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April 2009

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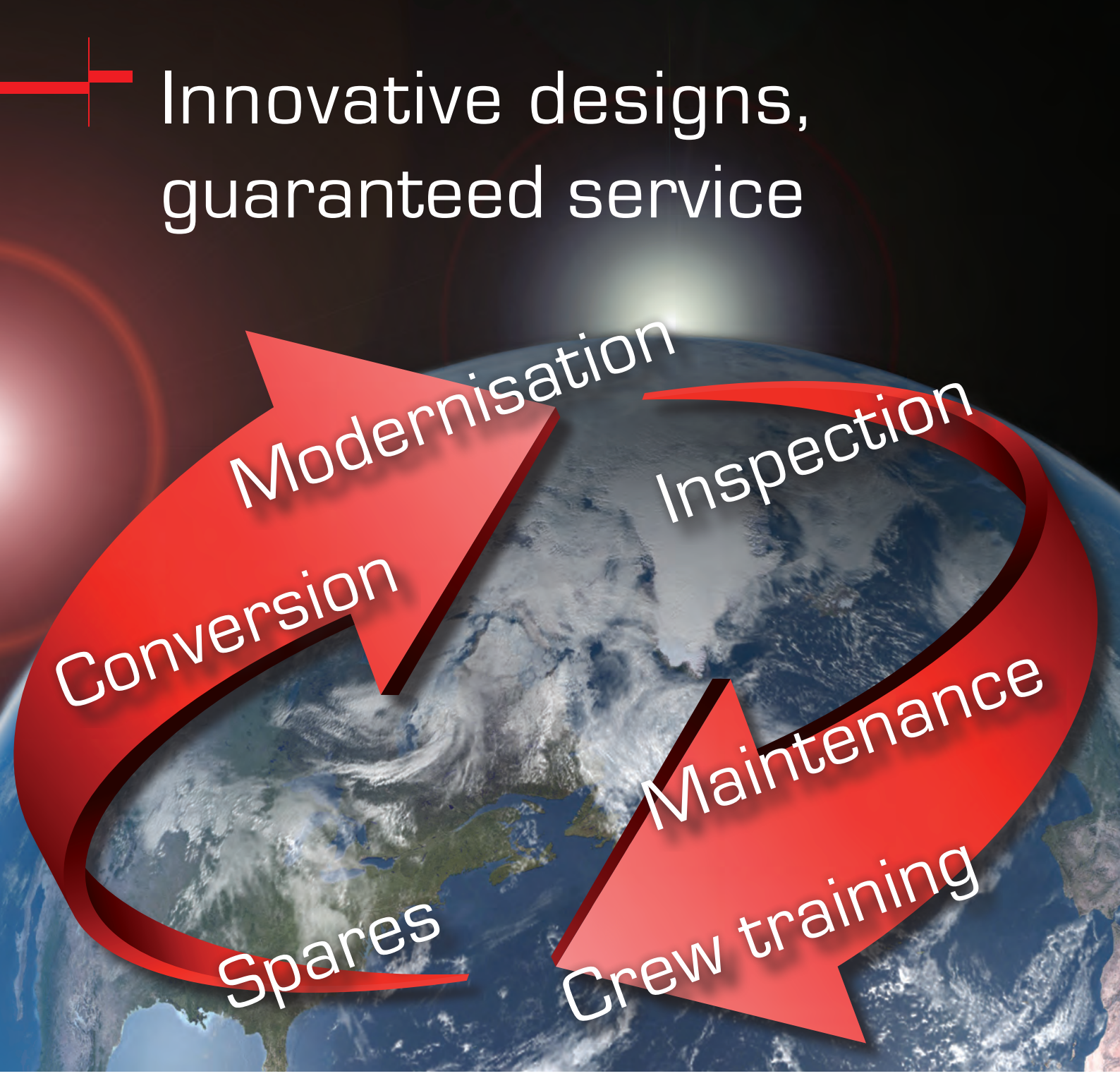

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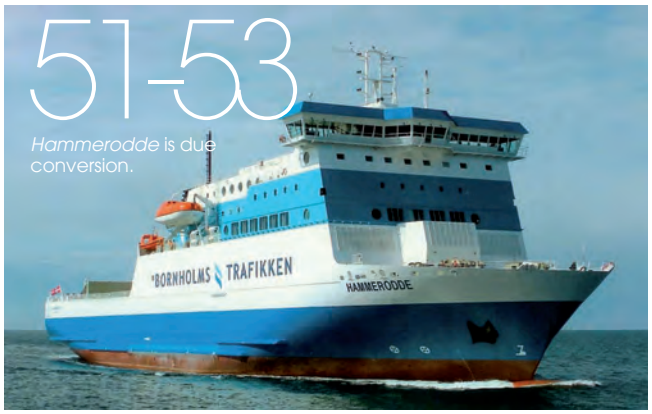

On-line Edition

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

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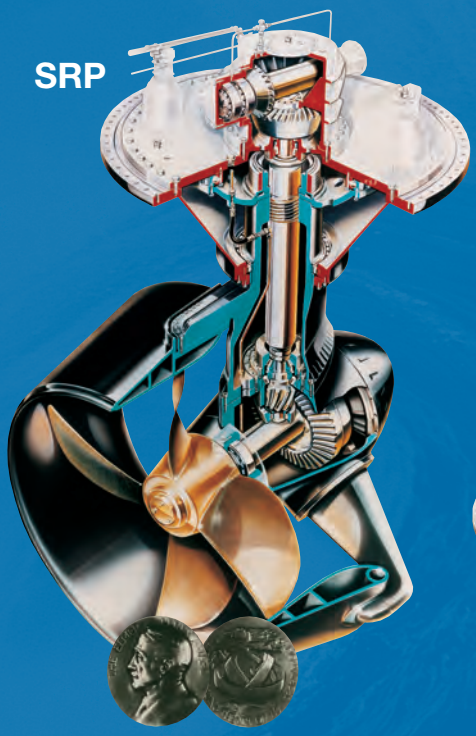

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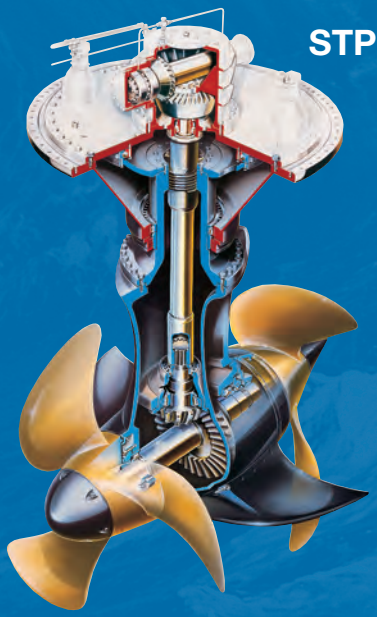

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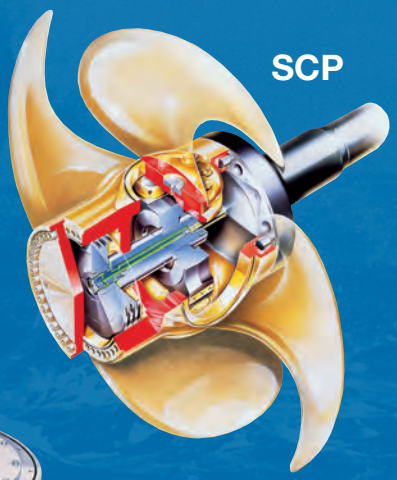

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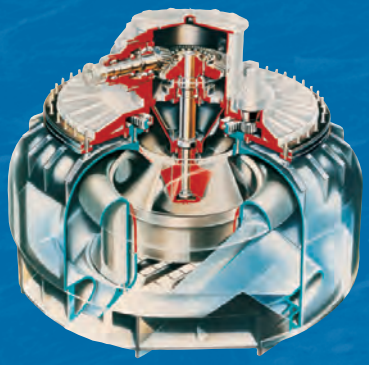

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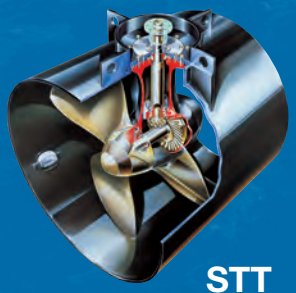

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Light at the end of the tunnel?

While confidence is at a low ebb, some believe that shipping will prove more resilient than other sectors to recession.

Overall confidence levels in the shipping industry have declined by more than 20% over the past twelve months, according to the latest Shipping Confidence Survey produced by accountant and shipping consultant Moore Stephens.

One year on from the first Moore Stephens survey, the average confidence level expressed by respondents, on a scale of 1 to 10, was 5.4, compared to 6.8 in the initial survey in February 2008. In the last four months, the average confidence level declined from 5.6 to 5.4, and was most significantly down amongst owners and managers, with the level falling to 5.4 in each category from previous levels of 5.8 and 6.0 respectively. One year ago, owners and managers recorded confidence levels of 7.1 and 7.2 respectively.

Despite the drop in average confidence levels, a number of respondents felt that things were likely to improve over the coming twelve months and beyond. Comments included: "As owners we have already touched the bottom, and I don't believe we can go any lower".

The survey also confirmed that there are winners in every downturn. One respondent observed that, "Given what is happening with some Chinese yards at present, it would be no surprise to find that some builders may become owners and start operating the vessels they build". Another observed, "We expect some real opportunities in terms of low-price, quality vessels", while yet another said, "Cash-rich buyers will be looking at the bargains of the millennium come the summer."

Charterers were comparatively upbeat, although the increase in confidence rating over that period to 5.5 (from 4.7) was still some way behind the 6.1 recorded twelve months ago. One respondent commented, "Charterers are playing now in the shipping market like a child plays with its doll."

Over the past twelve months, the perception of those factors which most influence performance have changed significantly. One year ago, it was ship operating costs, crew supply and tonnage supply that led the way among respondents. In the latest survey, demand trends (27%), the cost and availability of finance (21%), and competition (20%) have now emerged as the three factors deemed most likely to influence performance over the coming year.

There was a marked fall over the last four months, from 60% to 47%, in the number of respondents who expected finance costs to rise over the next year. This compared to 56% in the Febraury 2008 survey. The proportion of respondents expecting lower finance costs meanwhile rose in the last four months from 19% to 25%.

There was a significant drop compared to the last survey (from 52% to 40%) in the number of respondents who expected tanker rates to fall in the next twelve months. There was also a marked, if not altogether surprising, difference of opinion between owners (25%) and charterers (12%) in terms of those expecting rates to increase. Twelve months ago, 62% of charterers anticipated that tanker rates would increase over the year.

In the dry bulk market, there was an appreciable increase over the last four months, from 35% to 46%, in the number of respondents predicting higher rates, but a significant fall (from 43% to 20%), in the numbers of those anticipating lower rates. Twelve months ago, 40% of respondents were anticipating lower rates. There was a clear disparity between owners and charterers and in the regions Europe led the way in terms of expecting higher rates, followed by Asia and North America.

Finally, 36% of respondents to the survey expected containership rates to be lower in twelve months' time, compared to 50% last time, while the number anticipating higher rates in this sector rose from 20% to 23%.

Moore Stephens shipping partner, Richard Greiner says, "Given what has been happening in the world economy, the fall in confidence levels was to be expected. Perhaps the real surprise is that confidence levels have not fallen by even more.

"There was evidence of optimism from a number of respondents, even if much of it was predicated on the basis that things could hardly get worse. Examples include, 'As soon as the financial markets stabilise, the shipping markets will be the first to respond', and 'There are clear signs that trade and shipping are picking up in some parts of the world'." *NA*

Classification

DNV on ice

A three-year research project initiated by Det Norske Veritas has led to the development of an ice load monitoring system that provides bridge personnel with real-time information about the actual ice loads on the ship's hull and reports satellite information about ice as an integrated function of electronic navigation maps.

DNV said it was developing technological solutions to ensure that Arctic operations are safe and environmentally sound. Its 'Ice Load Monitoring' project identified critical risks and then worked to find mitigating solutions, the class body said. The project had culminated with the development of a comprehensive decision support tool for transiting ice that has been tested over the last two winter seasons onboard the Norwegian coast guard vessel *KV Svalbard*.

The system includes fibre optic sensors that measure shear strain on the vessel's hull and electromagnetic equipment which measures the thickness of the ice at the bow. This information is analysed and displayed on the bridge. Additionally, meteorological and satellite data about the ice is integrated into electronic charts allowing for optimum route selection.

DNV said the project was the first to monitor actual ice loads in real time at the bridge as a part of a decision support system. The system is ready to be installed for both newbuildings and ships in operation.

"Based on the success of the Ice Load Monitoring project and a thorough understanding of the risks associated with Arctic operations, our conclusion is that technology will not be a showstopper for conducting safe, well-planned ship operations in Arctic waters," said Morten Mejlænder-Larsen, program director for Arctic shipping within DNV Maritime.

"Our goal is to maintain high competence levels and updated rules and notations so that DNV is able to provide owners, yards and oil majors with the support they need to safeguard their cold climate activities," he added.

The experience from the development and operation of the Ice Load Monitoring system will be implemented in a new DNV Notation.

The Ice Load Monitoring project was supported by the Norwegian Research Council and other partners were Teekay, StatoilHydro, Light Structures, The Norwegian Meteorological Institute, C-map/Jeppesen and the Norwegian Coastguard.

