation driven design and optimisation is becoming well established (as reported by Stefan Harries and Florian Vesting, *Aerodynamic Optimization of Superstructures and Components*). Further, it can be said that computational fluid dynamics codes are now quite mature and used almost as routinely as finite element structural analysis.

Optimisation using genetic algorithms is also reasonably commonplace and again there is some convergence with several authors favouring the NSGA II multi-objective approach; for example: Ahmad Ayob, Tapabrata Ray and Warren F. Smith, *A Framework for Scenario-Based Hydrodynamic Design Optimization of Hard Chine Planing Craft*.

Cross-over of methodologies from other disciplines were discussed, notably the application of topology optimisation (commonplace in manufacturing and automotive engineering) for the optimisation of structural elements under specified load regimes.

Ralf Tschullik, Hannes Prommer, Pentscho Pentschew and Patrick Kaeding, *A Concept of Topological Optimisation for Bow Structures*, applied these techniques to optimise the preliminary structural design of a ship's bow, yielding the novel structural arrangement shown below.

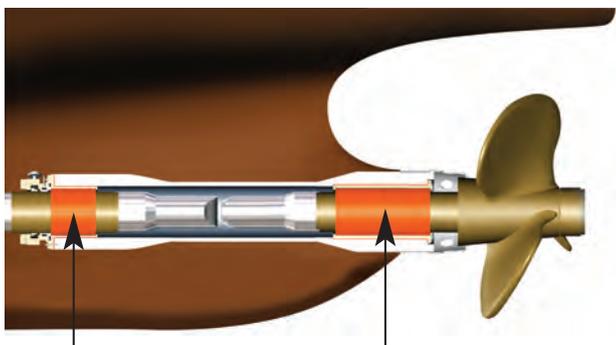
### Further information

The COMPIT conferences, organised by Volker Bertram, provides a forum for the discussion of the application of computer and information technology to the maritime industry. The conferences generally have a good mix of delegates from academia and industry, with interests in both naval and commercial vessels. Papers typically cover a wide variety of subjects from design, through production to operation. For those who were not able to make the trip to Italy, the papers from the 2010 conference, as well as the preceding conferences, are freely available for download from the COMPIT website ([www.compit.info](http://www.compit.info)). The 10th COMPIT conference will be held in Berlin, May 2-4 2011. **NA**

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# Wave loads – developments and directions

Lloyd’s Register (LR) uses the latest technologies to assess loads on new ship designs and to monitor the loads on ships in service. Spyros Hirdaris looks at the current assessment of wave induced design loads and LR’s Strategic Research programme on ship hydrodynamics.

## State of the art

Over the last 250 years Lloyd’s Register has been developing rules that are backed up by in-service experience and account for still water and low-frequency wave effects. In the Rules for Ships it is assumed that ship bending takes place in two distinct frequency regimes, namely: (a) ultra low frequency and (b) low frequency. The former occurs in still water and accounts for about 40% of the total stresses incorporated in the normal design standards. The latter occurs at frequencies primarily associated with the natural heaving and pitching periods of ships in regular waves. It accounts for about 50% of the lifetime stress expected upon the hull girder.

For those cases that the Rules for Ships are not deemed sufficient, the Society develops direct analysis design assessment procedures for load assessment that, wherever applicable, are implemented in the classification standards in a notation format. For example, these include the Ship Design Assessment (SDA) and Fatigue Design Assessment (FDA) procedures for the assessment of the structure of container ships. A reflection of these procedures, coupled with empirical rules, is also implemented in the unified International Association of Classification Societies (IACS) Common Structural Rules (CSRs) for Tankers and bulk carriers.

The design procedures and Rules are backed up by state of the art hydrodynamic tools. The principal ship motion and load prediction hydrodynamics tools currently used by Lloyd’s Register have been developed and validated with the aim to provide solutions to problems of practical significance. They are the ‘Cooperative Research Ships (CRS)’ programme PRECAL and the Lloyd’s Register (MARTEC Ltd.) program FD-WAVELOAD. These are linear seakeeping panel solvers that can be applied for the prediction of loads and

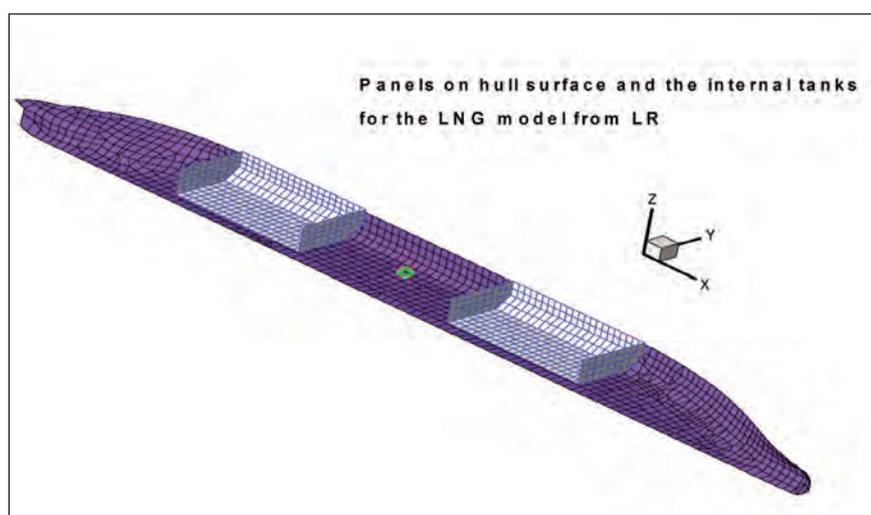


Figure 1: Hydrodynamic mesh for LNG carrier (Tanks 2 and 4 partially filled).

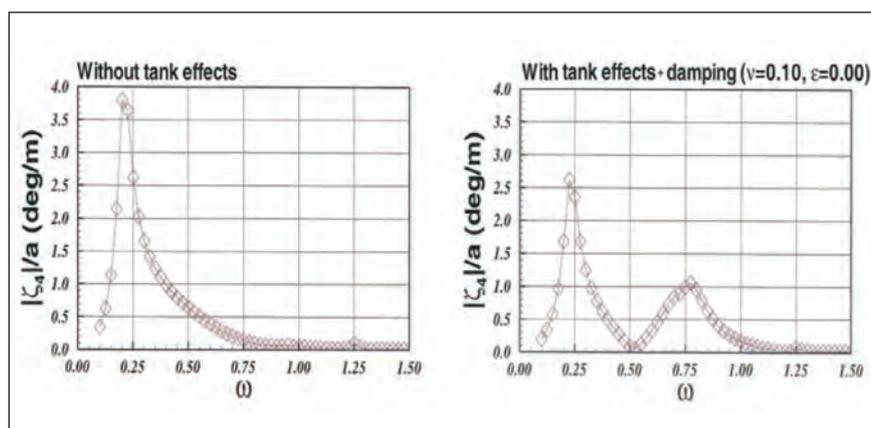


Figure 2: Roll motions of LNG carrier with and without tank effects.

responses of monohulls, catamarans and trimarans. In these validated computer codes the flow potential is solved by application of the zero speed green’s function. Radiation and diffraction pressures are integrated over the hydrodynamic mesh of the wetted part of the ship to give the forces and the body motions, in regular or random waves with or without spreading. Since representation

of non-linearity in the ship responses to the environment and of short duration events (e.g. slamming, deck wetness etc.), are best represented by time domain simulations within CRS LR has been developing the non-linear time stepping solver PRETTI. In this software, the hydrostatic and wave pressures are integrated over the wetted surface of the hull at each time step. The

# THE SUPERYACHT PAVILION AT METS 2010

## Getting down to business

### What is the SuperYacht Pavilion?

The SuperYacht Pavilion (SYP) and its service-oriented Refit Boulevard form a show-within-a-show at METS. Dedicated to companies who offer equipment and services specifically to the large leisure yacht sector, the SYP is a destination in its own right, but also sits at the heart of METS, the world's biggest and best attended leisure marine trade show. Over 115 exhibitors assembled in the SYP and Refit Boulevard in 2009 – to sell, promote and network. It's busy, it's professional – and it's special.

### Why special?

The SYP/METS combination is unique. At no other trade-only event can you visit a thriving superyacht equipment exhibition and also have access to over 1,000 other marine trade exhibitors, some of whom also cater to the superyacht sector. It's also a unique launch pad, as Ian Taylor, group sales manager of Quest International, reveals: "As a supplier of new and novel technology we were looking for the right approach to allow us to undertake a technology transfer into the superyacht and megayacht arena. METS provided us with a fantastic platform... and the organisers invited our managing director to be part of the Superyacht Forum. All of this support led to a fantastic reception from the industry and what we believe to be an unprecedented level of interest on the stand."



### Why should you attend?

The SYP is a meeting point for true industry professionals - superyacht captains, designers, builders, project managers, brokers and owners, and many others. The SYP is of interest to nearly half of the 20,000 professionals who visit METS each year and is also a must-visit for all the speakers and delegates who take part in the associated Global Superyacht Forum (GSF), the high profile HISWA Yacht Symposium and the Member's Mixer event organised every year by the International Superyacht Society – the society for captains and crew members. The result is a varied and appropriate display of products, a vibrant conference programme and networking galore.

### What is the GSF?

The GSF is one of the world's leading summits for superyacht professionals. As a conference, it delivers in every way – with top profile presenters and excellent interaction between speakers and delegates. Organised and presented by The Yacht Report Group in association with METS organisers, Amsterdam RAI, the Global Superyacht Forum attracts around 650 delegates and includes social highlights like the Global Superyacht Party. To register as a delegate for GSF, go to [www.globalsuperyachtforum.com](http://www.globalsuperyachtforum.com).



All GSF delegates have free entrance to SYP. Visitors of the SYP do not automatically have access to GSF.

### Register for your free entrance badge

To visit the SYP you need a FREE three-day entrance pass to METS 2010. Please pre-register for this on [metstrade.com](http://metstrade.com). To help with your planning, Amsterdam RAI can also book hotel rooms for you and assist with other travel requirements. Go to [metstrade.com](http://metstrade.com) and click on 'visit' and 'hotel & travel service'. To exhibit at the SYP, please contact the organisers.

### METS – at a glance

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Figure 3: Example illustrating the use of hydroelasticity theory in the design process of mono-hull vessels.

radiation forces are calculated by non-linear body velocities introduced into the linear radiation function.

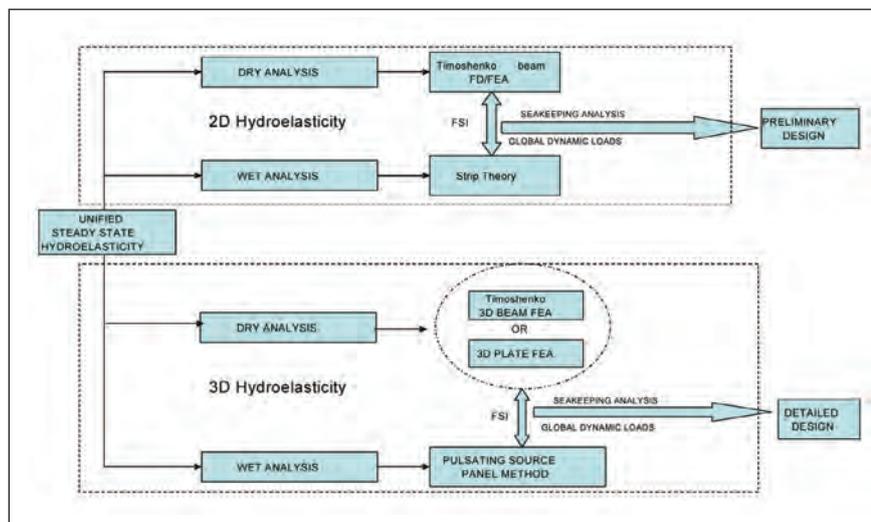
PRECAL and PRETTI consider only the sea domain on the hull and its appendages. The latest FD-WAVELOAD software version improves the situation by considering that the fluids in tanks can be treated in a similar way as the fluid acting outside the hull, in a coupled ship motion and tank sloshing solution. The tanks are modelled with a hydrodynamic mesh (Figure 1) and the linear potential model applied to give forces for each panel, in a similar way as for the hull. The most dominant effects appear as the roll ship motion changes from a single peak to a double peak response in way of the natural frequency of the tank fluid (Figure 2).

**Short to medium term research**

The current design philosophy for the prediction of motions and wave-induced loads is based on first principles calculation procedures based on well proven applications, such as ship motion prediction programs. In recent years, the software and computer technology available to predict design loads has improved dramatically; we have also seen a stepwise increase in ship size and complexity and we need to utilise these latest technologies to assess the design loads on new ship designs. The short to medium term programme of research carried out by the class society attributes emphasis on developing and validating advanced fluid structure interactions solvers for the prediction of local and global wave induced or dynamic loads and the development of advanced tools and procedures. Within this context, the development, validation and use of advanced hydrodynamic and hydroelastic solvers is pivotal and the following sections outline some of the recent developments.

**Focus on flexible fluid structure interactions**

Ships may experience resonance phenomena in the steady state or due to slamming of the bow or stern of the vessel. It is believed that these may produce low stress magnitudes but can have effects on the number of stress



reversals encountered by a ship, and certain ship types may be more prone to these effects. Currently, Lloyd's Register is involved with a number research studies on hydroelastic predictions. To minimise the uncertainties related with modelling assumptions and to create practical tools that can be used by designers, over the last five years the Society in association with the University of Southampton has developed the concept web enabled system G-hydroflex. These studies have been focused on modelling and predicting the flexible responses of container Ships and the service factor assessment of a Great Lakes bulk carrier, with the ultimate purpose to understand in further issues associated with the perspective benefit of application of validated hydroelasticity analysis in design and consultancy.

The concept level hydroelastic modelling approach currently investigated by Lloyd's Register for mono-hull vessels is shown in Figure 3. The analysis is divided in two parts, namely 'dry' and 'wet'. The relatively simpler 2D analysis, comprising of a beam structural idealisation and strip theory can be used for preliminary design or concept studies. A more detailed 3D (FEA) structural idealisation combined with source distribution over the mean wetted surface can be used for the detailed design and to account for structural discontinuities and torsional response issues.

**R&D studies to date**

The 3D linear (frequency domain) Hydroelastic solvers could be used to predict the steady state responses of

ships with large deck openings in regular waves. However, slamming induced and irregular wave computations for practical engineering analysis in 3D are subject to future enhancement of computational power and the maturity of computational fluid dynamics (CFD) and non linear hydrodynamic programmes.

When validated by full scale measurements, 2D Hydroelastic modelling, using weakly non linear Hydroelastic approximations could be more beneficial at preliminary design or consultancy studies. Concept studies on an 8100TEU container ship have shown that when such approach is used, hogging wave induced bending moments may increase by about 11% compared with linear rigid body hydrodynamic predictions when whipping/springing are included in computations. In head seas and at moderate speed the sagging wave induced vertical bending moment may increase by 42% when non-linear hydrodynamic effects are considered, and by 71% when whipping is included.