Design

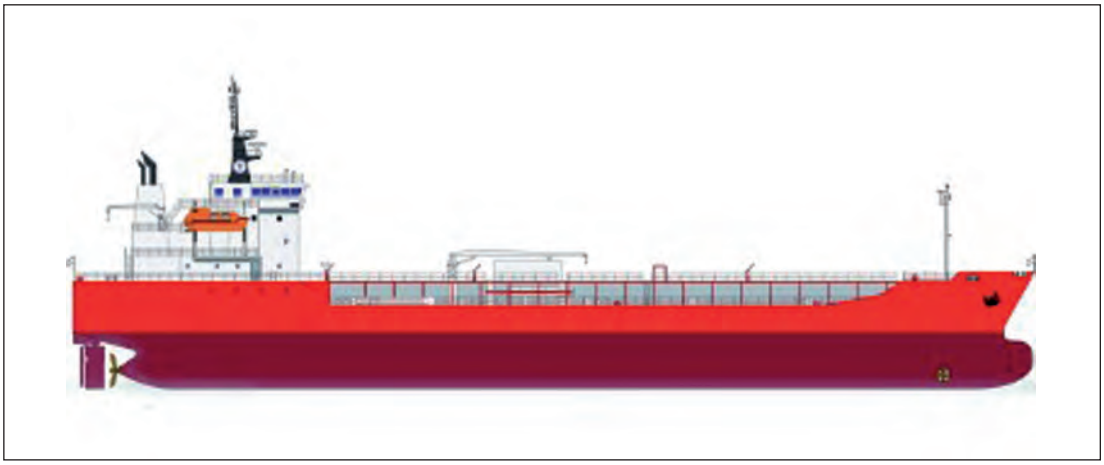
Wärtsilä in design first

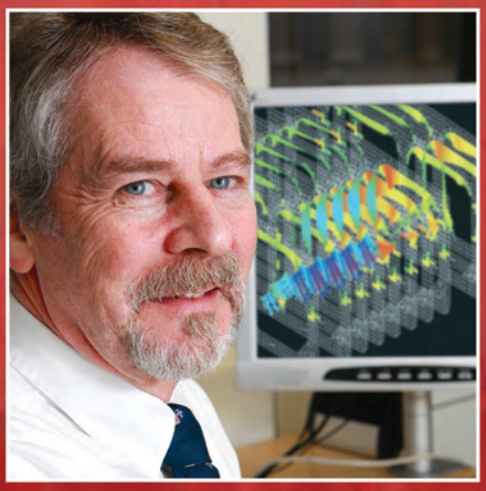
Conan Wu Associates has secured its first design order since coming under the ownership of Wärtsilä Corp, in September 2008.

CWA has been contracted to undertake the design and propulsion system for Taiwan's Jong Shyn Shipbuilding for a 6500dwt product chemical tanker. Due delivery in 2011, the ship will be owned by CPC Corporation (CPC), the Taiwanese state-owned oil company.

In addition to the design, Wärtsilä will deliver the entire propulsion system, which is to be based around a 9-cylinder in-line Wärtsilä 32 main engine, gearbox, and a controllable pitch propeller. Wärtsilä's scope of supply includes other equipment, such as a bow thruster, the

Wärtsilä will deliver the design and propulsion system for the product tanker to be built by Jong Shyn shipyard in Taiwan.





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propulsion control system, and all shaft seals and bearings. The contract also includes the supply of an integrated automation system for not only the machinery spaces, but the entire ship.

With an overall length of 110m and an18m beam, the single screw tanker will be equipped with a propulsion arrangement capable of delivering a ship speed of up to 13.4knots, at design draught condition.

Willy Perng, Wärtsilä's sales manager in Taiwan, said that Wärtsilä had a long-standing relationship with CPC, which already has 12 sets of Wärtsilä two-stroke engines installed in its fleet.

"The contract marks a significant milestone for Wärtsilä in that it is the first time we have dealt with the Jong Shyn shipyard. It is also the first time we have supplied CPC with new four-stroke main engines, and the first ever ship design we have sold in Taiwan," said Mr Perng.

Wärtsilä said the the acquisition of CWA demonstrated the group's commitment to becoming the leading provider of ship design services in specialised areas, including offshore and special vessels, as well as selected merchant vessels.

Business

Hamworthy snaps up Greenship

Hamworthy has acquired Greenship B.V., of The Netherlands, the developer of the Sedinox ballast water treatment technology. The initial deal, worth €2 million, will be augmented with a further €5 million once the system receives formal regulatory approval, anticipated later in 2009. The acquisition is being funded entirely from Hamworthy's own cash reserves.

Based in Groningen, Greenship is a privately owned business specialising in the emerging ballast water treatment for ships market, which is being driven by international environmental regulations. Its system involves a combination of separation and electrolysis. Sedinox involves no 'active' chemical process and has no moving parts, and is installed in a ship's engineroom, with power consumption being no more than. 2kW per 100m^3 of water.

The system, which is scalable from capacities of 100tonnes per hour to 5000tonnes per hour, has been specified in a 200tonne per hour configuration for use onboard two ships operated by Dutch owner Chemgas, for delivery in the first half of 2009. Four patrol vessels operated by the Royal Dutch Navy will also feature Sedinox.

For the year ended 31 December 2008 Greenship reported turnover of approximately €500,000. Backed by Hamworthy, the technology is expected to develop quickly as a commercial proposition.

Hamworthy chief executive, Joe Oatley, said: "Ballast water treatment is an exciting global opportunity underpinned by strict international environmental regulations. The acquisition of Greenship complements our existing water systems business and is consistent with our strategy of expanding the Group's technological base in long-term growth markets."

Coatings

Savings drive GNV conversions

Cruise ferry operator Grandi Navi Veloci (GNV) reckons to be saving a substantial amount of money after applying silicone-based foul release coatings to the hulls of its ships.

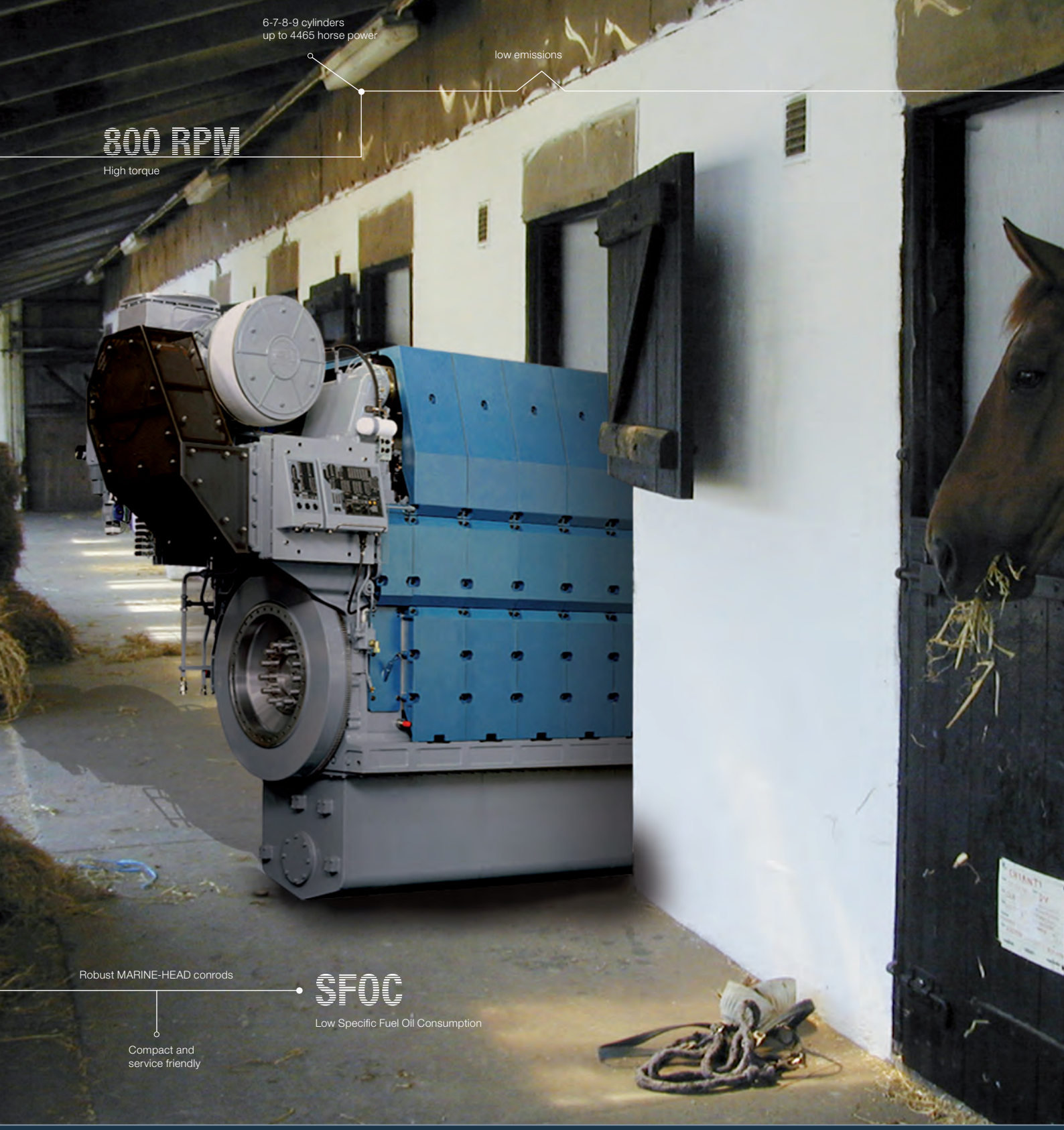
Starting from 2005, the Mediterranean operator has progressively converted all of its vessels at maintenance and repair dry docking to the biocide free, foul release system, Intersleek.

Intersleek 700 was first applied to the 32,700gt, 23knot cruise ferry *Majestic*, and has subsequently been applied to *Fantastic, Splendid, Excellent* and *Excelsior*.

In January 2009, after 40 months service in one of the world's most severe fouling environments, *Majestic* drydocked at the Ente Bacini Shipyard, Genoa. The hull was described as being "in excellent condition, smooth, glossy and with minimal mechanical damage". Only 30 litres of Intersleek was required for touch-up on the bow before the vessel returned to service.

Bruno Dionisi, GNV technical consultant, said: "On average this product provides undisputed advantages which, in our case, are represented by a bunker saving of around 6%-7%, a significant reduction in time spent in drydock and hull washing costs and, most of all, an overall saving on the complete economic paint scheme which can be evaluated at around €100.000".

Even before *Majestic* returned to drydock, fleet fuel savings had already influenced GNV's decision to coat two further ships (*La Superba* and *La Suprema*) with Intersleek 900 - International's latest fluoropolymer-based foul release technology. *La Superba*, completed in March 2007 is the largest cruise ferry in the world and was the first vessel in Italy to be coated with Intersleek 900. Intersleek 900 has now been applied on over 50 passenger vessels worldwide.



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Shipbuilding

Damen into Qatar

Just when it seemed the world may have quite enough shipbuilders, Qatar Gas Transport Company Ltd. (Nakilat) and Damen Shipyards Group, of The Netherlands, have signed a memorandum of understanding looking to form a joint venture to manage a new state-of-the-art shipyard, in the Port of Ras Laffan, for the construction of high-value ships.

The partners said that the new shipyard would focus on three different vessel sectors: commercial vessels (e.g. tugs, offshore supply vessels, coastal tankers, ferries); naval and coastguard vessels (e.g. corvettes, patrol boats, fast attack craft); and luxury yachts (custom and semi-custom steel/aluminium vessels).

The yard is expected to be operational in early 2010.

Classification

New guidance from Class NK

Drawing on comments from port state control authorities, shipowners, and mariners, ClassNK has released an updated version of its Good Maintenance Onboard Ships publication, first published in 1994.

This publication provides a comprehensive set of four checklists for shipmasters, crew, shipowners, and other key personnel that covers every aspect of statutory requirements with clear references to the relevant regulations. These four checklists cover items essential to routine maintenance, PSC inspections, Safety Management Systems, and International Ship and Port Facility Security.

The latest version of the publication incorporates a new appendix, which includes photos of the most common deficiencies found onboard ship. Advice is also provided on how to address key maintenance issues, including how to check many specific items and the action to be taken when problems are found.

ClassNK managing director, Toshitomo Matsui, said: "The checklists also identify and list common deficiencies pointed out during port state control inspections. The contents of the checklists are very simple and can be easily checked by the crew during the voyage or before entering port. We hope that these checklists will contribute to decreasing the number of ship detentions by PSC and help to prevent maintenance related problems onboard before they have a chance to occur."

Classification

LR Asia's new dedication

Lloyd's Register Asia has opened its first dedicated marine surveyor training centre in Shanghai.

The Maritime Surveyor Training Institute (MSTI) represents more than an US$8 million (£5.6 million) investment for the organisation in the first five years of operations, during which time 200 newly trained surveyors are expected to graduate from the programme.

"Quality staff training provides the most significant contribution to the continued development of our core product - the provision of independent technical assurance to the maritime industry," said Roy Ellams, Lloyd's Register Asia's Marine Training Manager – North Asia. "It ensures that we always will have the right skills to support the provision of maritime transport services that are safe for both mariners and the environment."

Mr Ellams said the the MSTI represented a new approach to the development of technical competency for the industry, and was being offered at a time when commercial pressures were driving the need for innovation. With the recession shrinking access to new capital for companies in the maritime industry, he said new solutions were required for old problems.

A key element in that new approach was the appointment of experienced "surveyor-mentors" to guide the trainees through the one-year programme, he said. Each programme will feature 20 trainees and two programmes will be held each year.

The MSTI's integrated program consists of seven phases, including:

- a general introduction to Lloyd's Register's vision and values, the role of the surveyor and occupational health and safety
- materials and non-destructive testing, focusing on the application of materials rules
- induction into survey: an overview of convention and rule requirements, the classification process from plan approval to ships in operation
- introduction to classification: a closely mentored, on-the-job familiarisation with the application of the classification process
- classroom training in new construction, periodical and statutory surveys (strong emphasis is placed on accessing information for the survey process)
- focused field training led by dedicated mentors (this targets delegate specialisation)
- classroom training: consolidating learning from focused field training (emphasis on project-management and managing client relationships)

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Propulsion

Wärtsilä cooperates

Wärtsilä and IHI Marine United Inc. (IHIMU) have concluded a cooperation agreement to incorporate Contra-Rotating Propeller (CRP) systems developed by IHIMU into Wärtsilä's propulsion systems for diesel-electric driven ships offered to European customers.

The IHIMU CRP system is said to improve propulsion efficiency by 10% over a conventional diesel-electric propulsion configuration, and is applicable to all vessels from small ships to large LNG carriers. This efficiency improvement translates into significant fuel savings, enabling a short return on investment, as well as reduced greenhouse gas emissions.

In the future, the application of the CRP system could be extended to include hybrid (mechanical driven and electric driven) propulsion systems, and four-stroke mechanical systems.

In a separate announcement, Wärtsilä and Hitachi Zosen Corporation have signed a 10 year renewal of the existing cooperation agreement for the marketing, sale, manufacturing and servicing of Wärtsilä low-speed marine diesel engines. Hitachi's low-speed engine business is handled by the group company Hitachi Zosen Diesel & Engineering Co Ltd at its Ariake Machinery Works in Kumamoto Prefecture, Japan.

The licence cooperation agreement is a basis for the exchange of diesel engine technology between Wärtsilä and Hitachi.

Contact Wärtsilä Corporation, John Stenbergin ranta 2, P.O. Box 196, FI-00531 Helsinki. Finland.
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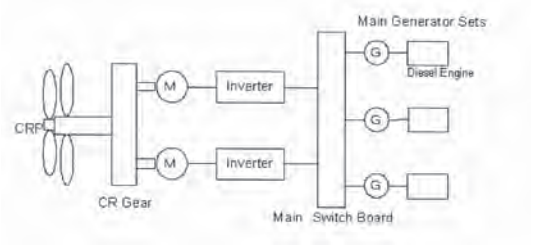
Picture of the Contra-Rotating Propeller (CRP) system.



Layout of a typical arrangement for a Wärtsilä - IHIMU CRP system in diesel-electric mode.

Ancillary equipment

Torm aware of bearing wear

Kongsberg Maritime made the first deliveries of its new bearing wear monitoring system (BWMS) in March 2009, for a series of 11 vessels in production in China for Danish shipping company Torm. The engine monitoring solution was ordered in February 2009 and will integrate with the K-Chief 500 automation solution already selected for all 11 newbuilds.

The Kongsberg Maritime BWMS is designed to monitor wear in bearings of large two-stroke diesel engines. It will provide early warning if any of the three crank-train bearings (crosshead, crank and main bearings) experience unexpected wear problems during ship operation, enabling the crew to carry out preventative engine maintenance in order to save downtime and money.

The system is available as a stand-alone solution or can be fully integrated with the Kongsberg Maritime K-Chief 500 and AutoChief C20 automation systems. In the case of the Torm newbuild vessels, the system will use the bearing wear monitoring mimic in the K-Chief 500 to monitor the wear and trending measurements, and a two level alarm will also be handled by the K-Chief 500 automation system.

The Torm vessels will be powered by MAN 6S50ME-B Mk8 engines and the BWMS will be installed by engine builder DMD in China.

Contact Kongsberg Maritime, P.O.Box 483, NO-3601 Kongsberg, Norway.
Tel +47 32 28 50 00
Fax +47 32 28 50 10
www.km.kongsberg.com

Ancillary equipment

NSC radar goes wide screen

Raytheon Anschütz has launched a new range of wide-screen NSC radars. The wide screen displays in 16:10

Latest wide screen display by Raytheon NSC radar.

format will be the same height as conventional displays but will be distinctly broader. Raytheon Anschütz offers an increased, quadratic target area on the radar screen (PPI). The user controls a larger area of the display and needs to change the range less often. The redesigned presentation of the radar screen allows a clear display of all control functions and status indications. The NSC radar reduces submenus and offers an intuitive and direct operation of all important controls.

The new radar presentation will go hand in hand with the unique user interface of NSC radars, where all operator buttons (e.g. TM / RM) are used for combined operator and status applications to help save on space and de-clutter the display. The radar screen will appear simplified and well structured with consistent large visual area buttons, which provide safe operation even during heavy seas. Due to a common operating philosophy, it is possible to operate all radar functions with an ergonomic trackball. An operation panel with rotary knobs and soft keys is still available directly to control important functions such as gain, anti-clutter, bearing and range controls.

Disturbances of the radar image caused by heavy seas (seaclutter) can be compensated with an auto-mode, reducing manual settings on a minimum. To combat clutter caused by rain, the NSC radar offers, apart from the common FTC function, the patented Raytheon RainRate function, which measures the actual rain attenuation and applies continuous filtering.

All NSC radars are fitted with the innovative SeaScout function that analyses the traffic situation relative to all plotted targets and displays dangerous areas when the operator presses a single soft-key. Based on a target's position, the closest point of approach (CPA), heading and speed, the function continuously calculates "no go areas" and shows them graphically on the screen.

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Ancillary equipment

Stow-away gangway

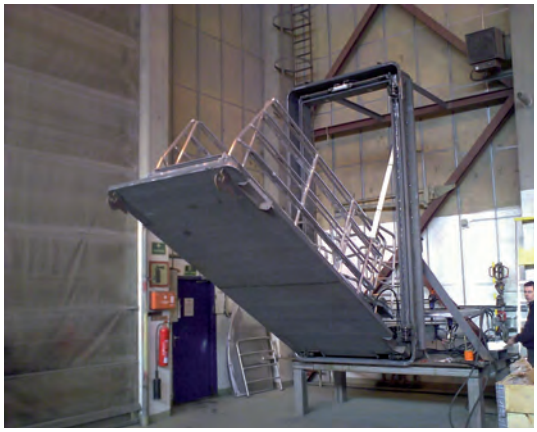
An aluminium gangway has been launched by Norwegian-based Brude Safety AS. The compact design allows it to be integrated into the door, taking up virtually no space.

The Brude gangway system consists of a coaming, a mounted door plus telescopic gangway, a hydraulic unit (HPU), a control panel, and side railings, which come up automatically when the gangway is extended.

The unit, which is powered by an onboard 230V system, is manually controlled through valves placed beneath the gangway. In the locked position, the door fits tightly against a rubber gasket in the coaming. The steel door itself is hinged to the coaming, and is stiffened in order to be as structurally strong as the ship's side. It is locked by means of a hydraulic cylinder, operating two locking cleats mounted in the coaming.

When the door is lowered and placed on the quay, the gangway has a free-float function to absorb tidewater and swell movements occurring between the ship and the quay. As an option, the gangway is also available with a swing movement (0-90deg) along the ship's side.

Brude Safety's latest aluminium gangway.



The Brude Gangway System meets latest SOLAS requirements, the classification society SeeBg (ISO 5488) and national Norwegian authority requirements (NS 6249).

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Tel +47 70 15 87 00
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Shipboard cranes

Palfinger into Singapore

Marine crane manufacturer Palfinger, of Salzburg, incorporated a new subsidiary in Singapore in early March 2009. The parent company, which specialises in foldable knuckle boom cranes, heavy duty knuckle boom cranes, stiff boom cranes and telescopic boom cranes for shipboard and onshore use, said that the new Palfinger Systems (SEA) Pte. Ltd, represented a joint venture between Palfinger Systems GmbH and long-term partner Wong Fong Engineering Works (1988) Pte. Ltd.

Palfinger Systems (SEA) Pte. Ltd. will be led by regional director Jack Wong. The company will further develop the sales, after-sales and service support infrastructure in the region for the complete Palfinger product range.

"We are committed to our customers and have a long-term focus," said Michel van Wees, Palfinger Systems managing director. "We want a local presence to be able to communicate closely and give the best possible support. The Marine and Offshore business is worldwide and that is why we are establishing global footprints in strategic global locations."

This is the second new Palfinger sales and service company estabablished by Palfinger in recent months, after the company set up Palfinger Systems, Turkey, in October 2008.

Ancillary equipment

Cathelco's tube protection

Cathelco has launched a system which is specifically designed to protect box coolers against the bio-fouling that can be caused by barnacles and mussels.

Cathelco's anode-based technology has been used to protect box coolers in the past, having been inserted through the side of the seachest, but the new approach sees anodes completely submerged for the first time.

In the new approach, the anode is mounted horizontally beneath the cooling tubes and has cathode plates on either side, creating a more even distribution of copper ions over the entire surface area. The ions create an environment where mussel and barnacle larvae do not settle or grow, avoiding the problems which are caused when they multiply and become encrusted on cooling tubes.

"The system will provide greater effectiveness in eliminating bio-fouling in box coolers enabling vessel operators to reduce their maintenance costs and make savings in fuel consumption", said Justin Salisbury, managing director of Cathelco Ltd.

A purpose built mounting unit has been designed to hold the anode horizontally in direct line with seawater flowing from the inlet to the cooling tubes. A cable exit boss is supplied by Cathelco with double watertight cable glands to produce an effective seal.

In common with Cathelco's existing equipment, the box cooler system is based on the electrolytic principle where current is supplied to the anode from a control panel.

The first vessel to be installed with the new box cooler system is *Venus*, an 86m car ferry operated by the Swedish Road Administration on the short crossing between Svanesund and Kolhattan.

The system protects two seachests, each containing four box coolers using two Cathelco anode units mounted beneath each cooler. The installation work was carried out by Marinprodukter, Cathelco's Swedish agent.

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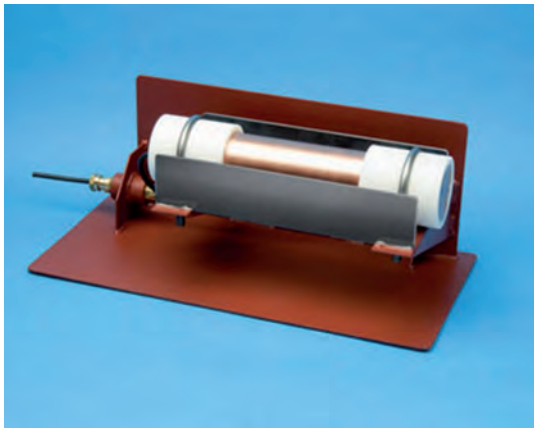
Cathelco's box cooler designed to protect against bio-fouling.



New rules for high strength steel

A different approach to rules governing new materials used in containership construction has emerged at Germanischer Lloyd.

Germanischer Lloyd has issued a new set of supplementary rules covering the application of new steel used in containership construction that are said to offer a different approach to rules set out by rival class body ClassNK.

The new classification and construction rules cover steel with yield strength of 460N/mm^2, a higher tensile material which is being introduced as part of upper hull construction in the very largest of containerships, where lower tensile materials would demand plate thicknesses that are too weighty, too costly, and too difficult to weld.

GL's new rules apply to steel plates of up to 100mm in thickness.

GL says that, based on fracture mechanics, there are two approaches to brittle fractures. One, which it attributes to ClassNK, has rules based on the notion that brittle fractures occurring in plates are arrested, by virtue of the structural properties exhibited by 'YP47', the higher tensile steel developed by Japanese steel mills in association with ClassNK. .

The German society says that it has, rather, based its own rules on avoiding initiation of brittle cracking altogether. The approach looks to analyse internal defects in the structure using ultrasonic techniques at the time of construction.

Unless otherwise agreed, the surface finish of the products shall be subject to standard EN 10163 specifications relating to the surface finish of hot-rolled steel plate, Class A, or equivalent standard. The manufacturer may, at his discretion, remove surface defects by grinding, provided that the depth of material ground away does not exceed 3mm in relation to the nominal thickness of the product and provided also that at least 93% of the nominal thickness remains. Defects shall not be repaired by welding.

> "The fracture tests GL has in mind are already well established in the aero, energy and nuclear industries, but they will represent a change of philosophy for shipowners."

Life expectations

GL is not advocating a blanket limitation on defects as such, however, as this would lead to production costs that could not be reasonably met by yards. Rather, it is looking to identify defects, in say a weld seam, at the time of construction, in order to establish design life expectations.