2D Hydroelastic modelling analysis may be useful for the service factor assessment of long slender ships such as Great Lakes bulk carriers. Pilot studies have shown that hydroelastic actions may potentially augment the vertical response of such vessels in open waters by up to about 38%. Whereas numerical analysis results appear to correlate generally well with full-scale measurements that are available for such ships in irregular seas they clearly depend on the parameters of the wave spectra as well as the estimation of structural damping for the latter and any



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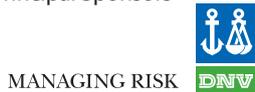
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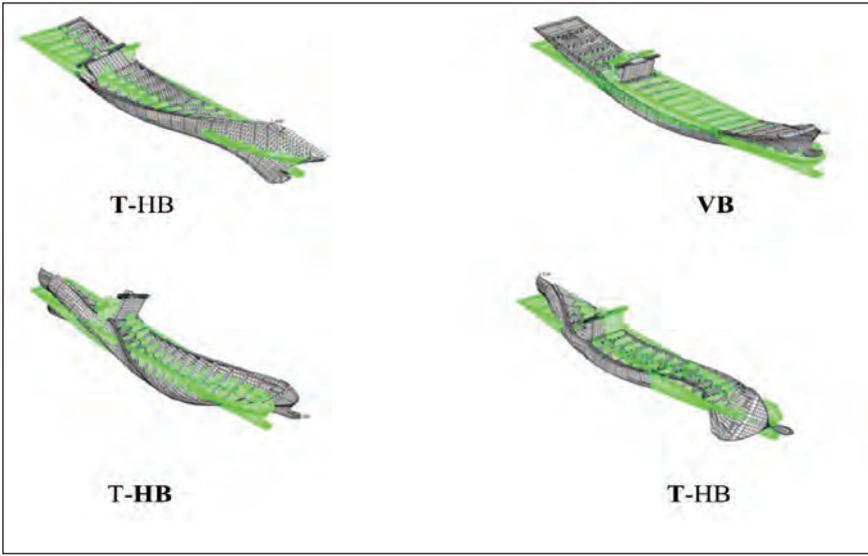


Figure 4: NASTRAN Illustration of flexible modes of the container ship (T = Torsion, H = Horizontal Bending driven, VB = Vertical bending, Bold letters denote dominant effects).

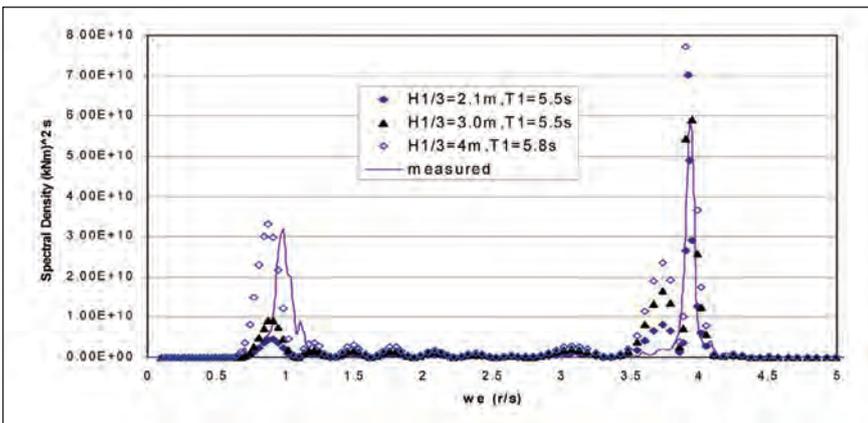
uncertainties involved in measuring such data (Figure 5).

Full Scale Measurements (FSMs) have and may improve in further our understanding on the contribution of hull flexibility to the cumulative fatigue damage index. FSMs on container ships have shown that the contribution to the fatigue damage index from torsional loads is significant, up to 50% for the longitudinal stiffener in way of the deck passageway and 75% for the longitudinal stiffener in way of inner hull bottom. Whereas the fatigue life is 65 years when the effect of natural hull girder vibration is not taken into account, for container ships

the projected fatigue life at the hatch coaming top based on the sea condition encountered in the first 14 months of operation was estimated as 49.5 years.

Further work is required to confirm the validity of predictions and the incorporation of hydroelastic modelling approach within the context of design assessment procedures. LR has been participating in the joint industry project WILS (Wave Induced Loads on Ships) managed by the Korean MOERI (Maritime and Ocean Engineering Research Institute). To date the hydroelastic model tests that have been carried out involved experiments with a 1:55 scale model of a 6250TEU container

Figure 5: Comparison of amidships vertical bending moment response spectra (kNm)2s predicted by 2D Hydroelasticity analysis against full scale measurements for a Great Lakes bulk carrier.



ship with bilge keels and four segments (Figure 6). Comparisons between experimental and numerical results have shown satisfactory agreement for ship symmetric responses. Currently, emphasis is attributed to the validation of torsion induced loads.

### Future directions

The completion of Common Structural Rules for tankers and bulk carriers, the IMO Goal Based Standards initiative, the continuous technology advances in IT and naval architecture, the shipbuilding market demands with reference to the economies of scale and the opening of new routes for shipping operations (e.g. arctic route), as well as the increasing need for collaborative work between maritime industry stakeholders, are some of the top level drivers that in the future will affect hull design assessment services. These in turn will drive technologies that will affect the rationale behind research and development directions for the assessment of ship loads and responses.

In order to reflect future industry demands the Lloyd's Register Strategic Research programme on ship loads and hydrodynamics has been tasked with the aim of establishing the class society as the 'leading provider of technological solutions by considering risk contributions applicable to contemporary and novel ship designs through open innovation'.

Our approach to research and innovation brings together ideas, people and strategies to develop future products and services with the view of making LR the leading Classification technology provider. As part of our open innovation research strategy, and in order to start implementing our forward looking programme of research on loads and hydrodynamics, we have initiated a forward looking programme of scientific research with leading UK maritime Universities, namely Southampton, Strathclyde and Newcastle.

Accordingly, the medium to long term research in ship hydrodynamics is driven by the LR longer term vision to built up its intellectual infrastructure so as to:



Figure 6: Four segmented 6250TEU container ship model used for WILS I model tests.

- lead in the development of risk based regulatory framework for ship loads and responses;
- develop improved ship design procedures for robust strength assessment under extreme conditions; and
- provide training courses to educate ship designers, consultants and operators.

The LR medium to long term streams of innovation on technologies for hydrodynamics and wave load assessment are driven by research initiatives with specific focus on:

- risk assessment;
- emergency preparedness;
- extreme wave modelling;
- advanced prediction methods; and
- operational monitoring.

The long term research streams outlined above are directed toward enabling an optimal approach to design under extreme wave environments and the development of accepted analysis thresholds.

In the future the use of direct calculation methods that account simultaneously for the effects of dynamic wave environment using fully non-linear hydrodynamics, computational fluid dynamics, and non-linear static and dynamic finite element analysis are expected to evolve further. To reflect this trend the LR products for design assessment are being developed to include:

Three dimensional full-ship detailed linear and, wherever applicable, non-linear FEA to support coupling with hydroelasticity analyses.

Three dimensional fully non-linear springing and whipping analysis, where the 3D bow flare and stern slamming analysis should incorporate the effects of hull flexibility, green water, and, wherever applicable, air trapping, jet flow formation, etc.

Three dimensional spectral fatigue analysis accounting for the effects of hydroelasticity, e.g. springing and whipping.

Computational fluid dynamics approaches are expected to become increasingly useful in the future. The use of Reynolds averaged Navier stores (RANS) methods as part of or coupled to hydroelastic solutions is a realistic goal. The finite volume method and particle based methods (SPH, MPS etc.) may offer further capability. **NA**



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# Adapt and survive

“Entrepreneurs must adapt” to changing situations said Bernard Anne, Executive Vice President and Managing Director, Bureau Veritas Marine Division, explaining that the changing face of shipping must be embraced by those that operate within it.

**T**hat shipping is changing is hardly a revelation, but for an insider such as Bernard Anne to embrace the changes and to be positive about the outlook is refreshing to hear.

According to the head of Bureau Veritas’ (BV) maritime division many things happen during the lifespan of a ship, many changes occur and those developments must be met like all other challenges by the industry and those who run it.

Unsurprisingly Mr Anne believes that the major challenge facing the maritime industry is the raft of regulation that is certain to follow the imposition of emission targets, either later this year in Mexico or at some later date. The changes will come, but he confidently asserts, “The only way to reduce emissions is through technology.”

He is unimpressed by the market-based mechanisms being touted: “Carbon trading is not the right solution to reduce emissions, the only way, objectively is through technology.”

If there is a surprise with regards to the views of a senior manager from a leading classification society it is that he is so refreshingly forthright with them. He declared that delivering emission controls cannot be done just by building ships to a certain standard, such as the International Maritime Organization’s (IMO) Energy Efficiency Design Index (EEDI). “EEDI itself is not the answer, it is the way that you use it afterwards, you need to know the level of efficiency of the design and that’s a good starting point, the more difficult problem is to fix the objective.”

Favouring the reduction of speed as a method for reducing emissions is too simplistic, he says, the capital expenditure has already been made for existing ships and owners need to utilise these vessels to the full, moreover shippers need goods to arrive within a particular time frame.

“Reducing a vessel’s speed from 25knots



Pragmatic optimist Bernard Anne embraces change and sees a bright future for the maritime industry.

to 18knots would mean you need two more ships on the trade, you would need to burn energy to build the vessels and that would also increase costs, the problem needs a global approach,” said Mr Anne.

Additionally, he believes that the idea that Europeans and Americans can start to produce goods locally again, thereby reducing demand for shipping and consequently reducing emissions, is not realistic according to current economic realities, though whether the price of labour in Asia and the cost of shipping will increase enough to alter those economic realities, a process that Mr Anne calls a move towards “relocalisation” is he says the big question mark.

In the mean time the shipping industry must look to deal with the changing regulatory situation by building bigger ships and adapting their speed to reduce emissions. “By increasing the size of the ship you reduce the cost per unit and decrease fuel consumption per unit then

you must look at improving the engine, the hydrodynamics and the speed which can all offer savings,” explained Mr Anne.

He said that the industry should not expect too much from existing ships which had been designed for a specific purpose around certain parameters, but for future vessels new designs would be more efficient.

He was confident that new designs that use LNG technology will offer great savings in costs and emissions for owners. “Natural gas as a fuel offers new solutions, but there also needs to be solutions regarding the design for the storage and containment of LNG onboard,” explained Mr Anne.

He went on to say: “Any new designs for LNG powered ships must be for big ships, calling often at ports and where there are emission control areas (ECA) that require operators to comply with controls on CO<sub>2</sub>.”

Initially that description could be applied to ferries where the vessels would be able to re-fuel often, but eventually the technology needs to be applied to ships that operate in open seas, such as cruise and container vessels.

“We need to find a solution for these ships too”, said Mr Anne and BV is working with its partners, such as Wärtsilä and MAN Diesel, to develop this technology. “LNG has a real advantage on CO<sub>2</sub>, but there needs to be gas at each port of call. This can be arranged for some trades and some ships, we must find the right technological solution and then it will depend on economic pressure and regulation to make the fuel viable,” explained Mr Anne.

In effect the credit crisis has allowed a lull in the shipbuilding market that naval architects have used to look at new designs. At BV that has meant “jumbo containerships”. In this instance Mr Anne means 13,000-14,000TEU ships and larger.

“There is much demand for new designs,” said Mr Anne.

This fact alone is surprising with the glut of container vessels that have slipped off the ramps in the last two years the appetite for new box carriers was seen, by some, to have been satiated for some years to come.

However, according to Mr Anne, writing in the BV’s 2009/2010 Marine Business Review, said: “pragmatic optimists right across the marine industries are mobilising technology and capital and looking forward to the future.”

That is because 2009 was nowhere near as bad as many feared, though “2010 has the potential to be seriously tough for the bulk and tank sectors and passenger ship yards in particular”, though the outlook is not all gloomy, say BV.

In fact Mr Anne points to a recovery of sorts in the shipbuilding market. “We have seen a significant improvement in the shipping market compared to 2009, it has not reached the levels of 2007 and 2008, but it allows companies to operate in acceptable conditions,” he said.

Additionally, lower yard prices have made newbuildings more attractive, prices for a capsized bulk carrier were at around US\$95-98million in 2008 and 2009, that has nearly halved to US\$50-55 million in 2010. As a result the orderbook has bounced back from 2009 levels of 20-25 million GRT to 30-35 million GRT this year, still well below the 2008 peak of around 180 million GRT, but a step forward.

Scrapping has also taken a significant small step in the right direction steadily

increasing from 2008 levels of eight million GRT, to around 20 million GRT last year and is projected to rise to around 35 million GRT this year following a good first 10 weeks in which five million GRT was sent to the breakers.

International trade is also expected to increase between 3% and 5% this year, compared to last year’s contraction of 12%. “The market is adapting very quickly with some tanker orders converted to bulkers and 2010 will see the same level of newbuildings as 2009 due to slippage in delivery dates” said Mr Anne.

After the collapse of the boom years the sharp contraction in the industry has seen those with the entrepreneurial spirit now in the process of re-inventing the ship, position themselves to reassert their credentials as movers and shakers. *NA*

## Going green? Go RINA

The pressure is on to make ships greener, but ships are used in a complex way with no simple way to ensure that a particular ship on a particular trade will provide the lowest environmental impact, so Genoa-based RINA has developed its Green Plus index and notation.

**I**n providing owners with the Green Plus index and notation RINA is offering visible proof that owners and operators have undertaken a full analysis of the options for design, equipment and operation of a specific vessel and chosen a mix of mitigation options which significantly reduces the environmental footprint of the vessel.

“The Green Plus index is a way of comparing the mitigation effects of different technologies and different operational methods,” explains Paolo Salza, head of RINA’s technical department. “But alone the index is not enough. We need strong analytical tools to help us compare the different effects of different options. So we have invested heavily in the development of user friendly software which will help owners to choose the best possible combination of options to deliver the most cost-effective environmentally friendly ship. The system adopts a goal-based approach to minimising the environmental impact of any ship, and allows the designer, owner and yard to choose from menus of different design, equipment and operational



The Green Plus index compares different technologies and operational methods said Paolo Salza, head of RINA’s technical department.

practices to determine how the ship can be most effectively built and operated to reduce

its environmental impact.”

The system will be ready for commercial use during 2010. Experience with RINA’s Green Star notation shows that not only passenger ship owners but also cargo ship owners, particularly those seeking long term charters, are keen to adopt these higher standards, and keen to demonstrate that they have done so.

“We expect yards and owners to begin using this Green Index software tool for all types of ship,” said Mr Salza. “Using our tool the yard and operator can evaluate at an early design stage the environmental impact and also the cost of changes to hull design, engine power, coatings, waste handling systems, lighting systems and operational methods and arrive at the best compromise for each ship type and trade. In the real world we all know that there are compromises to be made, we have to balance benefits against costs and tailor solutions to the way the ship is to be used. Our Green Index software makes that easier to do, which will ensure that the next generation of ships will be cleaner and more

efficient, as well as cost-effective.”

Genoa-based RINa is strongly committed to research and development, and it has always seen its role as much more than working on new products and services in house. RINa reaches out to work with shipyards, institutes, ship owners and any other interested party to develop wide based research projects.

“We see our role as partly to provide expertise and facilities, but also to be a catalyst for other people’s expertise,” said Mr Salza. “In that context we continued our leadership role in regional maritime research and development last year by working with the Italian government to found the Mediterranean and Black Sea Technology Platform (PTMB) to align the interests of stakeholders and create a regional dialogue on maritime research, innovation and training.”

During 2009 RINa launched two new research projects. RINa’s Minoas project should significantly reduce the time needed

for major surveys, and also the cost of providing access for human surveyors. Working with Lloyd’s Register, German Research Center for Artificial Intelligence and CNR (Italian National Research Council), RINa hopes to see a fleet of robots and supporting infrastructure able to carry out simultaneous survey of different parts of the vessel at the same time. The project is due for completion by middle 2012.

Moses is another RINa project aimed at developing multiplex optical sensors for hull stress monitoring systems. RINa is working with engineering consulting company D’Appolonia, shipowner Premuda and equipment maker Pegaso Systems to deliver a hull stress monitoring system which will give real time information to the officer on watch and enhance the ability of the master to adapt the ship’s course and speed to the prevailing conditions. It is due to be completed by next autumn.

A third project, Handling Waves, aims to develop an onboard decision support system for tactical decisions concerning ship handling in waves which enables the master to improve ship performance and to minimise the likelihood of structural damage.

The system that is being proposed aims at predicting the near term changes in motions and loads that would arise from any change in course and speed by the shipmaster. During 2009 monitoring devices able to accurately measure the motions of the ship have been developed and pilot applications on different ship types will start in June.

In the second half of 2010 RINa expects to gather data and begin modelling ways that this information can be processed along with the proposed changes of course and speed to give the master useful predictions of the outcome of any actions he decides to take in heavy weather. *NA*

## Breaking the ice

The Russian Maritime Register of Shipping (RS) is working on shipping technology that will help to exploit oil resources offshore in severe climates within the Arctic Circle.

New developments often require a new approach and with the development of the offshore market to the north of Russia the RS is offering its clients the benefit of its considerable knowledge of working in ultra-cold climates.

The company is now offering an Ice Ship Safety Certificate (ISSC) which it says is the “one and only” multi-purpose notation on the market. The Certificate enables the operator to choose safe modes of operation in icy conditions under icebreaker assistance as well as of independent operation.

The particular mode chosen is dependent on the actual ice conditions, the particulars of the hull’s shape and design, its dimensions, displacement and features of the propulsion. The

Certificate will be useful for the vessels of new types, such as Arctic LNG carriers as the design and construction of these ships requires a multi-criteria strength assessment of the hull’s strength.



The Russian Maritime Register of Shipping’s director general, Nikolay Reshetov.

The development of the safety criteria is based on the consideration of the diverse modes of proceeding in ice conditions: that is simple, straight forward motion or more complicated non-linear hull-to-ice interaction with regard to elastic and plastic deformation of the hull's structure. The hydrodynamic model of the hull-to-ice interaction, used under the development of the ISSC was developed by Russian technicians.

"The implementation of new technologies is aimed at ensuring a high quality standard of the service," said Nikolay Reshetov, RS Director General. Innovation is "the basis for developing new requirements and standards to ensure maritime safety and pollution prevention", he added.

According to RS one of the most urgent problems for Arctic shipping is the development of the requirements for machinery on icebreaking ships. In harsh Arctic conditions the pilotage of ships behind an icebreaker is the most effective and safest method to operate. And this is the basis for the development of modern RS rules including the classification, requirements for the hull strength, machinery installations and propulsion power of icebreaking ships.

Development of these requirements is based on a systematic approach and includes a formal safety assessment. In addition research has enabled the company to develop draft requirements for the strength scantlings of icebreaker propellers in order to give fatigue and pyramidal strength analysis.

For the first time the strengthening for IP of DAT ships has been developed. New RS requirements make it possible to reduce blade thickness significantly due to use of steel with high fatigue characteristics and surface strengthening during the manufacturing process.

RS has also completed the implementation of the System of Technical Ordering and Reporting Management or STORM. This innovation enables the company to effectively control the survey process and provide services on a 24-hour, seven-day a week basis. The new advanced software enables the

operator to monitor the ship while it is under construction and later while it is in service. A transition from 'hard' reports to a unified electronic checklist will enable the surveyor to obtain detailed and up-to-date information on the condition of particular items and the scope of the forthcoming survey, thereby saving time on reporting. STORM allows several surveyors, with

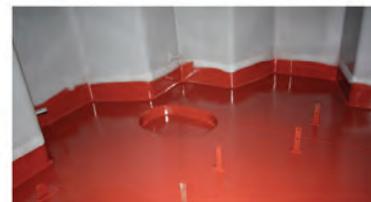
different specialisations, to monitor the vessel. A further advantage of an electronic checklist is the possibility to use it simultaneously and to incorporate it into a single final document. STORM allows surveyors to monitor a ship stage-by-stage allowing owners to make modifications as and when it calls at a port and by using several surveyors. *NA*

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# Taking the load off tankers

Ensuring the integrity of tankers in a variety of environments, including icy conditions, is the core work for classification societies claims Bureau Veritas (BV) the company has created three new tools to help owners and operators protect their vessels.

## Structural integrity

Structural integrity is right at the heart of classification. Three new developments from Bureau Veritas (BV) emphasise a strong focus on structure. “We want tanker owners to have the benefit of our advanced work on fatigue analysis, so we have delivered enhanced fatigue standards for common structural rules (CSR) tankers,” explains Philippe Baumans, Director of development, Bureau Veritas. “And this year we have also introduced a better structural integrity visualisation tool, VeriSTAR Hull Life Cycle and a unique tool for calculating the effects on structure of heavy ice loads, IceSTAR.”

The new Fatigue Plus notation for Common Structural Rules compliant tanker standards build on a research project on fatigue monitoring. Experience with the CSR Tanker rules showed that the approach to fatigue details should be improved, which required the development of an efficient Fatigue Check Methodology for CSR Oil Tankers. “We have developed Fatigue Plus, which is a general method for fatigue finite

element modelling (FEM), checking on all kinds of details in tanker structures,” explains Mr Baumans. “We have also created a simpler and quicker solver for FEM calculations under the CSR Tanker Rules. That is now being made available to yards.”

The Fatigue PLUS notation covers enhanced fatigue checking of structural details which are in addition to those strictly required by the CSR for double-hull oil tankers. This optional additional class notation can be assigned following satisfactory checking of these additional areas.

BV is at the forefront of fatigue analysis methodology and regularly proposes additional verifications of structural details in order to respond to the demands of the industry for fatigue assessment. “Following the publication of CSR for oil tankers, where a simplified fatigue analysis of the connection details of the longitudinal with web frames and transverse bulkhead and a FEM fatigue study of the single knuckle detail between the inner bottom and the hopper became mandatory, BV felt that we should voluntarily

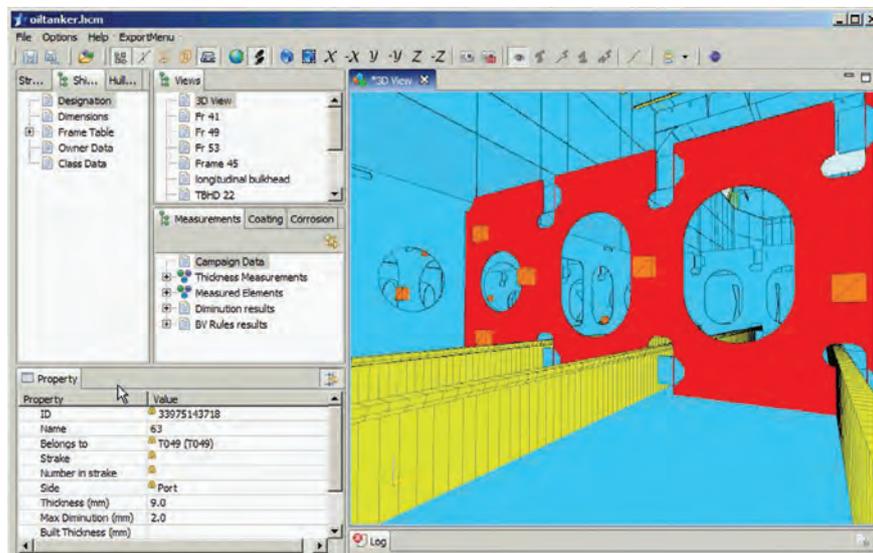


Tanker owners must get the benefit of BV’s “advanced work on fatigue analysis,” said director of development Philippe Baumans.

offer this additional family of notations,” said Mr Baumans.

The additional notation Fatigue PLUS can be assigned in addition to the compliance with CSR for oil tankers if all analysed details required by this notation comply with a design fatigue life equal to 25 years, as requested by CSR.

The VeriSTAR Hull Life Cycle viewer allows a Google-Earth type walk through of the structural detail.



## FEM approach

The additional notation Fatigue PLUS DFL xx, which corresponds with an extended design fatigue life of xx years (xx being greater than 25), can be assigned if all analysed details comply with CSR for oil tanker requirements and the additional list of structural details comply with the as requested additional design fatigue life.

Finally, the notation Fatigue PLUS spectral ( ) and Fatigue PLUS spectral ( ) DFL xx, can also be selected, which in addition to CSR for oil tankers, considers other wave environment areas encountered during the operation of the vessel, with the information between the brackets corresponding to a short description of the anticipated route or areas which have

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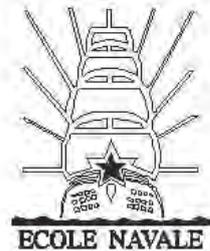
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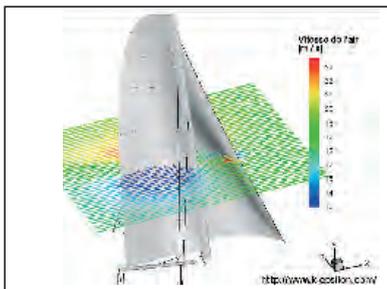
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### SECOND NOTICE



Organised again by the Cité de la Voile Eric Tabarly (CVET), the Naval Academy Research Institute (IRENav) and the Royal Institution of Naval Architects (RINA), INNOV'SAIL 2010 will build on the success of the 2008 conference to provide an international forum for the presentation and discussion of the latest scientific and technologic research and its application in the complex field of high performance yachts and competitive sailing. INNOV'SAIL 2010 will provide an opportunity for scientists, architects, engineers, sailors, sail makers and others involved in this fascinating and challenging field to come together to share skills and knowledge.



The conference will be held in the auditorium of the Cité de la Voile Eric Tabarly in Lorient/Brittany, which opened in the beginning of 2008 and is dedicated to the adventure which is modern sailing, of which Eric Tabarly is an emblem. The Cité is situated in the heart of the old submarine base which, after its closure in 1997, is being converted into a big nautical project centre called 'Le Nautic de Keroman'. Already, an important builder of multihull sailboats, a manufacturer of carbon masts, the logistical centre of the biggest European boat fittings supplier, and nine offshore racing teams are installed here, next to the Cité de la Voile Eric Tabarly. The language for the papers and presentation at the conference is English.



Topics will include all aspects of yacht design including the following amongst others:

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been requested to be considered, such as (worldwide) or (owner’s trading route).

VeriSTAR Hull Life Cycle is a new tool to allow owners, surveyors, authorities, salvage masters and P&I Clubs a full “Google-Earth” view of any ship or offshore unit structure, complete with all hull thickness measurements and coating condition descriptions. It will revolutionise the way condition assessment inspections are done, and how casualties are assessed.

“The Arctic is our next big challenge,” said Mr Baumans. “We need to be able to directly calculate the ice loads on structures, and their effects, so that we can ensure a new generation of tankers are able to operate safely, and maintain operations for a high percentage of the time. That need led BV to work with the State Maritime University of St Petersburg and Aker Arctic on an extensive project to define ice loads and develop a tool to apply them to assessing specific designs. We have developed IceSTAR, an industrial tool which

Rules / Notation	Structural Details to be Checked	Fatigue Methodology
CSR Oil Tanker	1. Longitudinal ordinary stiffener end connections 2. Scallops in way of block joints at deck	Simplified analysis
CSR Oil Tanker	1. Lower hopper knuckle	FEM approach
Fatigue PLUS	1. Connection of lower stools with plane bulkheads 2. Connection of lower stools with corrugated bulkheads 3. Connection of inner bottom with hopper tank sloping plates 4. Connection of hopper tank sloping plates with inner sides 5. Transverse bulkhead stringer heel and toe 6. Cross ties	FEM approach

Details to be checked for both bulk carrier and tankers.

will map ice loads and apply them to a FEM model of the hull structure, and then be able to adjust those loads according to the ship’s speed, or to the ice drift speed for offshore units. Currently it is an internal tool for our

engineers, who are working on very advanced Front end engineering design (FEED) studies on Arctic units and ships. We plan to develop it further and roll it out as a tool for industry use, probably sometime next year.” **NA**

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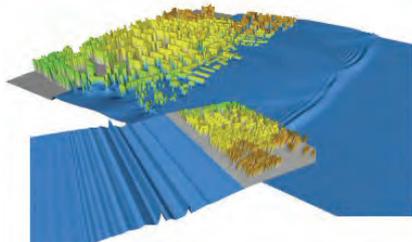
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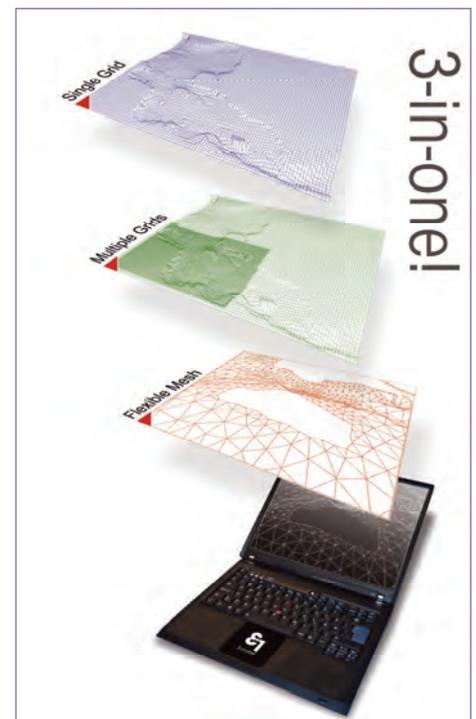
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## Balancing act

Solutions to air pollution emitted from ships is a question of balance, it is also the most significant issue on the global agenda, according to the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) in Japan.

Preventing global warming is one of the world's hottest issues says Takahiro Kijima, deputy director International Affairs Office, Shipbuilding and State Machinery Division, Maritime Bureau, MLIT.

Greenhouse gas (GHG) emissions from the international maritime sector accounts for about 3% of the world's total emissions and pollution volumes are forecast to keep increasing in the future due to the growth of world economy.

Mr Kijima believes that there is a social imperative for the maritime industry to limit its GHG emissions and to make its contribution in the battle against global warming.

Furthermore, he says that the issue is not limited to GHG alone: "As the role of international maritime transport increases with progressing globalisation of the world economy, the potential environmental impact from the maritime sector will be magnified. Needless to say, shipping could transport a huge amount of cargo at a low price, and safely too, in an environmentally friendly manner. Hence we always need to seek a balanced approach to realise both maximising such excellent characteristics and minimising the environmental impact from the maritime sector."