Ultrasonic test results will be properly documented in such a way that the performed testing can be retraced at a later date. Ten years after construction, GL would check specific weld seams to see if defects had reached a critical level. Normally, cracks in steel are rounded, and grow over a 20-30 year period, but even in the case of sharp cracks, GL postulates that a crack close to the steel's surface apparent after four years will not become critical until 16 years have elapsed, meaning that its 10 year check includes a six year safety margin. GL recommends that a second check should be carried out 15 years after a ship has been built. It says that the fracture tests it has in mind are already well established in the aero, energy and nuclear industries, but that they will represent a change of philosophy for shipowners. *NA*

LESS is more for cruise control

Caterpillar Marine Power Systems says that its latest 'MaK Large Engine Protection/Safety System' (LESS) reduces the time required for engine installation, commissioning and maintenance.

The MaK LESS package is said to be playing a pivotal role in the selection of larger MaK long-stroke medium-speed marine engines, comprising the M 25 C, M 32 C and M 43 C series. Currently, the technology suits main engines driving a Controllable Pitch Propeller (CPP). Now, a version tailored to easing operations of multi-engine plants, such as those used on large cruise vessels, is also being offered.

MaK LESS, which is type-approved by leading classification societies, integrates different functions involved in engine monitoring and control by using two small, resiliently mounted control boxes at the back of the engine. The first contains the engine protection system, the revs/min switch unit, the start/stop control, an LED display and a graphic display. The second box contains the complete engine monitoring system and MODbus data output to the alarm system. This box can also be fitted with an exhaust gas mean value system as well as control devices for main and big-end bearing monitoring. If the MaK DICARE engine monitoring and maintenance system is onboard, CANbus data output to the DICARE PC will also be placed in the second box.

Caterpillar says the LESS technology, which is delivered 'as-is' to the yard, "has advantages for everyone involved – the vessel operator, shipyard, engine manufacturer and commissioning dealer." The shipyard saves installation time and space because there are no separate electronic components and less wiring. Engine commissioning is quick and easy because pre-tests and class approvals are done at the factory and there is reduced potential for wiring mistakes at the yard. Finally, the vessel operator is said to benefit from the integrated protection/safety system because there is maximum engine availability and minimum risk of failures. Should failure occur, however, the affected sensor or actuator is highlighted in the LESS display for easy repair or replacement. *NA*

New EGR enters market

A new exhaust gas re-circulation (EGR) unit is making a significant impact in the Norwegian market for high and medium speed engine applications in the maritime and offshore sectors.

Marine DNOx has been developed by a partnership involving STT Emtec and AS Nymo.

Norway recently established a 'NOx-fee', bringing an immediate incentive for operators of coastal ships to apply NOx-reducing measures. In Europe and North America demands are simultaneously increasing for reduced pollution from offshore installations and ships.

Marine DNOx has been developed specifically for small- and medium-sized vessels in the maritime and offshore sector.

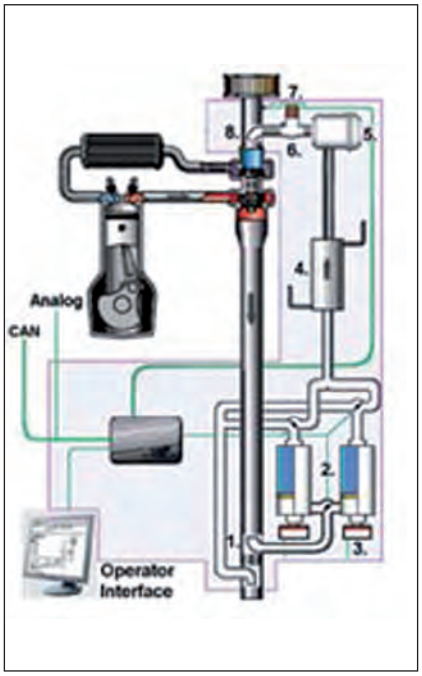
STT Emtec is manufacturing the Marine DNOx unit at its production facility in Sweden, while Nymo is responsible for distribution, installation and marketing of Marine DNOx throughout Norway to the maritime and offshore communities.

EGR is a well-known and cost-effective method for reducing NOx from automotive diesel engines. By recirculating a part of the exhaust gas back to into the air inlet, the formation of NOx in the combustion process can be cut. It is estimated that NOx emissions can be reduced by up to 50%.

The marine DNOx technology is a stand-alone system specifically suited for retrofit installations due to limited space requirements and without any engine modification. The partners say the Marine EGR system will be a cost-effective alternative to existing technologies, such as SCR and engine upgrades, especially in retrofit applications where limited space in enginerooms can be a considerable challenge.

To date, the system has been specified for 20 vessels in Norway, with installation of the system taking around one week.

Caterpillar dealer Pon Power has also said that it will take responsibility for commercialising the product when associated with all MaK engines and gensets in the range of 7000kW to 16,000kW. *NA*



Schematic diagram of the EGR system.

Höegh gas FPSO on the rise

Höegh LNG has announced its two year project for its LNG floating, production storage and offloading (FPSO) vessel.

With the pre-FEED (front end engineering design) study finished in March 2008 for a new FPSO, Höegh LNG moved onto the full FEED phase, which was due to be completed at the end of March 2009. Höegh LNG has spent the last 12 months and US$50 million on FEED engineering to develop its own design.

CB&I was awarded the FEED contract for the topside of the vessel, while Daewoo Shipbuilding and Marine Engineering (DSME) was awarded the contract covering the hull and containment systems. The vessel will have the capacity to treat and liquefy a well stream of 2.5 billion m^3 per year, although production capacity will be tailored to 'stranded' gas reserves.

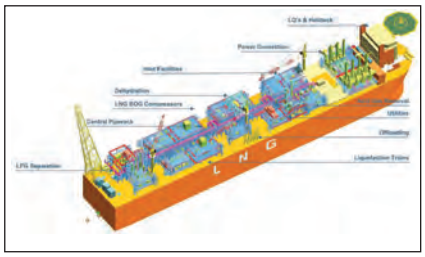


Illustration of LNG FPSO.

The vessel will be 380m in length overall, with a width of 60m and a draft of 11.5m. The LNG capacity will be 1.6 million tonnes of LNG per year, with LNG storage capacity being 190,000m^3. The final tonnage is yet to be decided upon and will be defined via the FEED contract.

Höegh LNG said it was looking to confirm an order for a vessel in the third or fourth quarter of 2009, with a view to taking delivery of the vessel in the third quarter of 2012.

The FPSO is intended to work to access stranded gas in small and medium-sized fields, in the range of 0.5TCF – 3.0TCF. It will provide an alternative to land-based greenfield LNG-plants and will be competitive both on costs and on construction time, according to Höegh. *NA*

Denmark goes greener

Main players in Denmark's maritime industry have set their sights on meeting new environmental goals. A report by Henrik Segercrantz.

Initiated 12 months ago, Denmark's "Green Ship of the Future" project is looking to develop strategies to reduce CO_2, SOx, NOx and particulate emissions from both existing ships and newbuildings.

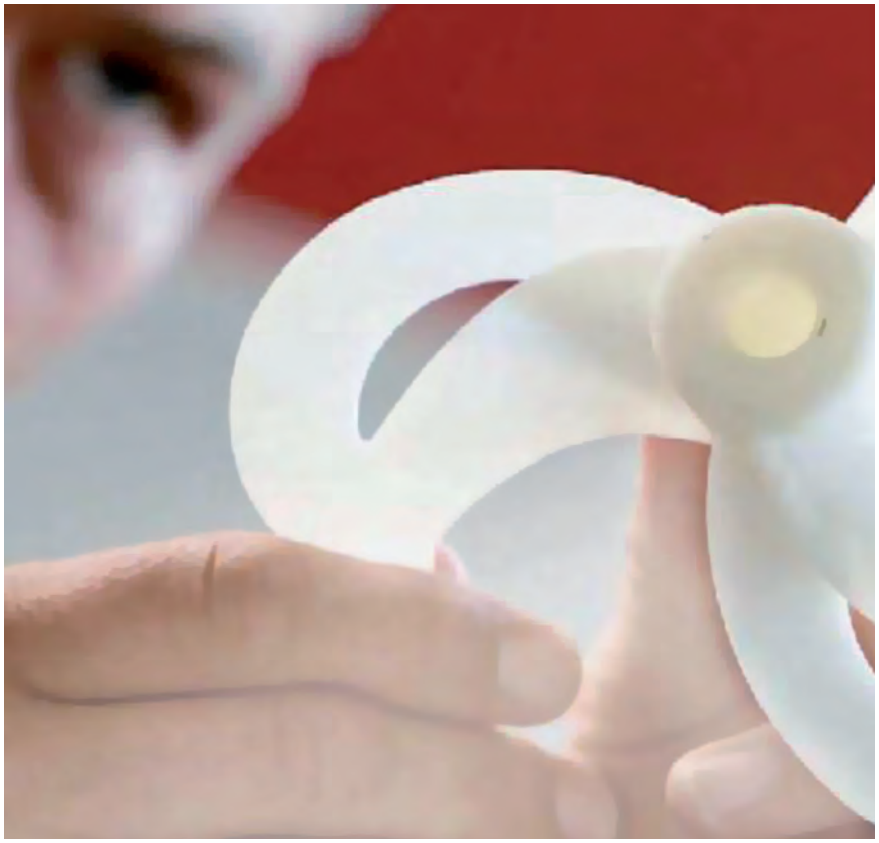
The project offers a framework within which to cultivate and demonstrate technologies capable of obtaining a 30% reduction in CO_2 emissions, a 90% reduction in SOx and a 90% reduction in NOx, drawing on a base equivalent to the average emissions of the world fleet in 2007. Areas of focus are: machinery, propulsion, operation and logistics.

Participating Danish organisations include MAN Diesel, A.P. Moller-Maersk, DFDS, Odense Steel Shipyard, Aalborg, ABB, Grontmij Carl Bro, Desmi, APV, DK Group, Injector, Aalborg University, the Danish Centre for Maritime Technology (including Force Technology), and the Technical University of Denmark (DTU). Companies fund their own research projects, although coordination work is funded by the Danish Maritime Foundation.

Within the project, tasks are divided into coordination, workshops and new projects, all coordinated by Thomas Eefsen, senior project manager at Force Technology. Marketing and communication are handled by Hans Otto Kristensen at DTU.

Current projects include approaches using existing technologies, but also some entirely new developments. In each project, the common goal is to be able to present a demonstration model to the Kyoto follow-up conference in Copenhagen at the end of 2009, either as a theoretical study or as a real demonstration case. Many of the projects are to continue after 2009.

The 'dual/multi certification' part of 'Green Ship' involves MCR development of main engines with dual or multi-certification for the simple change of MCR rating for any trade route or speed.



Proposal for an innovative 'tandem' propeller.

In order to assure optimal efficiency for various routes and ship speed, it is a good idea to be able to set the engine for two or more operating conditions. The task includes setting the correct specification by the operator and engine manufacturer, in order to receive proper classification and approval, also from the Flag State. The task is to develop retrofit-packages for the new settings and to do the installations. The project is coordinated by MAN Diesel.

The 'variable nozzle rings' unit explores the way turbocharging with variable nozzle rings can result in high efficiency in a wider load range than is the case for traditional turbochargers, especially at low engine loads, i.e. low speeds. As part of this project, ABB's new A100 VTG turbocharger with variable nozzle will be installed onboard *Alexander Maersk*. The next stage is two-stage turbocharging, also currently being developed by ABB.

Another strand to the Green Ship project is the 'optimisation of a waste heat recovery systems' (WHRS) unit. Some 10% of the shaft power energy produced by a main engine can be utilised for energy production using existing technologies. The project includes installation of a new exhaust gas fired boiler and turbo generator (steam/gas turbine and generator) on a vessel and optimisation of the WHR system given the available space constraints. WHRS-technology can be further developed to utilise up to 16% of the main engine's shaft power for electrical production, project managers maintain. The project is coordinated by Odense Steel Shipyard.

A separate project foresees the development and demonstration of an exhaust gas recirculation (EGR) system. The task is to achieve an EGR system installation that reduces NOx emissions from a big two-stroke main engine installed on a commercial vessel to half its current IMO Tier 1 level - the maximum NOx level permissible for engines built after year 2000. The project includes system integration within the scope of current engineroom design and current engine auxiliary systems. A suitable scrubber specification and design is to be selected for cleaning of sulphur and particles, an environmentally friendly cooling water system is to be developed, and an energy efficient exhaust gas turbine is to be developed as well as a cooler and a water separator. The project aims at a complete installation on the vessel *Alexander Maersk* in 2010. The first part of the work is being done using a stationary test engine. The full scale installation of the EGR will be supported by EU's Hercules-B project. The project is coordinated by MAN Diesel.

Also under development is the 'wet methods' project. This focuses on the further development of fuel/water emulsion system technology, and involves the re-design of the auxiliary system for increased fresh water generation, and the re-design of the fuel system. An already initiated project from MAN Diesel involves the development and demonstration of a scavenging air moistening (SAM) technology, or a fuel/water emulsion system (WIF). The project includes further development, design and installation of a SAM system, eventually in combination with WIF, in order to reduce NOx emissions. The goal is to find and verify the maximum potential for these methods to reduce NOx on big two-stroke diesel engines, without compromising engine reliability. A NOx reduction of more than 60% is expected with limited negative effects on fuel consumption, which can efficiently be compensated by efficiently recovering the extra amount of heat produced.

The main activities related to the SAM-system are the re-design of the turbocharger and cooling air-/cooler arrangement, design of components for the salt water air moistening system, and the design of auxiliary system for the scavenging air moistening system. MAN Diesel is coordinating this project.

A separate unit of the project looks at the redesign of pump and auxiliary systems with a view to reducing energy consumption on big vessels. Here, traditionally, the crew starts and stops a number of systems onboard. By using automation and continuous adjustments, some 10% in auxiliary power savings should realistically be achieved. The project is coordinated by A.P. Moller-Maersk and looks to optimise the pump and cooling water systems on a 34,000dwt bulk carrier design, with a view to cutting CO_2 emission by 1.5%, corresponding to 20% of the daily auxiliary generated power.

The marine department at Grontmij Carl Bro is coordinating the project 'automated engine monitoring', which looks to optimise engine settings using automated monitoring and information systems. The goal is to see that the engine is always set for optimal fuel consumption, by monitoring vital parameters resulting in either automatic adjustment of the engine or through information output for manual actions. The technology offers the potential to cut equivalent costs by between one and two per cent of total energy consumption. Full scale tests are to be concluded before December 2009.

Also part of the Green Ship project is the development of gas scrubber systems to remove up to 90% of SOx and at least a 90% of particulate matter from fuel emissions. The goal is for a vessel using heavy fuel oil and the scrubber system to be as clean as or cleaner than a vessel using MDO as fuel. Aalborg Industries has developed a number of exhaust gas scrubbers in the form of scrubbers for inert gas systems for big tankers. The project includes further developing of these scrubbers for use after the main engine. The project includes the entire design and pricing of the system, including evaluation of its efficiency in cleaning SOx and particulates. In June 2009, a scrubber will be installed and tested on a DFDS ro-pax ferry. The coordinator of the project is Aalborg Industries A/S.

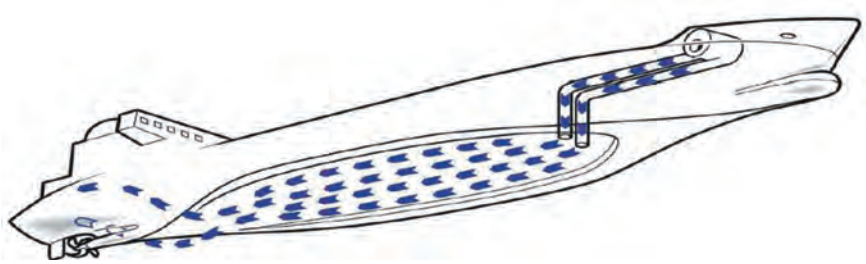
An alternative, or at least parallel, project looks at the further potential to use liquefied natural gas (LNG) as fuel, on the basis of technical feasibility and economic viability in a retrofit scenario.

The wide-ranging development programme also includes two projects looking to optimise control for ship cooling systems' energy consumption. Optimised control algorithms for reefer systems and for general high temperature and low temperature onboard refrigeration systems are being developed by Aalborg University in cooperation with Lodam A/S. The latter project is still at an early stage, but preliminary results indicate significant energy savings, possibly up to 45%.

Other projects falling under the Green Ship initiative include:

- development of an innovative tandem propeller, coordinated by Injector A/S, and
- development and verification of the 'air lubrication system', where up to 15% fuel and CO_2 savings may be achieved by a stand alone design. In this case, sea trials using the 83m tanker *ASC Demonstrator*, owned by DK-Group, have already been accomplished (see *The Naval Architect*, January 2009, pp26-27). DK Group has patented this technology, and a service test is underway. Pay-back time is estimated as two to four years. ***NA***

DK Group's patented 'air lubrication system'.



Index for energy efficient design

Proposal for an energy efficient design index for ships has deep roots at the Technical University of Denmark.

One of the key elements of the "Green Ship of the Future" has seen a proposal for an International; Maritime Organization Energy Efficiency Design Index (EEDI) of vessels presented at the IMO's Working Group on Greenhouse Gas Emissions (GHG) from Ships in March.

Hans Otto Holmegaard Kristensen, senior researcher at the Technical University of Denmark (DTU), explained that the index being planned would mandate a maximum CO_2 emission per tonne deadweight per nautical mile for new ships. According to Mr Kristensen, it would be more correct to call the index "maximum allowable CO_2 emissions per transport unit", but in the discussions at IMO the index has got the official name "Energy Efficiency Design Index".

Mr Kristensen has, in fact, been working on an energy efficiency index for ships for nearly 10 years. "I just happened to be working on this important project much before others," he told *The Naval Architect*. His program calculates emissions from different ship types, using a set of input values in a generic computer model for each, where the power can be predicted based on the ship's main dimensions, determined from statistical analysis of ship data drawn from the Lloyd's Register-Fairplay ship database. Not only can CO_2 emissions be estimated, but also SOx, NOx and particulates. Furthermore, the program can estimate the influence of various ship parameters, such as changes in the main dimensions, changing the service speed, engine configuration and propulsion layout.

Mr Kristensen has been able to work in close cooperation with different Danish shipowners in order to back-up the theoretical results with real data. Due to the growth in size of containerships since 2000, the model is now being upgraded. During this upgrading the influence of new exhaust gas cleaning technologies will also be taken into account, to be able to judge the influence of selected technology on the total emission picture at the planning stage.

As far as discussions at IMO are concerned,

Ship data	Units	Deafult values	First modification	Second modification
Panamax (1) or Postpanamax type (2)	(-)	1	1	1
Container capacity (type 1: <4900 TEU type 2: >4900 TEU)	TEU	3500	3500	3500
Length between pp	m	231,37	231,37	231,37
Length in waterline incl. bulbous bow (= 1,01 Lpp)	m	233,68	233,68	233,68
Length over all	m	244,97	244,97	244,97
Breadth mld.	m	32,24	32,24	32,24
Depth	m	19,18	19,18	19,18
Design draught	m	11,24	11,24	11,24
Scantling draught	m	12,22	12,22	12,22
Scantling draught - design draught	m	0,97	0,97	0,97
Design deadweight/Scantling deadweight	%	86	86	86
Design deadweight	tons	39580	39580	39580
Scantling deadweight	tons	45794	45794	45794
Scantling deadweight/TEU	tons/TEU	13,08	13,08	13,08
Lightweight coefficient	t/m^3	0,109	0,109	0,109
Lightweight	tons	15567	15567	15567
Block coefficient (based on Lpp) at design draught	-	0,642	0,642	0,642
Block coefficient (based on Lpp) at scantling draught	-	0,657	0,657	0,657
Service speed at design draught	knots	23,0	22,0	20,0
Froude Number at service speed	-	0,247	0,235	0,215
Scantling trial speed at 75 % MCR ('reference speed')	knots	22,5	21,5	19,5
Froude Number at 'reference speed'	-	0,241	0,231	0,210
Service allowance on resistance	pct.	10	10	10
Transmission efficiency	pct.	97	97	97
Normal main engine service rating	pct. MCR	85	85	85
Main engine power (MCR)	kW	37315	30542	21301
Auxiliary power at sea at design draught	kW	1183	1014	783
Propeller diameter	m	7,87	7,87	7,87
Speed dependency exponent n (Power = constant V^n)	-	4,7	4,2	3,6
IMO Energy Efficiency Design Index (CO_2 emissions)	g/dwt/nm	14,84	12,57	9,68

Influence of speed on the proposal for IMO's Energy Efficiency Design Index.

Mr Kristensen said: "The goal is to be able to have the theoretical framework ready for the new Energy Efficiency Design Index before the Climate Summit in Copenhagen at the end of 2009 for establishing permitted CO_2 emission levels for different ships. I personally do not think this will be implemented before two or three years, but we are working hard on it, and the goal is to reach an agreement on the matter at the next MEPC 59 meeting this summer.

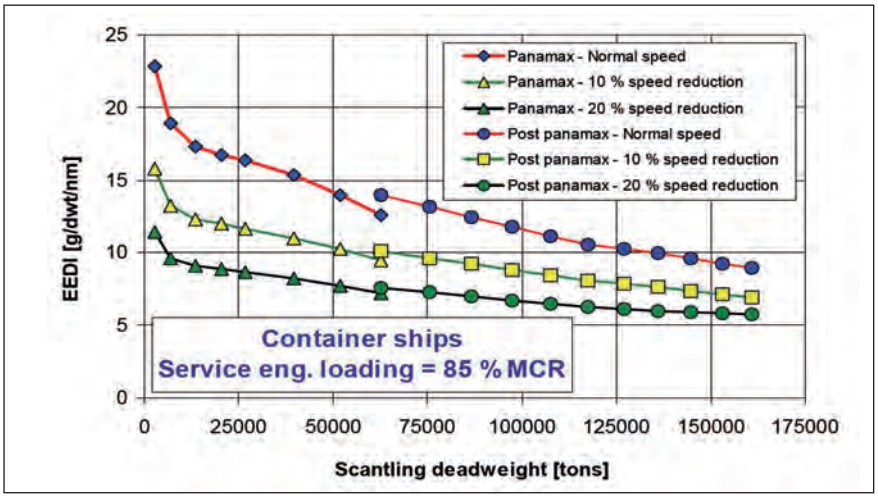
"Indirectly, the IMO index will slow down the speeds of vessels in the future," Mr Kristensen noted. The solution is not that simple though, and it is likely that such an index, in its current form, will be problematic for the ferry industry, for example. If the index for a certain ferry required a speed giving a turnaround time of 25 hours instead of 24 hours, for example, this could destroy the timetable and thereby the economy for that particular route because a regular 24 hour sailing cycle could not be obtained. Another problem with the current index is the divergence it gives for Panamax-size vessels as compared to post-Panamax vessels (see graphs on next page).

The very simplified version of the Energy Efficiency Design Index proposal is;

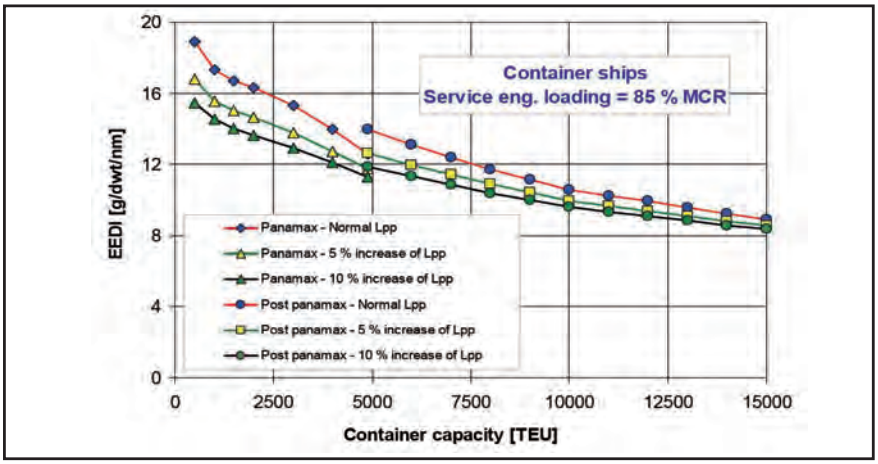
$$\text{EEDI} = \text{Energy Efficiency Design Index} = \frac{\sum C_F \cdot SFC \cdot P}{\text{Capacity} \cdot V_{ref}}$$

where;

- C_F = a non-dimensional conversion factor between fuel consumption measured in g and CO_2 emission also measured in g based on carbon content (C_F = approximately 3.1).
- SFC = specific fuel oil consumption for the engine in g per kW per hour.
- V_{ref} = the ship speed, measured in nautical miles per hour (knots), on deep water in the maximum design load condition (scantling condition) at 75% of the maximum output of the engine(s) and assuming the weather is calm with no wind and no waves. The maximum design load condition shall be defined by the deepest draught with its associated trim, at which the ship is allowed to operate.
- Capacity = the deadweight in tonnes for dry container ships, bulk carriers, tankers, gas tankers, ships, and general cargo ships. For passenger ships capacity is defined as the ships gross tonnage, GT, as such ships are more 'volume carriers' instead of



Influence of containership deadweight on the proposal for IMO's Energy Efficiency Design Index.



Influence of containership TEU on the proposal for IMO's Energy Efficiency Design Index.

'deadweight carriers'.

- P = engine power in kW which shall include both the main engine power for propulsion (75% MCR) and the auxiliary engine power for other purposes.

The index was applied on a Panamax size 3500TEU container vessel, with only the service speed varying. The resulting indexes for speeds 23knots, 22knots and 20knots are 14.64, 12.57 and 9.68 respectively.

Based on detailed analysis on the parameters influencing the index, Mr Kristensen recommends being careful when selecting the engine power, and especially the selected service allowance. He also proposes that consideration must be made of the dual certificate of the main engine(s) in cases where the EEDI is too high, and evaluating carefully the main dimensions and other design variables on an early design stage. He said that, in his own view, two separate EEDI baselines should be considered, one for Panamax containerships and one for post-Panamax ships. Speed is a very important parameter. *NA*

Indexed development

The International Maritime Organization reports "major progress" in the development of its 'Energy Efficiency Design Index," developed by the Danish Maritime Authority.

The anodyne title of IMO's new Energy Efficiency Design Index, developed by the Danish Maritime Authority, represents the UN body's latest attempt to get to grips with greenhouse gas emissions from ships, after previous discussions have been filibustered by administrations citing shipping's exemption from the Kyoto Protocol.