Japan is a world leader in the maritime industry, including the shipbuilding industry, which has developed cutting edge environmental technologies. By using this knowledge, Japan can contribute significantly to the reduction of pollution from ships. Mr Kijima said the ministry has provided-financial support for research and development projects on GHG reduction technologies.

In our study, CO<sub>2</sub> emissions from international maritime transport will be more than five times as much as the current emissions if no mitigating measures are applied, the so-called business as usual (BAU) scenario. Emissions could be halved from the BAU case if various measures,



A balance between social needs, the requirements of the maritime sector and the need to cut emissions must be maintained said MLIT.

including the application of new technology and speed reductions etc. However, even if mitigation is put into place emissions will be three times higher than current levels.

"The biggest increase in emissions is derived from the economic growth of developing countries, this means that halving GHG emissions by 2050 from their 2005 levels has little reality in economic, technological and also political terms," concluded Mr Kijima.

As a result Japan sees the Energy Efficiency Design Index (EEDI), Energy Efficiency Operating Index (EEOI) and Ship Energy Efficiency Management Plan (SEEMP) as important tools to reduce GHG emissions.

"EEDI has significant importance as a standardised yardstick to measure the energy efficiency of the ships. EEDI will have a great effect on the energy efficiency of new ships."

Japan hopes to ratify the amendment to MARPOL Annex VI as soon as possible, said Mr Kijima and there is support for a market-based mechanism which Japan sees as important in order to offer economic incentives in an effort to reduce emissions.

Underlining that importance Japan's National Maritime Research Institute (NMRI) has said it is conducting research on a Ship Performance Index (SPI). The SPI will look at a number of ship types and their

operations in a variety of actual sea states, including wind and wave conditions.

The aim of the project is to boost development of ships with less fuel consumption, said the NMRI. The outcome of the project will comprise a voluntary ship design index designed in such a way that each vessel is, at the design stage, evaluated for its performance in a number of sea states and guidelines will developed for certification purposes.

The index, together with the guidelines, has already been put in use by a classification society by certifying that the procedure provided in the guidelines in calculating the index has been appropriately followed by applicants. At the moment, the index provides a ship speed reduction at designated sea conditions (e.g. BF 6), cargo loading condition (Design Full Load) and engine load (NOR).

Effectively, the NMRI believes that the future increased demand for ships will mean the unrealistic to expect a reduction in seaborne must be EEOI and SEEMP effective in reducing emissions from existing ships and that new ships should be designed so that they significantly reduce GHG emissions.

MLIT admits, however, that shipbuilding has been impacted by the continuing economic crisis. That means that the "world shipbuilding market is facing serious supply and demand gap. Therefore, we express the concern that the existing demand/supply imbalance will be made worse and prices will inevitably fall from their present level," said Mr Kijima.

Nobody knows when there will be a significant upturn in orders for new vessels. "The world's shipbuilding industry may recover with the turning up of the world shipping market, for example, through the economic growth of China. At that time, we hope that the Japanese shipbuilding industry will also recover." But a balance between these forces must be maintained. **NA**

# Marine Diesel Engines Complying with January 2011 Tier 2 NOx Standards

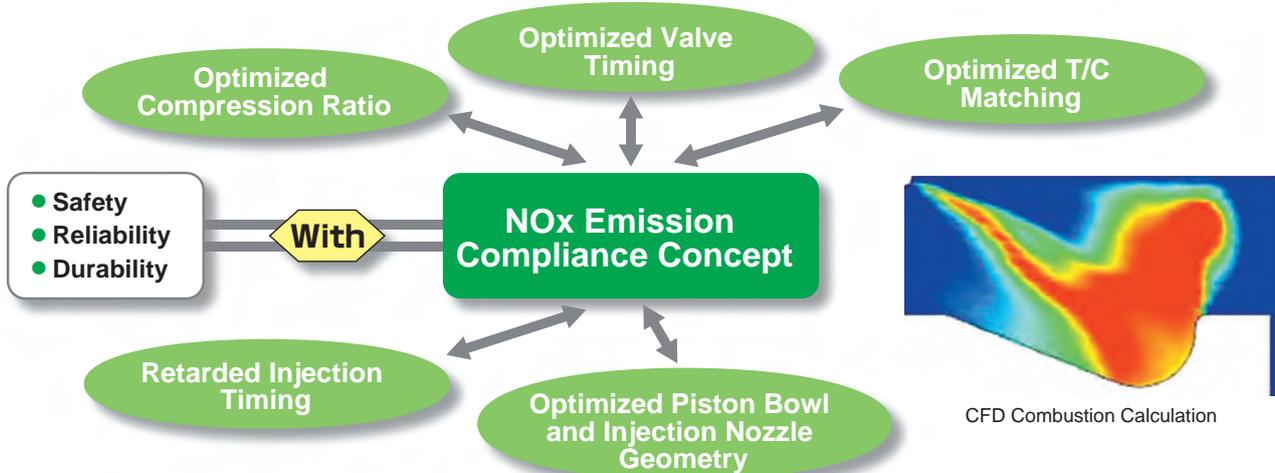


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## ClassNK ready to lead IACS

Meeting the needs of the maritime community is the work of a diplomat combined with the knowledge of an engineer and foresight of a naval architect. Norubu Ueda, ClassNK chairman and president, will take the reins at the International Association of Classification Societies (IACS) in July ready to meet that challenge.

As the volcanic ash from Iceland settles over Europe and the eruptions in the capital markets shake the global economy at least one voice, emanating from Japan, is calming the fears for the future of the maritime industry as Norubu Ueda takes control at IACS.

The chairmanship of IACS, with its influence at International Maritime Organization (IMO) and significant role as the advisor to yards, designers and owners is a unique and particularly important position. Mr Ueda is already looking forward to making use of "IACS' technical knowledge to positively contribute to the maritime industry, and provide technical advice and information to better address and solve issues being tackled by the IMO."

He went on to say: "I want to work more closely with the IMO, International Labour Organisation and the entire maritime industry to ensure that the ballast water management convention, the ship recycling convention, and the Marine Labour Convention are smoothly implemented."

In addition harmonising the two sets of Common Structural Rules (CSR), for tankers and bulk carriers is a pressing development. Tanker and bulk carrier CSR's were developed independently of each other, and before they were even released the industry was calling for them to be harmonised. Even as IACS released the two CSR sets it began working on harmonised rules.

"I am pleased to be able to announce that the development of these new Harmonised Common Structural Rules (HSR) is on schedule. Rather than two independent sets of rules, the new HSR will consist of three booklets, a common set of rules applicable to both ship types, and respective booklets for the rules applicable solely to tankers and bulk carriers. Perhaps more importantly, we are using this harmonisation process



Norubu Ueda, ClassNK chairman and president, will be IACS chairman for a year from 1 July 2010.

to ensure that the new HSR will be fully compliant with the IMO's Goal Based Standards and ensuring that the rules are not only practical for actual use by the maritime industry, but also ensuring a higher level of safety for tankers and bulk carriers."

Mr Ueda will bring with him a commitment to represent the interests of the maritime industry globally through all of IACS' activities and to "Faithfully implement the European Commission (EC) commitments", following the Competition Directorate's investigation that concluded last year.

Expansion of IACS was one outcome of the EC's intense scrutiny and a number of

new applications have been submitted, though IACS members are highly secretive on this issue and will not reveal how many applications and from whom they have come from. Although Mr Ueda did say: "I think it is a bit early to say whether IACS will expand significantly in the future,"

He added, however, IACS has made a commitment to allow non-members to participate in IACS working groups. "I think this is a very positive change," said Mr Ueda. "While IACS is committed to leading from the front on technical issues, IACS does not have a monopoly on knowledge, nor do we intend to," he explained.

Additionally, Mr Ueda would like to



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see IACS develop technical resolutions such as the Common Structural Rules (CSR), Unified Requirements and Unified Interpretations, and provide technical leadership.

“By enhancing our technical resolutions, I mean constantly working to ensure that the IACS CSR and the rules of each member society are constantly improved. This will ensure that these technical resolutions are not only compliant with the IMO’s regulations, such as Goal Based Standards (GBS), but are also uniform in application, and properly adapted to new innovations and technologies.”

Furthermore, IACS presented the new Quality Management System Certification Scheme (QSCS) to the IMO and has uploaded information on the new system on the IACS website. As the new system is independent of IACS, it answers all concerns about transparency and conflicts of interest, and also makes the system available for use by non-IACS societies.

“For IACS members, the transition to the new system will be completed this year, but I think that non-IACS societies, and in turn their clients, will benefit the most from the new system, as it will ensure an even higher level of quality and safety,” said Mr Ueda.

In Mr Ueda’s opinion IACS needs to show true leadership on technical matters. “This means that IACS has to be supportive of new technologies, and utilise them for both improving our rules and achieving more concrete goals like improved safety and protection of the environment. It also means that we should use our research capabilities and the incredible amount of information at our disposal (including damage statistics and casualty investigations) to support the continued development of the maritime industry”.

That role includes the helping to develop technology that will make shipping a cleaner industry, restricting emissions and making sure ships do not pollute the seas.

“Class societies are working independently to not only develop new rules to meet treaty requirements, but also developing new guidelines and standards not covered by treaties,” said Mr Ueda.

In addition class societies are working in partnership with flag states, as recognised organisations, to smooth the implementation of NOx and SOx rules and

greenhouse gas (GHG) reduction measures, as well as the ballast water management and ship recycling conventions.

Meanwhile, Mr Ueda firmly believes that the IMO’s Energy Efficiency Design Index (EEDI) and Energy Efficiency Operating Index (EEOI) will be effective in restricting

“The beauty of EEDI and EEOI is they do not prescribe a single solution to GHG reduction. Under these standards it is possible to reduce GHG using a number of different methods”

emissions from shipping.

“The fact is that shipping has a huge role to play, not only in the international economy, but as a way of reducing CO<sub>2</sub> volumes. As shipping volumes are going to grow in the future, the best approach to GHG reduction is to focus on reducing GHG emissions on a tonne-mile base, and not an overall volume reduction like that used in the Kyoto Protocol. In short, the best way to reduce emissions will be improving ship efficiency. The IMO’s implementation of the EEDI and EEOI for newbuildings and ships in service is designed to do just that, and I believe this will be both a practical and effective means of maritime GHG reduction.”

He went on to point out that “The beauty of EEDI and EEOI is they do not prescribe a single solution to GHG reduction. Under these standards it is possible to reduce GHG using a number of different methods, including improved engines, more efficient hull designs, better coatings, use of battery systems, and waste heat recycling technologies. EEDI and EEOI are really enabling groundbreaking

technical innovations to be made on a wide variety of fronts.”

New regulations are necessary to ensure the continued protection of life and property at sea and the marine environment, he continued, however, we need to place a premium on voluntary efforts to reduce GHG emissions, and also make sure that new regulations do not prohibitively punish the shipping industry, which is an essential element of the world economy.

Mr Ueda concluded: “From the perspective of the global shipping industry, global regulations are preferable to regional or local regulations. No matter what kind of regulations are eventually enacted, we feel it is important that they are primarily implemented by the IMO, so that they are global in scope.

In implementing EEDI and EEOI the industry is demonstrating its commitment to play its part in combating global warming. Class must support the industry in achieving these goals so that a measure of control can be maintained by the industry over what kind of regulations are enacted and how they are implemented.

“From ship and machinery design, to coatings, to better routing and operational practices, the demand for greener, more efficient ships is being felt all across the industry. Shipyards are not only designing more efficient ships, but also developing more environmentally friendly systems. Machinery makers are designing more efficient engines, and waste heat recycling systems for existing propulsion systems. At the same time owners are turning towards new energy sources like solar, while also looking to streamline their operations. We support these efforts, and are constantly working with our clients to ensure that these new technologies can be implemented safely and effectively.”

He went on to say: “I strongly feel that class should support improvements in every part of the industry, from improved ship design, to better operational and management practices. We have the research capabilities and the real world experience to make a new generation of safer, greener ships a reality and we need to ensure that IACS is a leader in this process,” said Mr Ueda. **NA**



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# Reheat system improves fuel efficiency

Kawasaki Heavy Industry's (KHI) Advanced Reheat System will offer energy savings of around 15%, said the company.

**N**ext year a 177,000m<sup>3</sup> LNG carrier for Tokyo LNG Tanker Co., Ltd., wholly owned by Tokyo Gas Co., Ltd. and Nippon Yusen Kabushiki Kaisha (NYK Line) will be delivered from Kawasaki Shipbuilding's Sakaide Shipyard.

The vessel will be the first fitted with Kawasaki's innovative reheat turbine and boiler that the company believes can make significant fuel savings.

The ship, featuring Moss spherical tanks has inherited the features of Kawasaki's 147,000m<sup>3</sup> LNG carrier, including high propulsive performance and a conventional hull size.

For the first time, the ship will be equipped with another new Kawasaki development: an advanced reheat steam turbine plant in the main engine. Dubbed the Kawasaki URA Plant, the turbine plant employs a reheating cycle to return the steam used in the high pressure turbine to the boiler, where it is reheated and sent into the intermediate pressure turbine. As a result a high thermal efficiency is achieved and fuel consumption improves by 15% compared to a conventional steam turbine plant. In addition the company said that the reheat system has improved reliability and maintenance costs.

Owners had complained that the boil off gas and heavy fuel oil mixture was increasing maintenance costs to unacceptably high levels and some owners wanted to use a turbine system onboard again. Therefore, KHI started to develop a reheat system similar to one used 30 years ago, but with modern materials and design the system operates at a significantly higher level. **NA**

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**Advanced REHEAT Steam Turbine Plant**

Schematic diagram of REHEAT cycle

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Basic Concept & Advantages

- (1) High Efficiency**
  - Reheat steam cycle
  - Improvement of steam condition  
10~12MPa x 560~565°C (← 5.9MPa x 515~525°C)
  - Highly efficient recovery of waste gas energy  
Gas air Heater or Steam air heater
- (2) High Reliability**
  - Same level as conventional steam turbine plant
  - Proven reheat plant design & production records for 7 VLCCs and 1 ULCC
  - Many production records of Marine steam turbine & boiler
- (3) Simple Operation**
  - **No additional operator required** compared with conventional steam turbine plant
  - Simple heat cycle
  - Main turbine driven generator (as option)
  - Integrated automation system (IAS)

Conventional steam turbine plant (non-reheat steam cycle) does not have Reheater(4→5) and Intermediate Pressure Turbine(5→6)

Plan of Kawasaki's reheat system.

### Point of differences Conventional vs. Reheat

	Conventional Plant	Reheat Plant
Main Turbine	MCR:27,000~30,000kW x 76~90rpm NCR:90%~100%	MCR:27,000~30,000kW x 76~90rpm NCR:90%~100%
Main Boiler	2x68,000kg/H with ECO or GAH 5.9MPaG x 515~525°C	2x54,000kg/H with ECO or GAH 10~12MPaG x 560~565°C

A comparison of a conventional and reheat system.



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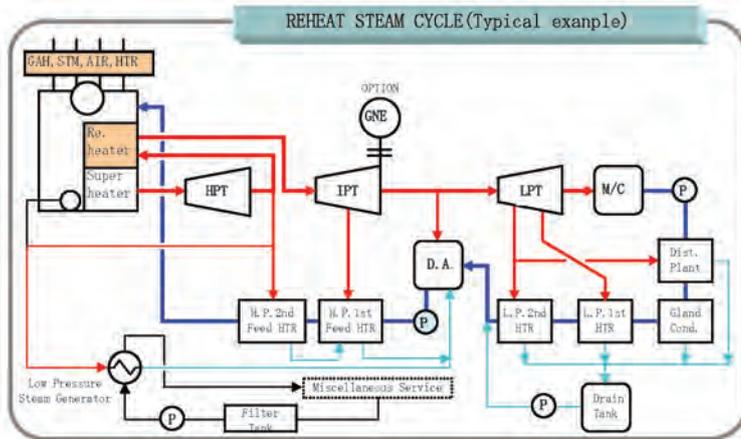
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	Reheat Plant
Main Steam	10~12MPaGx560~565°C
Heat Cycle	Reheat/Regenerative with 5-Stage Feed Heating
Main Turbine	HP/IP/LP 5-Stage Bleed
Main Boiler	2 x Main with GAH or STM.AIR.HTR

### Conventional Marine Steam Turbine

- ★ High reliability by long experience
  - Century history since 1907
- ★ No.1 share in LNG carrier
  - over 700 units as marine turbine
  - over 100 units for LNG carrier

### Conventional Marine Boiler

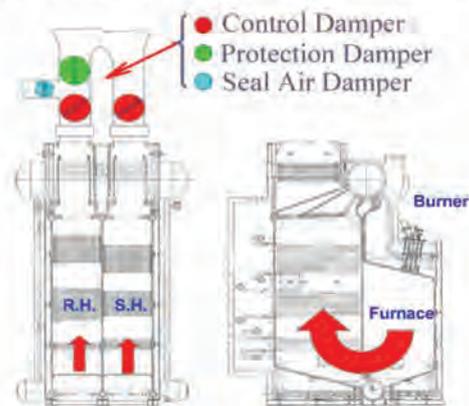
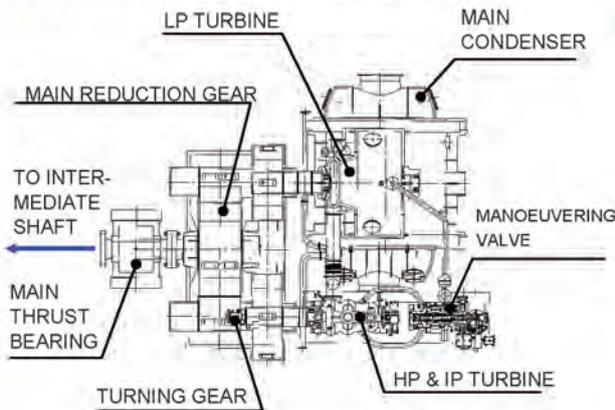
- ★ High reliability by long experience
  - over 50 years since 1950's
- ★ Many delivery records
  - over 500 units as marine boiler
  - over 100 units for 50 LNG carrier

### Reheat Main Turbine - URA Type -

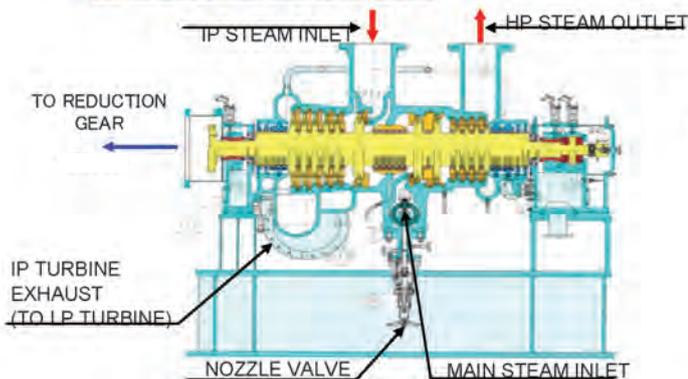
- Double reduction geared, two-cylinder cross compound impulse reheat steam turbine
- ★ HP & IP turbine in one common casing
  - ★ Tandem articulated type reduction gear

### Reheat Main Boiler - UTR-II Type -

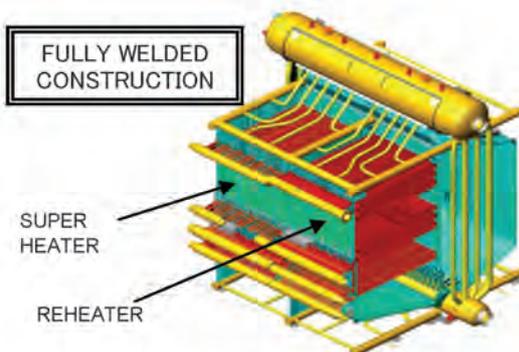
- Two-drums, water tube, marine reheat boiler with superheater, reheater and gas or stm. air heater
- ★ Two convection gas passages (SH & RH pass)
  - ★ Damper control & protection system to reheater



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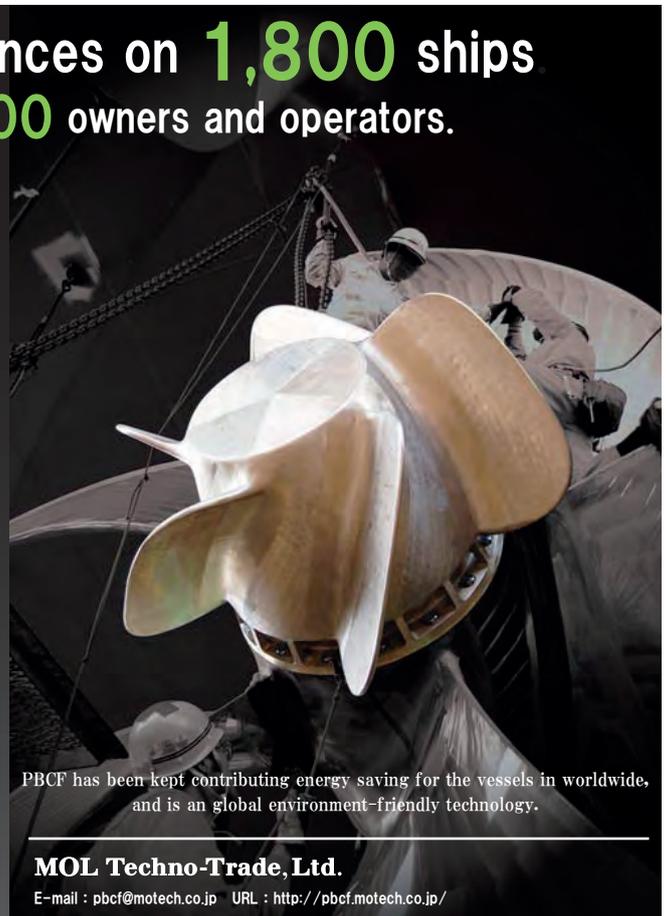
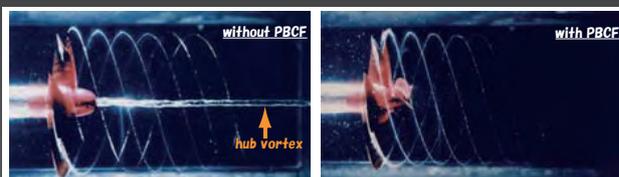
PBCF is the originated device to be focused in the recovery of energy from the flow out energy in propeller hub vortex.

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# Engine designers innovate to regulate

Japanese marine engine manufacturers are looking at new technologies that will enable the shipping industry to meet its obligations to control greenhouse gas emissions. Toshiyuki Nakashima director at Diesel United describes his company's position.

pondering the question of whether the maritime industry can meet Tier III NOx emission targets and meet the required SOx levels by the dates designated by the International Maritime Organization (IMO) Diesel United director Toshiyuki Nakashima is convinced the industry will find the solutions.

"We believe that it is possible [to meet Tier III targets]," he said, but he was more sceptical about the regulations governing SOx emissions: "More energy is consumed manufacturing the low sulphur fuel oil, therefore, it should be necessary to evaluate whether this restriction is realistic in total", he argued.

Greenhouse gas targets can all be met, though, if a ship is considered in its entirety with speed limits cutting CO<sub>2</sub> emissions. One of the major difficulties facing the industry at the moment is that scrubbers and other technology that will filter sulphur, NOx and particulates remain large when compared to the limited space available in a vessel's engine compartment. "As an engine builder, we are studying ways to miniaturise the additional [engine] attachments as much as possible," explained Mr Nakashima.

In addition the company is developing a maintenance and operating system that will support the engine throughout its lifecycle, said Mr Nakashima without elaborating on

### Key facts

The International Maritime Organization (IMO) approved amendments to the MARPOL Annex VI limiting nitrogen oxide (NOx) and sulphur oxides (SOx) emissions from ships in April 2008.

1. NOx Tier I applies to diesel engines installed on a ship built after 1 January 2000 and prior to 1 January 2011 and represents the existing 17g/kWh standard in MARPOL Annex VI.
2. Tier II, NOx emission levels of 14.4g/kWh apply to an engine installed on a ship built after 1 January 2011.
3. Tier III, 3.4g/kWh applies to diesel engines installed after 1 January 2016 when the ship is operating in a designated ECA, outside the ECA, Tier II limits apply.

Sulphur emissions from ships will initially be capped at 3.50%, from 4.50%, from 1 January 2012; and progressively to 0.50 %, from 1 January 2020, subject to a feasibility review to be completed no later than 2018. Further limits applicable in Sulphur Emission Control Areas (SECAs) will reduce emissions to 1.00% from 1 March 2010, from the current 1.50 %; and to 0.10 % by 1 January 2015.

the new development. He did say, however, that price competition had become very keen as a result of the recession with the decrease in orders also encouraging innovation in order to compete. *NA*

Diesel United director Toshiyuki Nakashima believes we need to re-evaluate sulphur restrictions because "More energy is consumed manufacturing the low sulphur fuel oil".



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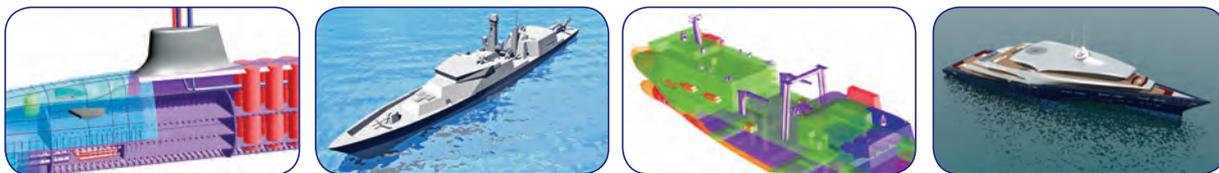
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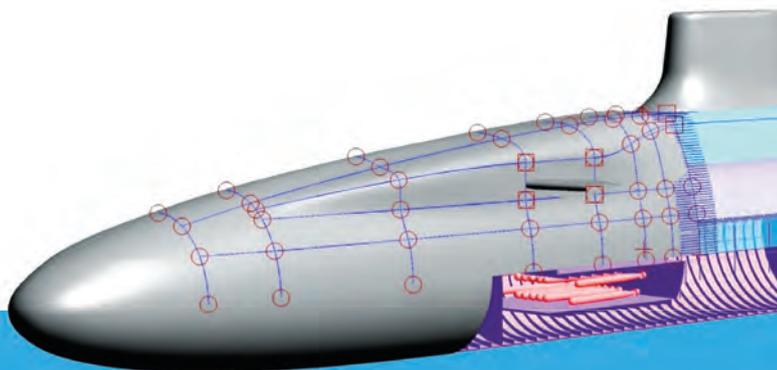
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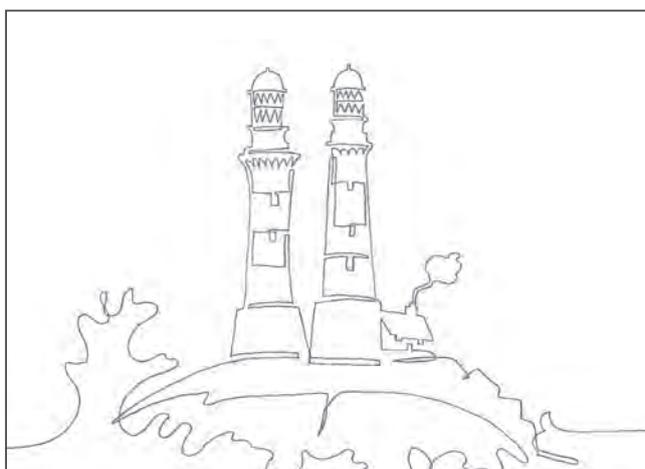
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# Mascoat insulates the market

American-based coatings company Mascoat is now working on the third generation of its Delta T Marine (DTM) Thermal Insulating Coating (TIC) and highlights the benefits of spray-on insulation.

It can be seen that in vessels that are 10-years old that some of the systems onboard are almost obsolete by today's standards. One problem is that some materials that go into shipbuilding are seen to be the only option during the construction phase, and those are the same materials used 10, 20, even 30 years ago.

One of the most crucial systems on a vessel is the insulation, which is sometimes overlooked in regards to modern construction materials and practices. Although it is usually not seen, insulation plays a vital role in areas such as energy efficiency, comfortable living space, fire concerns, and noise levels. Insulation is a necessary component for any ship being built today. The process usually involves pin-and-blanket for thermal insulation and tiles for sound damping. These types of insulation are inherently bulky, heavy and take up a great amount of valuable man-hours to install. They also create other hazards over the long term such as corrosion under insulation and odour issues.

As the vessels have now become more refined this has allowed the designers ways to improve the quality of the ships, while still keeping weight down and speed up. It has led to new types of insulation for the marine market, namely Thermal Insulating Coatings.

Thermal Insulating Coatings came on the market a little over 10 years ago. TIC's are spray-applied coatings that go on similar to paint, but offer comparable insulation values of the classic types of insulation. The main purpose of these coatings is to provide a barrier to heat/cold and to stop or severely reduce condensation development.

TIC's are not new with many manufacturers in the past taking their industrial insulating coatings into the marine sector, but the trend failed to take hold. The problem with previous insulation coatings in the marine area is that maritime



Mascoat caters for small to large vessels.



Mascoat gets onboard in the yacht market with Palmer Johnson.

requirements are so stringent; many of the new coatings could not meet the strict guidelines that every part of boat construction has to pass.

Mascoat said that it really understands maritime needs and developed products accordingly. Mascoat sought to change the perspective of insulating coatings for the marine environment by submitting their product to the proper agencies for testing and to show shipyards and engineers the capabilities of TIC's. This resulted with Mascoat's lines of insulating coatings claims

to be the only one on the market with all major marine approvals.

True TIC's apply the common physics principles of reflectivity, conduction, emissivity and absorptance. Microscopic particles within the coating reflect upwards of 85% of the radiant heat gain back into the environment from which it originated. Each ceramic particle encapsulates air within the particle, thereby retarding the heat transfer component. The heat transfer through the air gap offers outstanding insulation abilities even in a thin film coating. In

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addition, the coating's low emissivity allows for low heat flux or the amount of power of heat transferred. The combination of these factors allows for total thermal dissipation across the surface.