The EEDI was presented at the second intersessional meeting of IMO's Working Group on Greenhouse Gas Emissions (GHG) from Ships, held at IMO's London headquarters from 9 to 13 March 2009. A report will be forwarded to IMO's Marine Environment Protection Committee (MEPC) when it meets for its 59th session in July.

The working group, which was attended by more than 200 experts concentrated on the technical and operational measures to reduce GHG from ships.

The EEDI is meant to stimulate innovation and technical development of all the elements influencing the energy efficiency of a ship, thus making it possible to design and build intrinsically energy efficient ships of the future.

Based on the concept of measuring the environmental costs of a shipment against the benefit for society as a whole of same, IMO's reference to "major developments" is understood to refer to the fact that the working group was allowed to focus on technical, rather than political debate (although, see p61), defining capacity for passenger ships in gross tonnage terms, finding a more accurate way of incorporating shaft generators into calculations, and allowing for the inclusion of waste heat recovery systems within calculation. *NA*

Bigger wind comes out of Blue

Blue Ocean Ships has finalised development of a new wind turbine installation vessel, designed to meet current and future requirements of wind farm developers.

Copenhagen based consultancy Knud E. Hansen A/S, which developed the world's first dedicated wind turbine installation vessel, *Resolution*, in operation since 2004, has returned with a new specialised ship for new Danish ship management company Blue Ocean, designed for operations on a wider scale.

The ship is designed for unrestricted worldwide service and tenders for a number of vessels have been finalised. Blue Ocean Ships is now in the process of negotiating the construction contracts for an as yet unpublicised number of vessels.

"As offshore wind park development has become more ambitious, the trend has clearly been to move to larger turbines and into deeper water in search of more productive wind fields," said Ken Goh, Knud E Hansen manager, mechanical projects. "Such an example is the London Array, which will eventually consist of more than 300 turbines up to 7MW in size. This next generation of vessels, with a length of about 160m and breadth of 42m, will be radically different and significantly larger than any other similar vessels, and are designed to install the next generation of 5MW-10MW wind turbines in waters over 60m deep."

Blue Ocean's proposed new generation wind turbine vessel.

A key requirement for the new design was to expand the operational envelope, not only with respect to water depth but also to other environmental factors, such as wind and wave conditions, to maximise the number of operational days the vessel can be used to install wind turbines. Operations in shallow waters and tidal areas are also accommodated by the use of specially designed air-cooled machinery systems.

The new vessels will be able to perform all the necessary stages of wind turbine installation without support from other vessels, from pile driving foundations to the installation of transition pieces, turbine towers and finally the nacelle and blade assembly itself. The capacity will be much higher than before and the installation process will be optimised by reducing the amount of on-site assembly for a wind turbine to the absolute minimum. For example, the vessel's deck is designed to carry the whole turbine tower as a single unit, instead of a number of sections that would need a time consuming stacking and fastening process. The goal is to be able to install one complete wind turbine topside each day, thereby significantly reducing the cost of offshore installations. A 1200tonne main crane rotates around the aft starboard leg to provide the flexibility required for the installation of the tower and nacelle components of future wind turbines, which tend to become even bigger. The vessels are designed to be able to install a 500tonne nacelle at a height of 120m above the water. A smaller auxiliary crane, mounted amidships, supports loading operations and reduces port time, while a further aft-mounted auxiliary crane supports man-riding operations to and from the tower bases.

Six truss structure legs and specially designed high-speed jacking mechanisms will give the vessels what is said to be unrivalled capability and safety.

"There have been several accidents with three and four legged jack-ups," Mr Goh notes. "Unstable clay sea beds, scouring due to ocean currents and punch-throughs make jacking operations risky, but are a necessity for installing the delicate turbines. The new vessels will have to jack up and down many times a week so the safety issue was paramount. With a vessel this size, there aren't too many options for getting help if you get stuck. We can lose footing on one leg completely and still be able to recover safely. Most current jack-up type installation vessels can only use their legs to stabilise themselves, and cannot jack completely out of the water. With the powerful jacking mechanisms and increased leg length afforded by the truss structure, these vessels can quickly jack high above the sea, increase the operations weather window and ride out storms instead of having to run for shelter," he said.

The vessels are powered by a 20MW

diesel-electric plant consisting of four main and two harbour gensets. A relatively high speed of some 14knots will reduce transit time to-and-from port and maximise the time that the vessel can spend working at the field. Propulsion and manoeuvring is arranged with four aft-mounted thrusters and three forward thrusters, of which two are retractable azimuthing units, able to operate as tunnel thrusters to support shallow water operations. The units forward can also be deployed to assist in course keeping in difficult sea ways.

"Unlike a normal vessel, the thrust required for dynamic positioning (DP) operations in deep water are extremely demanding due to the drag on the lowered legs from ocean currents," Mr Goh said. "The high powered thruster system is connected by a redundant power distribution system which is necessary to maximize the DP2 operational envelope."

High capacity ballast, heeling and fuel transfer systems have been specified to cope with movements of large load outs. An advanced load management system reads tank ullages, crane and load movements and can calculate vessel stability, trim and stresses for both planning purposes and monitoring in real-time. Heat recovery is maximised for heating and fresh water generation by using exhaust gas boilers on each of the four main diesel generators. The vessels also have a comprehensive waste handling system to reduce the amount of waste needing to be stored and to provide a high degree of operational redundancy. Furthermore, wastewater can be recycled for technical purposes.

"In a market where it is becoming increasingly difficult to attract and retain good crew, much attention has been paid to crew comfort conditions and the amenities available," Mr Goh said. Each of the crew and contractors will have their own cabin with full wash facilities. Noise levels have been reduced through careful isolation of structures and use of materials. Multiple day rooms, a library, a theatre and a fitness centre with panoramic views are also among the other facilities provided to entertain and improve the working life aboard the vessels.

With a large crane and deck space, the vessel will also be able to transport and lift large modules for the offshore oil and gas industries. A medium class helicopter platform and a large moonpool to support ROVs and other offshore operations are also provided. It is projected that the first vessel will be operational in the first half of 2011. *NA*

Odense yard cut down to size

After a reality check courtesy of international consultancy A T Kearney, Denmark's biggest shipbuilder, Odense Staalskibsværft A/S set up a new business model in January, and began angling for more specialised shipbuilding projects and touting yard areas for external use.

While confirming that shipbuilding would continue at Lindø, the company's board acknowledged that new market conditions required new solutions.

While the existing orderbook remains intact, the Lindø yard effectively finds itself sliced in three – it is a shipyard, now focusing on smaller vessel types, and specifically offshore, but it is also an industrial facility for heavy steel products, and a 'shared facilities' business offering maintenance workshops to the yard itself and to outside interests.

"We are pleased with the new business model for Lindø which we believe is right for the company," said Finn Buus Nielsen, managing director of the Odense yard. "The business model is also right for A.P. Moller-Maersk, which will retain their technical knowledge of shipbuilding without having significant risk on a non-strategic business. Finally, it is the right decision for the Munkebo area which is set to gain a number of businesses in the area instead of one dominating business. We will now continue the job of converting the shown interest into firm contracts and the job of getting new orders for the shipyard."

MAN ends up in Tiers

While future orders have tailed off, the environment continues to drive developments at leading engine supplier.

MAN Diesel has made good on its 2006 decision to switch entirely to licensee production of two-stroke engines by 2009. The main effect of this decision has been felt at Fredrikshavn, Denmark, where production is now focused on smaller four-stroke engines, up to 3060kW and stationary generating sets up to 4230kW. Four-stroke engines are also produced in Augsburg, Germany and in Saint-Nazaire, France.

From 2009, the assembly and testing of the largest bore diameter four-stroke engines, of the 58/64cm range, will also take place in Fredrikshavn.

Today, MAN Diesel has over 40 licensees building engines and turbochargers throughout the world. Of these some 20 are two-stroke manufacturers, of which five have joined the fold during the last year.

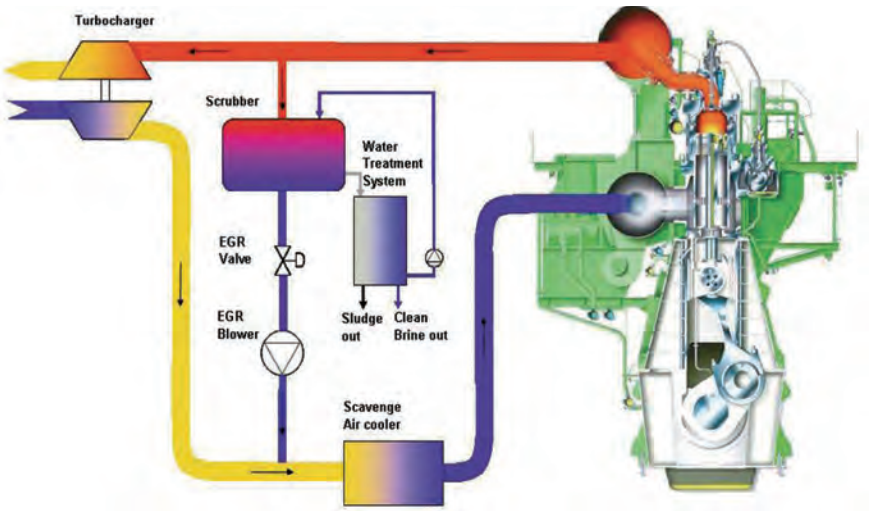
These organisational changes were, in part, triggered by the need for additional production capacity as shipbuilding boomed. This necessity has abated, as ship orders have slowed, as reflected in the fact that demand for diesel engines recorded an 8% drop in order intake during the second half of 2008, with demand for marine diesel engines falling in particular. This was partly offset by increased order intake in the land-based power plant business, while MAN's service network expanded. Even so, the total order intake for 2008, of €3089m, was some 9% lower than a year before.

Søren H. Jensen, head of MAN Diesel's research and development department, said: "The cancellations within the shipbuilding industry have, so far, not affected the slow-speed sector that much. We have seen some cancellations, mainly from our licensees supplying Chinese shipyards, but these have mainly been in the small bore end, in cylinder diameters of 50cm and below."

Green and lean

Despite the vagaries of the current market, environmental concerns continue to prove a main driver for future engine development. Last summer MAN Diesel announced that all of its engines met the Tier II regulations of IMO, which will enter into force from year 2011, including stricter NOx emission limits. "With electronically-controlled engines, MAN has focused on advanced rate shaping of the injection process, while on the conventional engine types combustion has been adjusted through design," said MAN Diesel executive vice president Peter Sunn Pedersen. "With regard to Tier II, we have now identified all the possible means which can be used to meet the needed level. We now know what to do and are now implementing our knowledge on our different engine types. For each model we need to find the right combination." Depending on the engine, the solution varies, but it is typically a combination of the tuning of the combustion, chamber shape, scavenge air pressure, atomiser spray pattern and injection rate-shaping.

Whereas Tier I limits NOx emissions to 17g/kWh for two-stroke engines, the Tier II limit is 14.4g/kWh. Tier III, to enter into force from 2016, sets the limit to 3.14g/kWh in coastal waters. "We are now working at full speed on meeting Tier III," said Mr Sunn Pedersen. "The projects here are still more R&D related. Regarding Tier II, our goal has been to achieve the NOx reduction without much increase in fuel consumption. With electronic control we can start the injection with lower pressure and then increase it. This gives low NOx emissions with just a slight increase in fuel consumption, which can be utilised in our series of low-speed engines with electronic control."



MAN Diesel's Copenhagen Test Centre has been able to reduce NOx emissions by 70% using its 4T50ME-X low-speed test engine in combination with a prototype exhaust gas recirculation (EGR) system.

Gas recirculation

MAN Diesel has also joined forces with its Danish partners from the industry in the "Green Ship of the Future" project. The project overlaps the HERCULES Beta project, and was initiated in April last year. A year ago, The Copenhagen Test Centre announced it had been able to reduce NOx emissions by 70% with its 4T50ME-X low-speed test engine. Using a prototype exhaust gas recirculation (EGR) system, the maximum NOx reduction was 70% at 75% load and 60% NOx reduction at MCR with a marginal negative SFOC 'trade off.' According to verification measurements, other emission-parameters and engine components were only slightly affected by the EGR process. EGR has shown promising results in reducing diesel-engine NOx emissions for decades, and is

commonly used in trucks. Since 2002, the EGR technique has been improved by introducing exhaust-gas coolers to further reduce NOx. Reductions of up to 60% have since been obtained in trucks.

The EGR process used in the test centre is based on the recirculation of exhaust gas on the engine-side of the turbocharger. Part of the exhaust gas is re-circulated from the exhaust-gas receiver to the scavenge-air system, downstream of the turbo compressor.

An electrical, high-pressure blower forces the exhaust gas through a wet scrubber (wet-gas cleaner) to the higher-pressure scavenge-air receiver. The scrubber cleans the exhaust gas by removing SOx and particulates and also cools it through humidification before reintroduction to the combustion chamber. The resultant NOx-reducing effect is due to part replacement of the oxygen by CO_2, which reduces the maximum peak temperatures due to deceleration of the combustion.

Mr Jensen said he was confident that EGR was a competitive, NOx-reducing technique and that it would be used in large, two-stroke, marine diesel engines in the future. The company is now working on optimising the process in Copenhagen within the context of the "Green Ship of the Future" project and is to demonstrate it in service through a complete installation on the vessel *Alexander Maersk* in 2010.