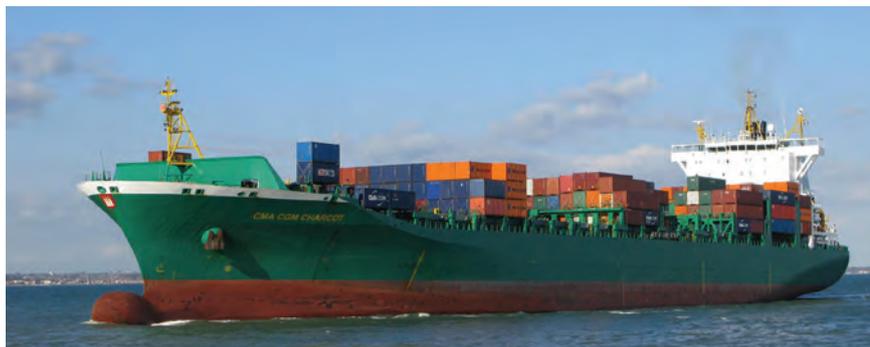
TIC's are mostly sprayed-applied up to thickness of 2.0mm in 0.5mm successive coats and due to this save room in shipboard construction. Compared with conventional thermal insulation, which can be 50-75mm thick. TIC's take up far less room, opening up new options for shipbuilders and designers. Also, an inherent trait to TIC's, is that they are extremely lightweight.

Mascoat's own TIC, Delta T Marine, weighs only 0.181kg per square metre. Compared with conventional insulation, which can weigh up to 4.88kg per square metre fully assembled, the weight savings are obvious.

George More, Chairman, Mascoat said: "Our product produces the best performance to thickness ratio as far as TIC's are concerned. Our evolvement of the DTM insulation coating is constantly improving performance along with keeping weight down. Our Chemistry is now on its third generation of which we are increasing the film build per coat so that the customer can have the fastest application time, and producing the best results."

Another component of the conventional insulation problem has to do with installation. Pin-and-blanket insulation, by nature, is tough to install and takes quite a long time. This method equates to around 1m<sup>2</sup> per one-man hour. This means that it would take at least two weeks to insulate a 100m ship with a three-man crew. By applying the coating in this manner, TIC's dramatically reduce installation times, say Mascoat. A three-man crew can insulate the same 100m ship in as little as 2-3 days, as they can spray 46.45m<sup>2</sup> of insulation per hour. That is over 16 times faster than installing conventional insulation. The downstream effects of this are important, in that the ship is not tied up for the 7-10 more days of insulation installation.

Mr More comments on the current regulations for coatings: "Currently regulations are under the International Maritime Organization (IMO) governing rules and at the present time, thermal insulation coatings are under the same thermal insulation/interior finish type regulations. TIC's are currently not



CMA CGM Charcot has had Delta T Marine applied to its wheelhouse.

applicable to structural fire protection as the requirements for this are very stringent. All of our applications with the DTM insulation coating are mainly to reduce/eliminate condensation development, as well as reducing radiant heat gain..."

He continues: "...Mascoat DTM is the only insulation coating on the market that has gone through all of the rigorous testing agencies and governing bodies and has obtained all approvals to IMO regulations. We believe that our diligence with obtaining all of the certification shows that we are serious about this industry and believe that by obtaining all of the approvals it shows the potential customer that we are the strongest player and the best coating."

Mascoat has also pointed out that conventional insulation has other drawbacks, such as condensation, which has forced the shipbuilding industry to try to come up with novel solutions. The condensation builds up between the substrate and the insulation, making an environment ripe for corrosion under insulation. As this moisture develops, it is wicked into the insulation, thereby not only reducing the overall thermal performance, but also creating a perfect environment for biological growth.

Palmer Johnson Yachts of Sturgeon Bay, Wisconsin, USA has adopted Mascoat's Delta~dB, a Ceramic Insulated Coating (CIC's) into the construction of its yachts. Palmer Johnson said that one area they saw that could use improvement to their already high standards was the thermal and sound insulation. The management at Palmer Johnson said that if the technology was found to be viable, it would save time and money, as well as escalate the vessel's

construction time frame.

In response, Palmer Johnson's engineer staff performed its own internal study of the insulating coatings vs. conventional methods over a period of six months. Palmer Johnson selected Mascoat to test, as they found that the solution met its technical requirements and that Mascoat had all major approvals, along with outstanding customer service onsite at Sturgeon Bay, said Mascoat. After successful tests, Mascoat's line of insulating coatings is now applied to every new construction out of the yard.

Palmer Johnson Paint Supervisor Sam Jones has said that he enjoys the clear benefits of the coatings; including no danger to the environment and that the coatings are not hazardous to the personnel applying them to the vessels. Bruce Johnson, production manger, comments: "application of the coatings drastically reduces installation time, allowing us to deliver vessels in a shorter time frame." All of the yachts using the new insulation systems have performed as well or better than predicted.

Palmer Johnson has added the new sound damping system also offered by Mascoat to improve their internal sound environment onboard vessels. This study confirmed all of Mascoat's insulation and damping claims, and thus Palmer Johnson Yachts started using Delta T Marine Thermal Insulating Coating and Delta~dB Sound Damping Coating in its newest yacht constructions.

Mascoat's Delta T Marine coating has approvals from USCG, ABS, DNV, Lloyds Register, NK, RINA, Transport Canada and has been certified/approved with NAVSEA. **NA**



# Gauging the depth

With regulations on the recent performance standards for protective coatings (PSPC) regulations coming into effect in 2009 for new ships, inspectors rely on the equipment in the field to be accurate and easy to handle.

**D**evelopments in the area of coating gauges are set to give coating inspectors more freedom of movement and better electronic data storage facilities, with hands free systems also starting to come on to the market.

Cygnus has recently introduced its latest product the Cygnus 3 Data Logger multiple echo thickness gauge that has been developed to accommodate the need for a simple method of logging thickness measurements through coatings.

The Cygnus 3 Data Logger has been developed with a flexible data logging facility. The gauge will use three data logging modes: Simple Linear Data Logging with a capacity of up to 5000 points each record; Grid Based Data Logging using simple XY grids for up to 5000 points; Template Based Data Logging featuring definable measurement points, minimum and reference thickness values and up to 40 configurable user fields to collect additional information.

The data logger also has the facility to add additional radial measurements around any chosen point; alphanumeric data entry via phone style keys; data stored on internal SD memory card for

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data security; a bright multicolour LED giving visual feedback when logging data; USB connection to computer without driver installation. The autolog function enables stable measurements to be recorded automatically, even when in use.

The Cygnus 3 Data Logger comes in an, IP65 rated aluminium enclosure. The kit includes a Microsoft Excel AddIn. In addition, Data Logger Manager Software is supplied for generating reports and transferring data between the gauge and computer.

Adding to Cygnus' developments Cygnus 4 General Purpose is undergoing a series of field testing and rigorous examinations before its launch in the third quarter. This gauge is a total redesign incorporating customer feedback and suggestions on desired features, said Cygnus.

The features of the updated Cygnus 4 will include: An aluminium enclosure with rubber side grips. LCD Graphic Display with automatic white backlight. Simple gauge and menu operation with three tactile keys. Minimum thickness alert function. 'Deep-Coat' mode for coatings up to 20mm thick. Powered by two AA batteries. The Cynus 4 comes in a size 85mm x 115mm x 25mm, weighs around 275g and is compliant with CE, RoHS, BS EN 15317:2007.

Further, paint manufacturers specify certain application parameters in their data sheets to ensure the optimum service life for the coating. Painting when the appropriate climatic conditions are not achieved can be detrimental to the coating and cause premature failure.

Elcometer Limited has introduced two new digital hygrometers to their product range; the Elcometer 308 and 309 Hygrometer, a quick, simple and accurate gauge for relative humidity and surface temperature measurement.

The Elcometer 309 Delta has a simple pass/fail gauge for determining the difference between the dewpoint temperature and the surface temperature (Delta T) and the relative humidity.

Cygnus makes data entry easier with its Cygnus 3 Data Logger.



The Elcometer 308 has been specifically designed for use in very hot climates where the surface temperature of the substrate can often exceed the coating manufacturer's recommended limits.

The Elcometer 309 has been designed to be the entry-level climatic gauge. Internal limits in the gauge warn the User when either the Delta T ( $\Delta T$ ) and/or the Relative Humidity (%RH) are exceeded with an on-screen indication and red flashing LED's. **NA**



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## Brunel cuts emissions and costs

While the shipping industry is looking for new ways to extend dry-docking intervals, coating manufacturer Brunel believes that it has the solution with its Enviromarine coating.

**B**runel's Enviromarine will offer ship owners better fuel efficiency and lower emissions, with a coating system that allows the ship to move easier in the water and provides a protective surface that marine organisms cannot attach to.

The coating has also been considered suitable for a 10-year docking intervals, say Brunel. It is introducing a pilot scheme that will also show that the 7.5 year docking period can be extended by Enviromarine to 10 years.

Brunel has highlighted that one of the major points of its Enviromarine coating is that it has zero volatile organic compounds (VOC's) in it. By not having these compounds in the coating, it is both safer for the environment and also for the workers applying the coating.

Recently, Brunel has been contracted to coat a passenger vessel and its sister ship, the vessel has shown that with coating it has made fuel savings of 9-10%, said Richard Hussy, PR, Brunel Marine Coatings. He also adds that: "Ship owners prefer to see savings in fuel by using less, than the smoke that is coming out of it."



Spraying of the underside of a vessel with Brunel's Enviromarine.

It has been noted that the effect of microtexture has increased the performance of ships hull, although manufacturers' graphs only start at 100microns, Enviromarine has a microtexture of less than 20microns. Hull performance is improved when it is coated with an ultra-smooth, non-absorbant, impermeable, safe system. Also, lower emissions come as the result of burning less fuel.

Brunel says that it sees reduced fuel usage as a matter of increasing importance due to the global instability of fuel markets, but also

because of legislation that will require ships to burn cleaner and more expensive fuel.

Enviromarine is straightforward and practical to use and can be applied with conventional spray equipment, in two coats. Because there are no solvents either within or added to the system, it cures naturally to a smooth finish, regardless of humidity and with out the need for further conditioning. The coating is also inert and will not contaminate surrounding vessels or steel work. The specific gravity of 1.42 means that overspray is not easily airborne. **NA**

### Hempel extends range with Hempasil Nexus X-Seal

In its latest developments Hempel has launched its Hempasil Nexus X-Seal. The latest coating from the Danish company has been aimed at giving the ship owner a faster and more cost effective solution for upgrading old antifouling systems, without the full blasting of the hull and achieving fuel savings the same as Hempasil Nexus – X3.

For ships that already use existing antifouling coating, converting to another form of antifouling coating can be costly and time consuming and due to the non-stick properties of Silicone often means that a hull will need to be blasted before another coat is applied.

Nexus X-Seal makes it possible to apply fouling release on top of an older antifouling coat, without full blasting the whole area. With one coat applied to seal the old antifouling system and to make a strong link to the Hempasil X3 topcoat.

Marie Bakholt Anderson, Group Product Manager, Hempel, explains: "We created this product specifically for customers who want to upgrade from conventional antifouling release – and it's a revolution compared to current industry standards. Ship owners can now benefit from a system that uses only one tie-coat to seal the aged antifouling and tie the system to the fouling release topcoat, instead of fully blasting the hull or using the two-layer tie-coat systems that have traditionally been used for these kind of conversions."

Hempel has said that its Nexus X-Seal can knock approximately two days off a vessels drydocking time, with an estimated cost saving for a vessel owner of up to US\$400,000.

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## Jotun applies nanotechnology

Nanotechnology and ships are not two words that you may expect to see in the same sentence. But, as Jotun's SeaLion Repulse antifouling coating goes to show there's more to a tin of antifouling than meets the eye.

Jotun has announced that it has recently developed an antifouling coating that incorporates nanotechnology. The SeaLion Repulse system is a development of the Jotun's coatings range, which has the science of nano technology to create a coating that releases and repels fouling.

The nanoscale coating's surface acts as a repellent layer that is created on the silicone surface. The nano structures extend into the water creating a layer that acts as nanoscaled-springs. When the spring-like structures are compressed, a counter force is developed. The nanoscale-springs provide release and repellent properties to prolong the period of the build up of slime and other fouling.

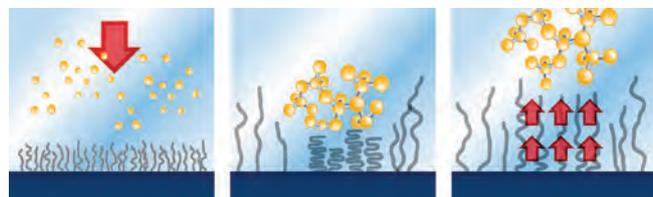
The concept of nanotechnology commonly refers to structures up to 100nanometers (one nanometer is one billionth of a meter). Organisms attach themselves to surfaces by exerting biological glues, which are molecules that can form chemical bonds to the surface. These are macromolecules with reactive chemical entities. When these are repelled by the nanoscaled springs, fouling is then reduced, say Jotun.

In comparisons Jotun claims that the coating performs as good as, or better than other coatings on the market and can meet the 7.5-year dry-docking period that ship owners are expecting to see. However, Dr Morten Eikenes, head of marketing, Jotun has said: "We must understand that the limits of the technology."

A coating system can only work as well as the environment that it works in and all antifouling coatings will eventually foul up, highlights Dr Eikenes. It is just a matter of how long that it takes. "The better a hull is prepared the better the product can be applied," he adds.

With this latest development Jotun is aiming at the niche market of cruise liners and deep-sea vessels. **NA**

The repellent properties of nanotechnology.



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# Priming the Market

International Paint has launched its latest Universal Primer range that will address the International Maritime Organization (IMO) performance standards for protective coatings (PSPC) and new regulations limiting Volatile Organic Compound (VOC) emissions.

The IMO's PSPC will be applicable to vessel where the building contract was placed on or after 1 July 2008, or the keel was laid on or after the 1 January 2009 or the delivery is on or after 1 July 2012. The standard has been designed to extend the coating lifetime to 15 years in dedicated seawater ballast tanks and double side-skin spaces and bulk carriers.

International Paint's latest range has been designed specifically for the newbuild market and will offer shipyards universal application, high volume solids with low VOC, year round workability with fast drying, low temperature cure and long overcoating intervals. It will also offer ship owners long term protection and reduce through life maintenance costs and PSPC compliance, say International paint.

The latest range will include Intersheild 300, which is a leading product for International pain will also be included in the range. Adding to it will be new Intersheild 300 which will offer the market 78% volume solids, lower VOC and direct application. Also, new Interguard 7600 will be included in the range along with new Interguard 5600 and 5620; and Interguard 787.

Further, International Paint has also launched what it claims to be its toughest cargo coating to date. Intersheild803Plus is a cargo hold coating that is specifically



Intergard 787, outside shell at newbuilding.

designed to address the key issue of impact damage from the loading of dry bulk cargoes.

Cargo holds can suffer from impact damage when being loaded such as shooting damage, where by coal cargo has been loaded by high speed conveyor. This occurs when the loaders project the coal at right angles to the bulk head causing the impact to fracture and damage coatings.

Rob Taylor, marketing manager bulk carriers, International Paint said: "Shooting' impact damage is a serious threat to the longevity of a cargo hold coating and recognising this we have developed a product to exactly meet this market need".

"New Intersheild803Plus has excellent impact resistance, offering the very best in protection against 'shooting' damage. It also provides superb general abrasion resistance, good corrosion protection, VOC compliance with 75% volume solids, fast drying times and all year round workability. The product has a smooth surface for easy cleaning, is certified for the carriage of grain and is FDA compliant," he added.

The product has under gone a new test method which is able to replicate the in service damage experienced in coal and iron ore carriers, say International Paint. Mr Taylor said: "We regard Intersheild803Plus as our toughest ever cargo hold coating which we believe will provide the ultimate defence against cargo hold damage". **NA**



New application of Intersheild803Plus.

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# Carl Bro goes green with Seahorse 35

Grontmij|Carl Bro has taken on the green challenge and through the Green Ship of the Future project has produced Seahorse 35 bulk carrier design.

**S**eahorse 35 has been designed in close cooperation with ship owners with the aim of creating a handysize bulk carrier incorporating all existing and known future regulations.

The project was initiated for COP15 where the idea behind the Seahorse 35 design was to produce a “green” bulk carrier and to give the ship owner the flexibility to choose what and how much green technology can be installed onboard.

The bulk carrier design has been developed from Carl Bro’s own designs that



Seahorse 35 a development of the Green Ship of the Future project.

## TECHNICAL PARTICULARS

### Seahorse 35

Length o.a	180.00m
Breadth	30.00m
Depth	14.7m
Scantling draught	10.1m
Gross tonnage	24.36m
Net tonnage	11.52m
Deadweight at scantling draught	35,000dwt
Classification	Det Norske Veritas +1A1 Bulk Carrier ES(D), CSR, BC-A (CH 2& 4 empty), GRAB(20), ESP, E0, HA(+), TMON, BIS, FUEL (380cSt, 991kg/m <sup>3</sup> , -15deg), BWM-E(s,F), COAT-PSPC (B), ICE-1C
Service speed, loaded	14knots
Service speed, ballast	15knots
Fuel Consumption	
At sea laden	27t/day
In port working	4.5t/day
In port idle	1.5t/day
Main engine	MAN B&W 5S50MC-C
SMCR	7500kW
CSR	6300kW
Aux engines	3 x 600kW
Emergency generator	110kW
Ballast pumps	2 x 800m <sup>3</sup> /h
Cargo loading	
Deck cranes	4 sets of wire-luffing deck cranes
Safe working load (SWL)	30tonnes
Max. outreach from CL of vessel	25.0m
Minimum outreach	4.5m

were completed at the end of last year, with ongoing research in to hull optimisation. The Green Ship of the Future project consists of Carl Bro and other Danish equipment manufacturers.

Seahorse 35 is set to reduce CO<sub>2</sub> emissions by 30% and NO<sub>x</sub>, SO<sub>x</sub> and particulate emissions by 90%. With new regulations coming in to effect making ship owners take a closer look at how efficiently their vessels run, Carl Bro believes the Seahorse 35 presents a solution for ship owners.

Leif Jacobsen, Marine department director, Carl Bro said: “New regulations will force ship owners to do something, as just being green will not do it. Regulations will force customers to be more demanding as well, which will also impact ship owners to deliver.”

He added: “We will probably see the impact start this summer with the introduction of the regulation for emission control areas (ECAs), which will limit sulphur levels, but will force ships into using more expensive fuels. What we will probably see afterwards is the price of fuel go sky high. Ship owners will then be looking at cost calculations for more viable solutions.”

With rates for bulk still not showing signs of significant improvement many ship owners have been starting to look for better and greener designs that will meet regulations, but will also be a cost effective solution. Mr Jacobsen points out that although the market rates are not what they were two years ago he is positive about the current market for bulk.

Currently, Carl Bro has five contracts

for vessels that are being constructed at Qidong Daoda Heavy Industry Co., Ltd (DDHI), China and a further two vessel under construction at Nantong JingHua Shipbuilding Co. Ltd (JHSY), China. The first of the vessels is due to be delivered early next year to owner Falcon Maritime. Carl Bro has said that it also has a further 30 contracts waiting for financial backing, which will be constructed in China for European ship owners if they are backed.

“There are a lot of ship owners wanting this type of ship, we get two to five ship owners a week asking about our design,” said Mr Jacobsen. “It’s early days yet, some contracts will go far and will turn in to full contracts, others will not. It takes a year from the initial start to the actual start of the contract,” he added.

Seahorse 35 will cost a ship owner US\$22-25 million, with a further 20% to have green technology installed onboard. This option gives the ship owner the flexibility how much green technology they want onboard the vessel, said Carl Bro.

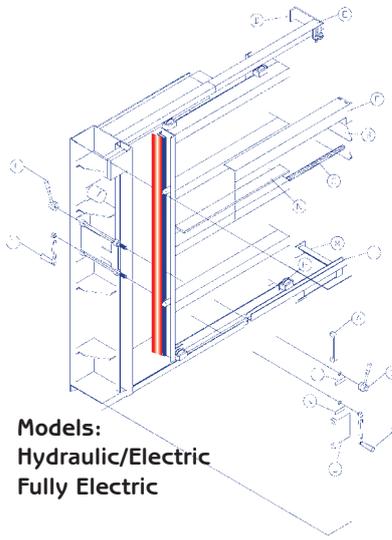
The Seahorse 35 design as a shallow-draft to maximize cargo-intake in draft restricted ports and has five flush double-skinned cargo holds, wide hatches and no hopper tanktops giving easier access to the cargo in the holds.

Along with this the design is also equipped with four 30m safe working load (SWL) wire luffing cargo cranes and four motor-grabs stowed on cross-decks between hatches.

Seahorse 35 is 180m in length overall, with a breadth of 30m, a depth of 14.7m, with a deadweight of 35,000tonnes. [NA](#)



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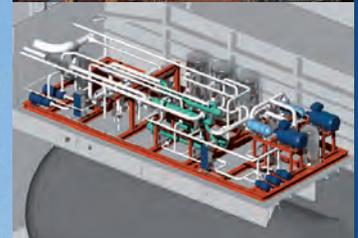
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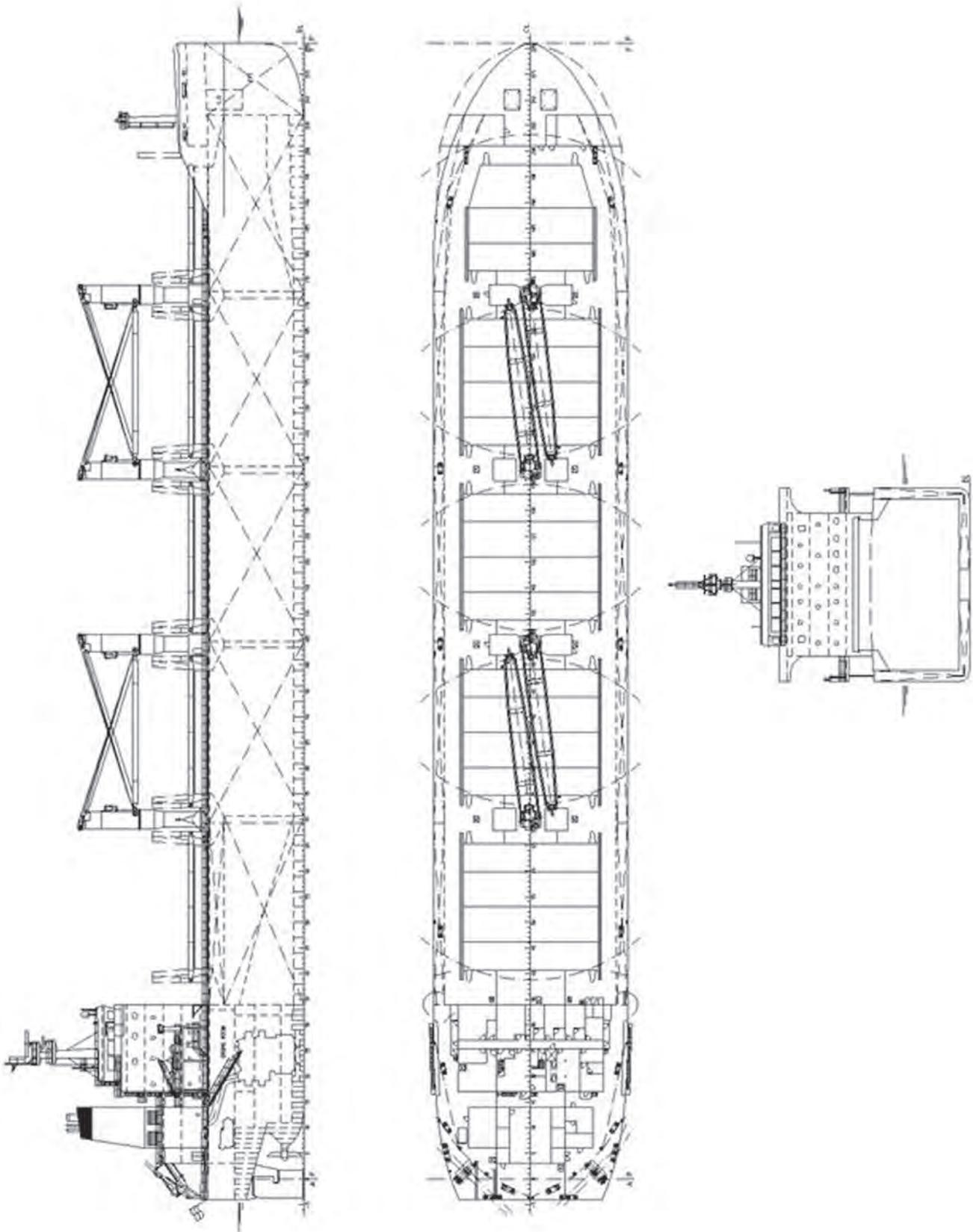
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## MacGregor supplies Samho bulk carriers

Cargotec has announced that it has received an order from Samho Shipbuilding for a series of folding weatherdeck hatchcovers for six 32,000dwt bulk carriers.

The six vessels will each have four MacGregor GLB3026 cranes, fitted with MacGregor's CC3000 crane control system, along with five MacGregor folding weatherdeck hatchcovers, comprising of 20 panels, say Macgregor.

"We are pleased that Samho Shipbuilding has specified our hatchcovers," said Torbjörn Dahl, senior naval architect for bulk ships, Cargotec. "The crane and the hatch cover outfits are an integral part of the cargo access and handling ability of the vessels, and MacGregor cargo handling solutions offers an efficient and reliable system for the shipowner. The order also demonstrates our ability to deliver conceptual sales that consider the whole operation of a vessel."

The hydraulically-operated hatchcover arrangement will offer a total day opening area of approximately 2023m<sup>2</sup> and will weigh around 640tonnes. The equipment is



MacGregor supplies folding hatchcovers and cranes to Samho Shipbuilding for six bulk carriers.

designed and manufactured in accordance with ABS regulations.

The hatchcovers will comprise of Flexipads, FlexSeal and a pump unit that will enable operation of any two pairs at a time. The hatchcovers will be battened

to the coaming by quick acting cleats and hatch No 3 (ballast water hold) will have heavy-duty ballast cleats.

The six vessels are scheduled for delivery from Samho Shipbuilding from this year until 2011. [NA](#)

## Kawasaki kick starts 2010

Most shipyards in the industry will be contemplating what 2010 will bring, but for Kawasaki shipbuilding Corporation it has been a busy start with the steady flow of bulk carriers coming from the shipyard.

**C**ape Yamabuki was a recent delivery to owner TLC Calamus Co.Ltd from Kawasaki's Sakaide shipyard. The vessel is the third 180dwt bulk carrier to be constructed by Kawasaki. *Cape Yamabuki* also has one of the largest hold capacities that can enter France's Port of Dunkirk.

The vessel is 292m in length and is fully compliant with the latest bulk carrier hull strength rules (IACS Common Structural Rules). The vessel has the latest technology onboard that will give the it maximum fuel savings, along with and energy-saving diesel



engine, highly efficient propellers, as well as the Kawasaki semi-duct system with contra fins (SDS-F) and rudder bulb

Kawasaki Shipbuilding start's 2010 on a positive note.

with fins (RBS-F), which all contribute to the vessel's enhanced propulsion performance. The *Cape Yamabuki* also employs double-hull fuel oil tanks and electrical deck machinery to prevent marine pollution. Another feature of the bulk carrier is its anti-corrosion coatings that comply with the new performance standards for protective coatings (PSPC) for ballast tanks to ensure that paint quality is of a high standard. [NA](#)

# Regulations tighten for bulk carriers

New regulations are set to impact on the bulk carrier market from this year; Ian Harrison Intercargo's technical manager takes a closer look at what those regulations will mean for both the operators and the designers.

**T**he operation of bulk carriers presents many technical challenges stemming from regulatory and operational requirements including those concerning cargo properties, and the measures required to handle and ship them. Recent developments include: the revision of the International Maritime Solid Bulk Cargoes code (IMSBC Code), (formerly known as the BC Code), and its forthcoming mandatory application; and managing the ship/shore interface with particular regard to the pressure from some terminals to load at high rates in a short time frame.

## IMSBC code

The Code of Safe Practice for Solid Bulk Cargoes 2004 (BC Code) has been revised and renamed. The IMSBC Code was adopted by the International Maritime Organization (IMO) Maritime Safety Committee (MSC 85) in December 2008 and while the application of the code is currently voluntary, it will become mandatory on 1 January 2011.

The revision of the code was conducted by the IMO Sub-Committee on Dangerous Goods, Solid Cargoes and Containers (DSC). During the review new schedules were added including provisions for formed sulphur, direct reduction (DRI) by-product fines, and granulated tyre rubber. Other schedules have been modified, for example the schedules



The aftermath of an explosion from a ship carrying DRI. (credit: Burgoynes)

for wood pellets and wood chips have been amended to stress the risks associated with oxygen depletion in holds and adjacent spaces with particular reference to procedures for safe entry into enclosed spaces. Changes to the Code not only affect onboard operations, but may also have an impact on some aspects of ship design.

Previously sulphur was listed only under "SULPHUR UN 1350 (crushed lump and coarse grained)" as a Group B cargo (possessing a chemical hazard) with strict carriage requirements and, since it is classed

as dangerous goods further requirements are applicable under SOLAS, for example an A60 engine room bulkhead (or 3m stow separation). A new schedule "SULPHUR (formed, solid)" has now been additionally introduced recognising a co-product recovered from sour gas processing or oil refinery operations that has been subjected to a forming process; this product is a Group C cargo representing less of a risk and hence has different requirements and is not considered as dangerous goods.

Another example of a Group B cargo

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is DRI. There have been a number of serious incidents involving vessels carrying DRI including the ships *Adamandas* and *Ythan*. In light of these incidents the DSC Sub-Committee considered the pertinent schedules in the BC Code extensively. As a result there are now three DRI schedules with the designation depending largely on the post-reduction treatment and forming. In terms of transported DRI there are three main types: DRI (A) - 'Hot Moulded Briquettes'; DRI (B) 'Lumps, pellets, cold-moulded briquettes'; and DRI (C) 'By-product fines'. The schedules explain the extensive measures that must be taken to monitor and control the risks associated with this cargo, which for the more reactive DRI (B) and DRI (C) types, include extensive temperature monitoring at several points throughout the stow and inerting the hold atmosphere. Most bulk carrier designs do not anticipate the carriage of such a cargo and bespoke arrangements are generally made with the shipper in agreement with the pertinent authorities.