Another project of MAN Diesel is the development of the fuel/water emulsion system (WIF) including a re-design of the auxiliary system for increased fresh water generation, and a re-design of the fuel system. "Here we are also working with A.P. Moller-Maersk and will test the system on an existing vessel or a newbuilding," said Mr Jensen. "The main activities related to the scavenging air moistening SAM-system are already going on as part of MAN Diesel's own R&D activities." *NA*

MAN goes marching on

MAN Diesel's latest K80ME-C9 engine recently received type approval at licensee Hyundai Heavy Industries in South Korea. With a bore of 80cm and an increased stroke, this engine has a power density more than 20% higher per cylinder than its predecessor, the K80ME-C6. The new engine is thus comparable in power range with the existing K90ME-C6.

Also unfolding is MAN Diesel's turbocharger programme. MAN Diesel's first VTA "Variable Turbine Area turbocharger technology" has already been installed, affixed to a slow speed, 6S46MC-C two stroke engine, one of two installed in the twin engine propulsion system of the 70,000dwt, shallow draught tanker *Stena President*.

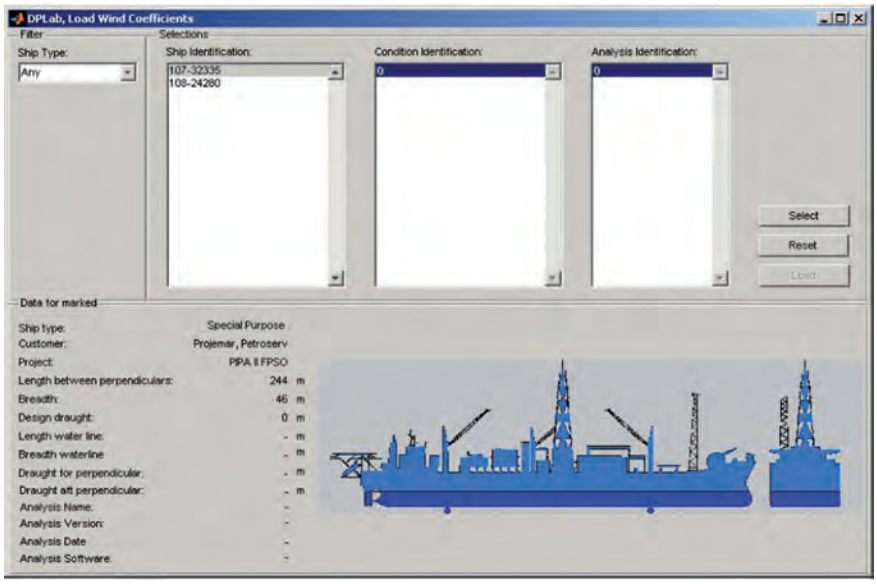
DPLab from dynamic Force

Force Technology is applying its DPLab dynamic positioning 'holding capability' software to an ever broader range of vessel types.

Force Technology has been involved in numerous dynamic positioning (DP) projects since the early 1990s. According to Thomas Eefsen, senior project manager at Force Technology's Hydro and Aerodynamics laboratory in Denmark, these projects cover the range, from numerical predictions to full blown model tests on ships and semi-submersibles.

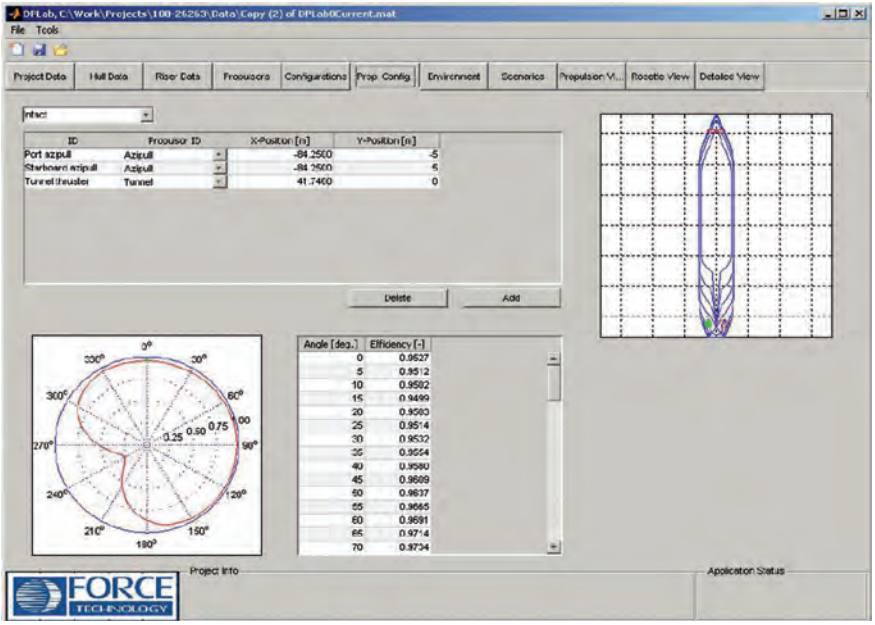
"In a project regarding dynamic positioning, the following three questions need an answer: is station keeping possible under current conditions? What size of thrusters is required and where do we need to install them to maximise their effect? And how are the thrusters best utilised?

Mr Eefsen notes that these three problems do not, of course, have independent solutions. "A common solution solving all three must be found." For this purpose, Force Technology has developed the Holding Capability Module for its DPLab software, intended for in-house use or as software sold in a package with wind and current predictions or wind tunnel model tests. The program follows the recommendations of the International Marine Contractors Association.



DPLab provides access to database of wind and current loads.

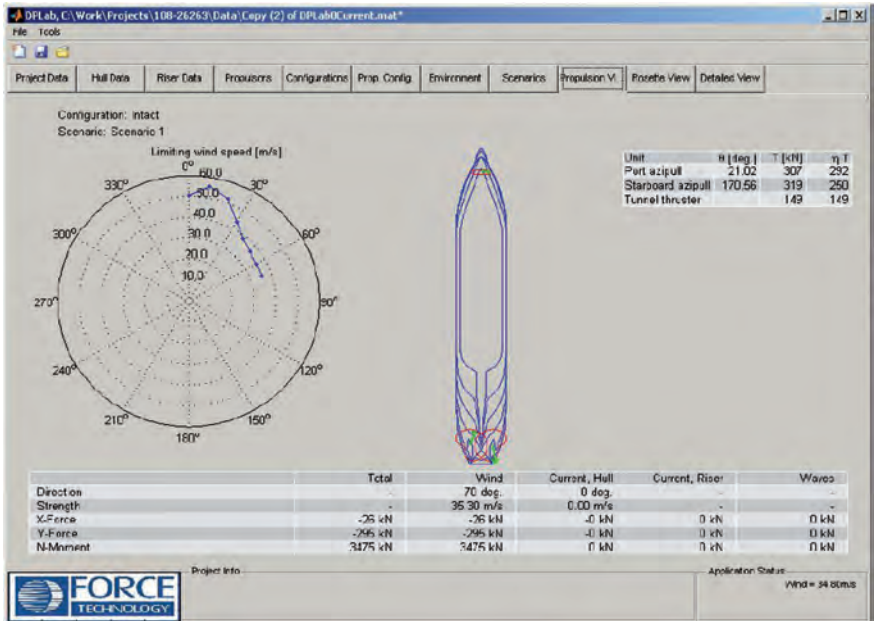
The data display allows for various analysis, database search or individual definition of thrusters and their efficiency.



The Basics version performs static calculations, balancing the available thrust with environmental forces. The holding capability is defined as limiting environmental forces arising from wind, current and waves, that can be balanced by the vessel using its propulsive systems in an optimal way.

Once the key data for the vessel or platform has been assembled and entered into the program, various analyses can be performed. These include Failure Mode Analysis (FMA). It is important for any operator of a vessel featuring DP capability to be able to evaluate the ability to stay at position in case of failure on one or more units. This task is built into the software of DPLab and is carried out, providing the client with rapid evaluation of the failures and their effects on the DP capability

The basic input data required for DPLab are vessel geometry, wind and current force coefficients, second order wave drift forces, thruster sizes and positions, and thruster efficiencies, that is, thruster to thruster interaction and thruster to hull interaction. Wind and current data are either obtained from predictions based on existing databases combined with Force's empirical data, or alternatively from wind tunnel tests on the



Intuitive inspection of various settings and solutions is possible.

specific project. Second order wave drift forces are either imported from the client's own seakeeping data response amplitude operators (RAOs) using WAMIT wave interaction analysing tools (or similar), or computed utilising Force Technology 3D panel seakeeping code Omega. Thruster information is either based on generic units and position data, data supplied by the thruster vendor, or from the model test on the exact project.

The results of the DPLab program are presented in a range of graphs and diagrams such as polar diagrams of limiting environmental conditions. For external use, the results can be exported and used in other programs or spreadsheets.

Once a configuration and relevant scenario has been prepared and analysed, the system automatically generates a report with settings and results. In case numerous configurations are analysed, the results are also compiled in comparison plots and tables for easy review and conclusions.

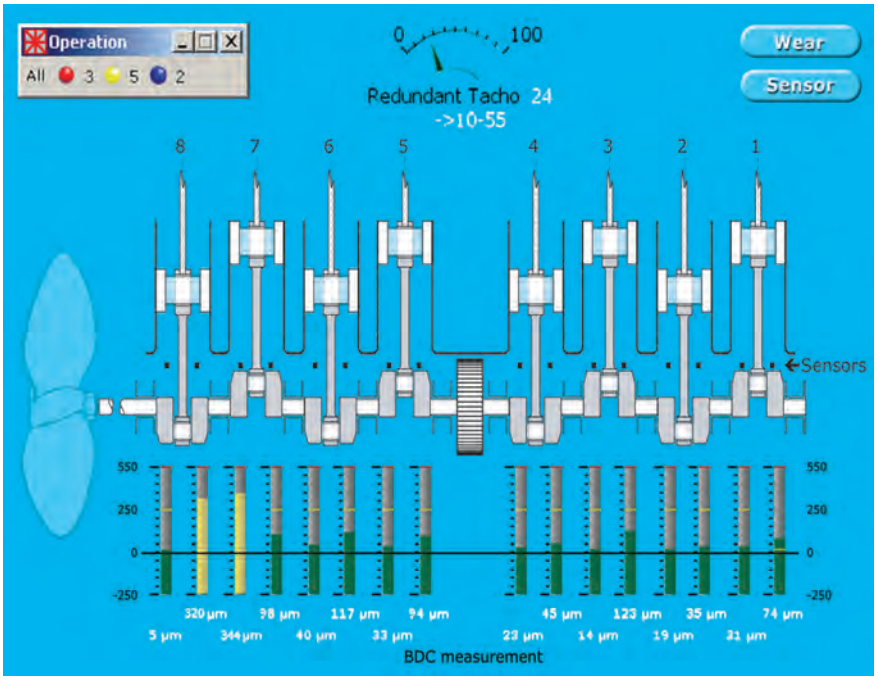
According to Mr Eefsen, the DPLab program has been used to assign a range of ship types, including drilling vessels, semi-submersibles, crane vessels, special purpose vessels, AHTS, etc. *NA*

Rovsing Dynamics stays in condition

OPENpredictor condition monitoring from Rovsing Dynamics is proving its worth for a range of shipowners.

Two years into operations, Scandlines is reported to have achieved significant cost savings in its overhaul programme for the ferry *Prinsesse Benedikte*, after adopting condition monitoring procedures developed by Rovsing Dynamics.

In combination with equipment supplier Rolls-Royce, Rovsing developed an online condition monitoring version of its OPENpredictor, which allows for concurrent monitoring of the main engine, through bearings and other



BDC measurement mimic for 8-cylinder engine. In case of rapidly developing bearing faults bar graphs for faulty bearings change to yellow or red at pre-defined wear levels, and the system initiates a sounding alarm.

machinery, so that it could be applied to the ferry's azimuthing thrusters, which are more complex and costly to repair than ordinary shaft-propellers.

The system offers advanced warnings of potentially expensive damages and is set up to avoid the loss of direct repair costs and indirect costs due to non-availability of a vessel at peak traffic times. It aims to reduce unplanned overhauls by 30%, potentially saving €1m- €.2m per year.

The online monitoring solution gives insight into the actual condition of the thrusters, providing upfront knowledge about developing problems and the possibility to inspect and plan any repairs at an early stage, and to make the necessary repairs when it is least inconvenient.

The system's patented AutoDiagnosis feature provides automatic fault identification, issuing reliable warnings and predicting lead times to inspection.

In the autumn of 2007, Hapag-Lloyd installed the OPENpredictor condition monitoring solution on three 4000TEU containerships in service since 2002 - *Dublin Express*, *Glasgow Express and Liverpool Express*. The systems monitor both the vessels 9-cylinder Wärtsilä engines and their Napier turbochargers. The bearing wear monitoring solution from Rovsing Dynamics enables the crew to plan corrective actions in due time and offers many expansion options like monitoring of other machinery and integration of predictive maintenance information with other systems.

Within six months, the investment paid off, when OPENpredictor detected increased vibration levels in one of the turbochargers onboard *Glasgow Express*. The warning was given in due time for the crew to replace the turbocharger's turbine rotor, thereby avoiding the risk of significant damage.