The Code will be regularly updated on a two-year cycle when it is envisaged that clarifications and updates will be incorporated as experience is gained and lessons learnt. A clarification discussed at the last session of DSC (14) and being put forward for approval at the next MSC (87) gives us an early example with regard to coal cargoes. Concern was expressed with regard to the requirement within the coal and brown coal briquettes schedules that "The master shall ensure that this cargo is not stowed adjacent to hot areas". With no clear interpretation of "hot areas" this could feasibly mean holds adjacent to heated bunker tanks could not be used for the carriage of coal.

The committee agreed that the words "adjacent to hot areas" in the provisions should be interpreted as "boundary areas of the cargo hold in contact with the cargo having a temperature consistently greater than 55°C during carriage of the cargo, such as can sometimes be experienced when heated fuel oil service tanks and fuel oil settling tanks have a common boundary with the cargo hold".

The Committee recommended that, in applying the aforementioned interpretation, the following is taken into account: "Heated fuel oil tanks adjacent to cargo spaces carrying these cargoes should not normally be considered as "hot areas" when the fuel oil

temperature is controlled at less than 55°C; this temperature is not exceeded for periods greater than 12 hours in any 24-hour period; and the maximum temperature of the fuel reached does not exceed 65°C".

This interpretation refers to an operational requirement with regard to monitoring fuel temperature and is appropriate guidance for existing ships. While there is no specific spaces requirement for new ships it may be prudent for a designer to consider boundary temperatures at the design stage.

### **Loading rates**

In recent years Intercargo members have been experiencing increased pressure to load bulk carriers quickly. This has escalated with the increased demand for commodities and the commercial pressure to maximise terminal throughput. Intercargo conducted a survey of ships' masters to determine the areas of concern, and two main areas were identified: the implied arrival 'minimum ballast' condition required to meet onerous loading requirements and its detrimental effect on manoeuvrability; and the consequences for the structural integrity of the ship.

Intercargo commissioned a study to investigate the effects of 'minimum ballast' on manoeuvrability providing objective evidence concurring with the masters' view on manoeuvrability and quantifying the effects of the minimum ballast condition – confirming that in most cases the safety margin is reduced when manoeuvring in a reduced ballast condition compared with the normal ballast condition.

The concerns with regard to hull structure are widely understood and guidance on structural aspect can be found in the International Associations of Classification Societies (IACS) recommendation 46. Operationally they centre on the ability to control the loading process including loading sequences, pour rate and ballast synchronisation in order to remain within the operational limits of the ship - with regard to shear forces, bending moments and local strength - throughout the process.

Consultation with the terminal interests and our members often focuses on the de-ballasting rate as the main "bottle neck". While this is not the only aspect of loading operations that may limit speed of loading there may be room for improvement. Most capesize bulk carrier designs have a de-ballasting capacity of two 2000-2500m<sup>3</sup>/hr pumps (i.e. total

4-5000m<sup>3</sup>/h) and designers have reported that the anticipated loading rate assumed at the design stage is an average rate of about 6000t/hr. Modern terminals increasingly require faster turn-around and higher average loading rates (as high as 16,000+ t/hr with total time of 14hrs, for a capesize).

In addition, from 2012 (new) bulk carriers will require ballast water treatment systems. As some of these systems have the potential to slow down the de-ballasting rate, the impact on loading operations should be a consideration when selecting ballast water management (BWM) treatment systems.

Intercargo made a submission to IMO, which has resulted in the last session of DSC agreeing on a draft circular that was sent to MSC (87) for approval in May 2010. The circular draws attention to the risks associated with high loading rates and potential mitigating measures with the simple aim of helping to ensure compliance with extant regulations, specifically SOLAS and the BLU Code.

We do not advocate simply designing ships to the extreme requirements of a few limited terminal interests; clearly there is a balance to be struck between many different interests and the capabilities of the existing infrastructures (including ships) while maintaining safe operational practice. However, we do believe that the ship/shore interface and associated operational requirements should be considered in more detail at the design stage.

These examples refer to aspects of dry bulk shipping that some may consider to be operational, but they do have an impact on ship design. It is important that ship design considers how a ship is used (including the crew that use it), the properties of the cargoes to be carried, the ship/shore interface and the regulation designed to manage these issues safely. Intercargo has an ongoing remit to represent our members' views, and share operational experience, in the development of regulation. In addition we aim to facilitate a sharing of information to help ensure that such regulatory and operational challenges are adequately communicated, in order to achieve properly considered designs that are safe, appropriate to meet operational requirements for the trades they serve, and have a minimal environmental impact. **NA**

### **Author**

I R Harrison, BEng, MA, CEng, MRINA, technical manager, Intercargo.

# Deltamarin puts B.Delta design back on the drawing board

The shipbuilding industry is starting to recoup after the initial impact of the financial downturn and signs of improvement are starting to show, so much so that Finnish-based Deltamarin has re-launched its B.Delta bulk carrier design.

**T**he B.Delta design was initially launched in 2008 where Deltamarin also joined forces with Barry Rogliano (BRS), to bring a more standard design of handysize bulk carrier to the market for ship owners. Markku Kanerva, sales director, comments: "When Deltamarin invested in this design as in 2008, the market was growing quickly and saw the need for an improved design for bulk carriers, which was optimised to

be more efficient." Deltamarin said that through its experience with car carriers, cruise vessels, etc that it was able to apply the basics to a bulk carrier.

Further to the need for an optimised bulk carrier design, Deltamarin aimed to reduce emissions through better design of the vessel. Deltamarin set goals of 10% savings in fuel, deadweight and volume onboard for cargo. "We model tested the design at Hamburgische Schiffbau-

Versuchsanstalt, GmbH (HSVA) and got good results from the optimised design," said Mr Kanerva. "The results from the design showed results of up to 20% savings, which is better than other vessels that are being constructed in China and Japan, which have only shown 18% savings. We have also tested a supramax model, which has also come back with good results. We have seen a typical improvement of 14% overall," he added.



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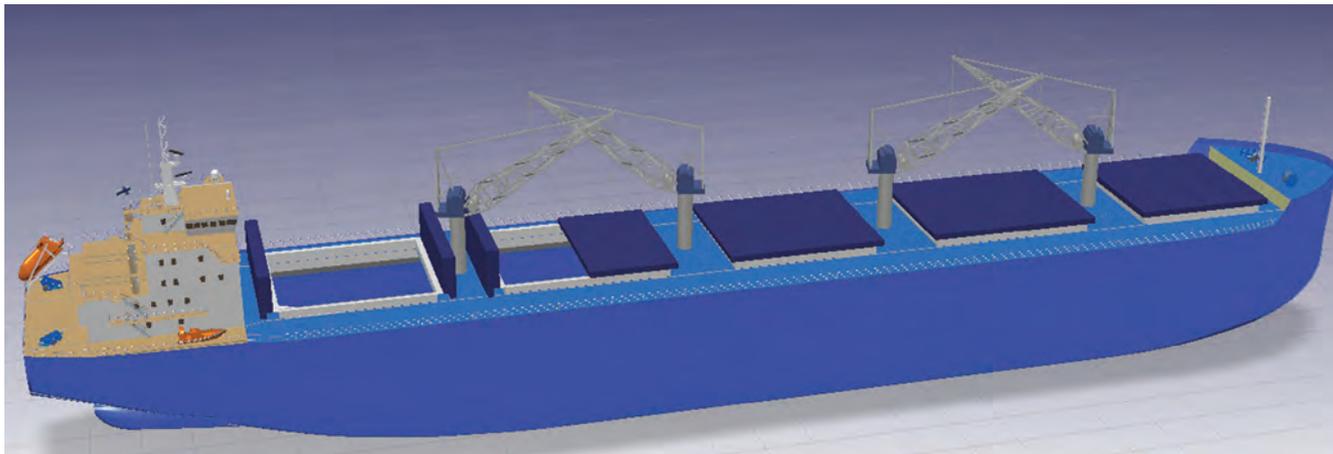



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The supramax B.Delta64 design has been bought back to service a growing need for a standard design.

The B. Delta design is around 10% lighter, while the hull geometry - including a substantial benefit from not having a bulbous bow - was achieved through using the NAPA system. But, the majority of efficiencies were derived from a larger propeller diameter and a derated engine.

Deltamarin's design for the B.Delta comes in handysize and supramax size, with the handysize being 179.99m in length overall, breadth 30m and a service speed of 14knots. The supramax size is 199.99m in length overall, has a breadth of 32,26m overall and a service speed of 14,5knots. Where the design has achieved a noteworthy saving is in the

fuel consumption, Mr Kanerva points out. Where usually a vessel of this size (handysize) would have a fuel consumption of 23-25tonnes/day; the Deltamarin handysize has achieved a fuel consumption of 18tonnes/day.

Although, Deltamarin has only recently bought this design back on to the market, it has already been shown interest from some ship owners. Deltamarin has said that it aims to have four to six different contracts for building under licence in the future for this type of vessel. It will also look in to the possibility of widening the scope of the design to other vessel types and has started to look at vessels that are panamax sized and also chemical and product tankers.

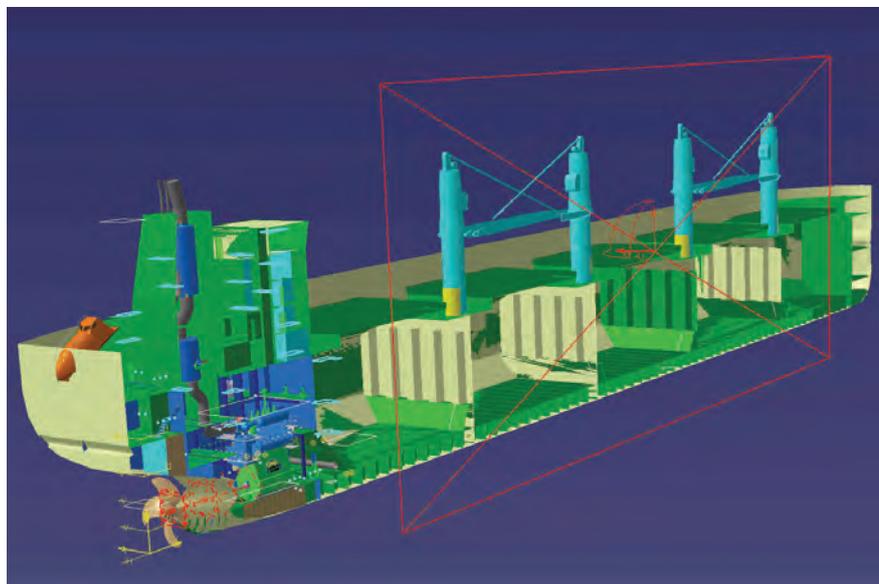
Mr Kanerva adds: "We will keep pushing to see how far we can go with it and will not sit back and just let it make money on its own. We need to keep pushing to keep the development going. This was a quantum leap for us and our main intention is to focus on size for the future, we have already received requests for kamsarmax vessel size and product carrier."

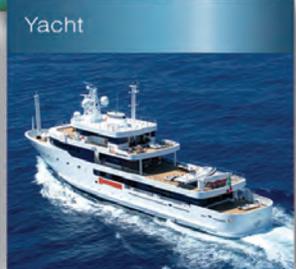
Deltamarin is currently in discussions with ship owners about the B.Delta designs and derivatives and it is working with ship owners in developing individual needs into the design, looking to get its first contract for this vessel design. *NA*

TECHNICAL PARTICULARS	
<b>Handysize B.Delta37</b>	
Length o.a.....	179.99m
Breadth.....	30.00m
Draught (design).....	9.50m
Service Speed.....	14knots
Cargo cubic.....	50,000m <sup>3</sup>
Daily fuel oil consumption.....	18.0tonnes/day (ISO)

TECHNICAL PARTICULARS	
<b>Supramax B.Delta64</b>	
Length o.a.....	199.99m
Breadth.....	32.26m
Draught (design).....	11.30m
Service speed.....	15.5knots
Cargo cubic.....	78,000m <sup>3</sup>
Daily fuel oil consumption.....	25.5tonnes/day (ISO)

Cut through of B.Delta design.





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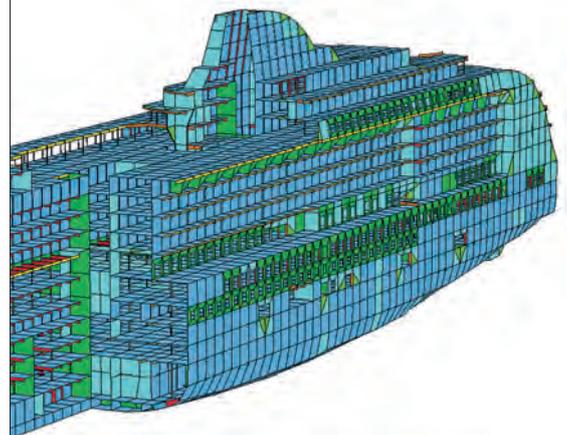


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# Overstating the green's case for emission control?

Dear Sir,

Having read your article 'United we stand' in your January 2010 issue, let me comment on an irritating statement of yours, that in 2050, CO<sub>2</sub> emissions from world shipping will equal or be in excess of that of Germany and Japan combined.

I have also attended recently a technical meeting of DNV in Cyprus where a similar statement was expressed. It seems as if the trend nowadays is to crack down on anything which smells "non green" or isn't green enough, no matter what. Well, a statement as such is no more than propaganda, twisting the issue ridiculously.

Can ship emissions be compared with

a state's emissions? What can one infer from such information? It would be like comparing a tomato and a potato, rather than two different tomatoes. The agenda today is pressed to show figures to impress the readers, but these figures don't say anything, they just give a false impression.

In the same article we read that in the year 2050 the emissions from ships combined will reach 2.4 billion tonnes of CO<sub>2</sub>. At the same time it is said that the total production of the world fleet will reach 72.49 billion tonne/miles. The latter fact (if this will be a fact it remains to be seen) means that the CO<sub>2</sub> emissions of the entire world fleet will be 0.033 tonnes CO<sub>2</sub> per tonne/mile. This is the figure to be compared with other means

of transport, but not with the emissions of countries.

It is suggested that if we in shipping want to comply with a greener world, we should stop threatening ourselves with figures as such which do not compare shipping with other industries in a proper way and give a false position with constant guilt. We should be showing the positive and advantageous sides of shipping by giving the figures just mentioned above, of 0.033 tonne per tonne mile and compare it to the aviation industry, truck, trains, etc. This will certainly show that shipping isn't the worst.

Sincerely

Capt Amos Cohen Antares Shipping Israel.

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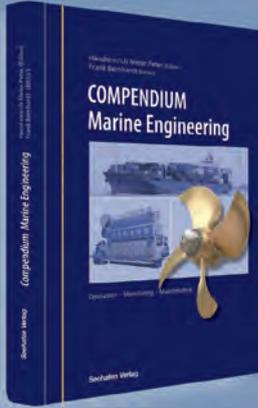
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The scope of the Conference will be broad, covering all the aspects of theoretical and applied hydrodynamics. Papers are invited on the following and other related topics:

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- Hydromechanics for the design of concept ship designs
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