Following the successful field test on the three vessels in service, Hapag-Lloyd decided to equip its six new 8750TEU containerships under construction with the OPENpredictor online condition monitoring solution to cover the 12-cylinder MAN B&W main engines, with a view to saving time, cost and manpower by avoiding open-up inspections.

Again, JSC Primorsk Shipping Company recently selected Rovsing Dynamics to supply bearing wear monitoring of the MAN B&W engines for its new Ice Class, 104,000dwt tanker *Zaliv Amurskiy*. Seven sistership will also now be equipped with the system. According to PRISCO technical director Konstantin Globenko, one of the speakers at Rovsing Dynamics' vessel condition monitoring seminar at SMM in Hamburg last autumn: "The main engine is critical for our tanker operations, so we want to make sure that it works around the-clock without problems. We are also looking to change our maintenance strategy to condition-based maintenance to avoid open-up inspections. These are critical for our operations, and we have experienced problems due to crew or shiprepair yard mistakes during inspections."

PRISCO intends to integrate information from the monitoring system into its maintenance system DANAOS. "We want to have all data in one global system for control of vessel condition and condition-based maintenance planning," Mr Globenko said.

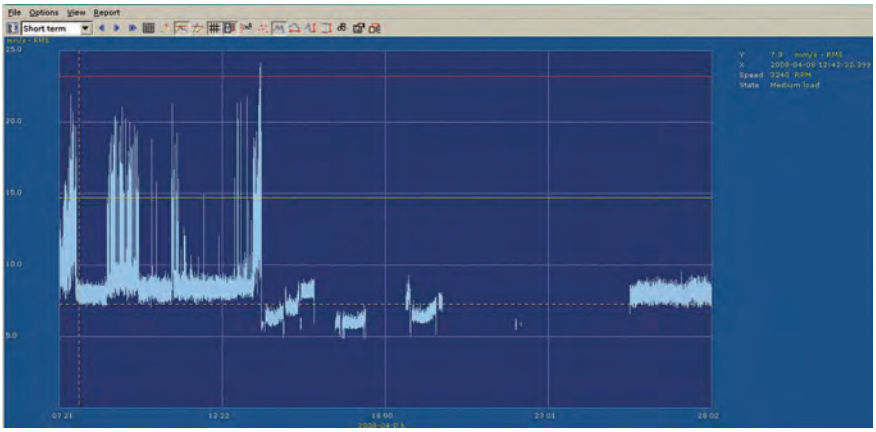
MAN Diesel now recommends that shipowners avoid regular open-up inspections of crank-train bearings when it comes to certain engine types, and that they only conduct condition-based maintenance, supported by various types of monitoring. The overall aim is to increase vessel reliability and reduce operational costs.

Citing 'the human factor', the engine builder suggests that open-ups identify less than one percent of problems, while generating more than two percent of damages. Grave examples of open-up induced engine damages include forgotten tools inside the engine. Other damages include lube oil being contaminated with water, white metal or other foreign particles, thin/thick shell fatigue and steel-to-steel contact. In many cases traditional systems like oil temperature measurement and oil mist detection warn far too late, when bearing damage had occurred, or not at all.

MAN Diesel identifies the monitoring of bearing wear, water in oil, bearing temperature, shaft line earthing device effectiveness as the ideal basis for carrying out condition-based maintenance.

Rovsing Dynamics is one of MAN Diesel's approved vendors of bearing wear monitoring. If required, data on water in oil, bearing temperature and shaft line earthing can also be integrated in the Rovsing Dynamics bearing wear monitoring system.

Since Rovsing Dynamics launched its first condition monitoring solution for maritime use in 2004, OPENpredictor has been chosen for more than 50 vessels, involving more than 12 shipowners, as a stand alone or combined solution. *NA*



The OPENpredictor graph shows how the turbocharger's vibration level increased beyond the yellow alert level and the red alarm level on a Hapag-Lloyd vessel. The investment in the monitoring system paid off in six months.

Hydrogel technology makes smooth entrance

Hempel's antifouling coating, Hempasil X3 is making an impact among owners of ships operating around the 8knot mark and in service around 50% of the year.

Intended for slow moving bulk carriers, tankers or cruiseships, to date, Hempel's third generation Hempasil coating, Hempasil X3, has been applied to more than 20 vessels, with, the supplier says, very good results.

The product is based on hydrogel silicone, which Torben Rasmussen, Hempel group product manager, said was unique in terms of fouling release technology in the industry. Non-reactive silicone polymers are added to the paint, which form a hydrogel micro layer between the paint's surface and the sea water resulting in enhanced antifouling capability and improved self cleaning potential.

"The concept is simple," said Mr Rasmussen. "The super water-absorbent hydrogel forms a polymeric network over the hull. Organisms perceive the hull as a liquid and not a solid surface, and as a result do not try to catch hold. The hydrogel layer is effectively backed up by silicone, known for its self-cleaning properties. Unlike fouling release coatings that are only partially silicone-based, X3 uses a solid silicone top coating. Its pure silicone composition means Hempasil X3 significantly outperforms conventional fouling release systems in the self-cleaning stakes, especially at low speeds."

Savings guaranteed

The Hempasil system comes in a package consisting of the paint system, a fuel saving guarantee and a third-party monitoring system.

"This is the first time that a paint supplier has offered a complete fouling release package that gives the ship operator a fuel performance monitoring tool and guarantees a fast return on investment based on fuel savings," said Mr Rasmussen. Hempel guarantees that the foul release system reduces the vessel's fuel consumption by at least 4%-8% within the first year, depending on the type of ship. As part of the package, customers receive the SeaTrend third party fuel monitoring system, SeaTrend from Force Technology. Shipowners can even estimate their potential fuel savings using a calculator on Hempel's web site.

Hempasil X3 is offered for 90-month service intervals and, according to Mr Rasmussen: "Unlike other fouling release products it works at speeds as low as 8knots and is still effective at 50% activity levels, providing longer intervals between dry docking, and at the same time making fouling release coatings relevant for a greater range of ships."

The fuel saving effects of Hempasil X3 have been documented through extensive towing tank studies and confirmed by real-life applications on more than 20 vessels. Measurements on, for example, on Holland America Line's cruise ship *Zaandam* indicate a reduced fuel consumption of 8.4%, while Hempel estimates the annual savings for a VLCC using 183,000tonnes of fuel over a 90 month period could amount to US$5.2 million.

Hempasil X3 is preferably applied on a clean shotblasted hull surface, which is first coated with two layers of epoxy, followed by the tiecoat, and then Hempasil.

Technically it is also possible to overcoat an existing old antifouling, by first waterjet-cleaning the hull to remove the loose old coating, then applying a thin coating of epoxy, then the new tiecoat and finally the Hempasil, but shotblasting is preferred, as the hull surface becomes smoother. *NA*

Hempel invests in growth

At the turn of the year Hempel A/S reached an agreement to acquire Hempel-Hai Hong in China. This latest acquisition means that Hempel invested nearly DKK1 billion in 2008, in line with its strategy for global growth. By increasing its share in Hempel-Hai Hong from 36% to 100%, Hempel said it had attained full control of its activities in China. Hempel-Hai Hong is already responsible for 25% of Hempel A/S's global turnover, making it one of the leading companies in the Hempel Group.

Hemsail X3 makes an impact at 8knots.

Benefits seen in 3D

Deltamarin gives an overview of the way it is spearheading effective ship design with 3D product modelling.

The message is clear, says leading Finnish consultancy, Deltamarin: integrated 3D product modelling in the development of new ship concepts, especially for cruiseships and ferries, offers exciting and positive benefits for naval architects, owners and operators. This philosophy provides a complete life cycle model for individual ships and can make huge contributions towards cost reductions.

An inclusion of parametrics means that highly accurate details result very early on in a project; thus, key decisions can be made much earlier than in the past. It is also easy to modify plans, should bulkheads or machinery positions be shifted.

By selecting a particular engine model, for example, from a data bank, full details and dimensions are immediately available, which can be inserted into a plan to provide exact positioning. 3D modelling can then be employed should subsequent ships be ordered.

In practice, these techniques can realise striking economies: taking just one example, a cruiseship designed to the 2009 SOLAS rules can have its layout optimised to feature many less bulkheads and only 24 tanks, instead of 60 or, even up to 92, had older design practices been followed, while a parametric navigation bridge takes only six weeks to design instead of six months. Deck heights can be reduced in the lower part of a hull, the number of staircases can be cut and steelweight is less.

All this also enables a finite element structural model to be generated directly and at a very early stage in a ship project – and much earlier than one year down the production line, as was typical in the past. 3D modelling also has significant benefits in terms of generating a safety plan, evacuation, fire systems, and flood control.

One of the first projects to employ the latest versions of this technology, with which Deltamarin was heavily involved, was Celebrity Cruises' Solstice class cruiseships ordered from Meyer Werft in Germany, and headed by the recently delivered *Celebrity Solstice*. This ship is also the first cruise design to which the new probabilitistic stability rules have been applied.

Celebrity Solstice: new probablistic stability rules were applied.

The results have made a huge difference, yielding qualitative assessment, fewer subdivisions, simpler construction, and less complexity, not to mention much more overall knowledge very early on in the project. Deltamarin has also carried out further work on a Panamax-dimensioned cruiseship.

> "A parametric navigation bridge takes only six weeks to design instead of six months"

Deltamarin reckons to have been a leader in 3D computer modelling since the 1980s, generating its first engineering package for an entire ship, including all disciplines, in 1986 – a cruise vessel built at Wärtsilä's Turku yard for Norwegian Cruise Line. During the following decade, the consultancy carried out its first 3D design and coordination model (for an entire ship and all disciplines) for a helicopter carrier built at Bazan, Spain, for Thai end-users, also a 3D design and functional model for the navigation bridge of the icebreaker, *Fennica*.

The company went on to complete its first pre-shipbuilding contract 3D design, coordination and planning model in 2003 for a cruiseship. This was followed in 2005 by the first parametric concept design models for several ship types. This is a far cry from the days when a typical cruise project could involve 12 different ship models and a 2D general arrangement plan!

A wide range of tools is used to generate these cutting edge designs. Depending on which aspect of a ship is involved, they include Tribon, Catia, Napa, Napa Steel, class society packages such as Nauticus, ShipRight and VeriStar, and computational fluid dynamics (CFD). The end result is one integrated and coordinated comprehensive product data model.

Return to Port rules

3D modelling is also playing a major role in designing and equipping ships to meet

NUPAS CADMATIC

Ship Design Software

Picture courtesy of Ulstein Verft AS Norway

Nupas-Cadmatic V5.3 is the ultimate 3D ship design software solution for ship designers and shipbuilders. Nupas-Cadmatic is a concurrent engineering software tool for ship hull-, machinery-, piping-, HVAC-and outfitting engineering. It genuinely saves time and money. It is easy to use and adopt. The open software is database-driven and utilizes advanced 3D modelling technology, providing the necessary information for accurate pre-outfitting and production.

The informative and easy-to-use 3D modelling capabilities 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 deck outfitting and final production phase. It improves engineering quality and shortens construction times. Nupas-Cadmatic seamlessly distributes engineering projects globally between different sites while ensuring effective communication between project partners. With the Nupas-cadmatic eBrowser all parties involved can view and check the 3D ship model and other design information via the Internet. The eBrowser adds value to the entire ship project, easing communication and providing everybody with continuous access to updated and relevant information.

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Design and engineering of:	Comprehensive information for:
GA and MA	Plate and profile cutting
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Piping and other diagrams	Pipe cutting and bending
Machinery & piping, HVAC	Other material lists
Accommodation & interior	Weights
Outfitting	Centers of gravity
Virtual 3D models	Logistic data
On-line Walk Around	Data for production robots
Windows AVI Video files	Interfacing other systems

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OPTIMIZING RESOURCES

the new SOLAS requirements (in force from 1 July 2010 for ships of 120m long or with three or more main fire zones), which call for passenger ships to retain an ability to return safely to port in the event of an accident, flooding damage or fire, following the loss of one watertight compartment or the loss of one space bounded by A-class bulkheads.

Cruiseships must retain propulsion, steering, navigation and fuel systems so that they are able to sail 1000 miles to port while retaining essential passenger services, including access to lifesaving apparatus, also communication and firefighting capacity. Ferries likewise have to comply, and in this respect Deltamarin has carried out 3D modelling on P&O's new ferries for the Dover Strait service, which are on order at STX Europe (formerly Aker Yards) in Finland. Here, because of the short route, the overall complexities are much reduced.

A 3D parametric model allied to a goal-based approach, also using optimisation and simulation tools, can be most helpful here, yielding a hull with a higher level of safety, better functionality and lower construction costs for both yard and owner. Furthermore, the model can be used by the owner after delivery for training and retained for any later conversion or modification.

Deltamarin has already used the 3D approach in Return to Port work with Royal Caribbean to determine parameters for all spaces, all equipment and all systems, studying each compartment individually. Once again, the 3D technique shows benefits in graphic design, as a training tool and for onboard maintenance.

In a typical study, Deltamarin analysed the results of the total loss, on a large cruiseship, of the forward machinery space, one switchboard room and a forward service space which, apart from loss of electrical power, also limited the volume of potable water and lost the black water collection service. Detailed graphics of available services were able to be displayed, identifying those sections which were not working. Of course, should the ship be modified or converted at a later date, the model could easily be redeployed, while it can also assist owners to ensure that their ship complies with any Port State Control requests.

For some years now, Deltamarin has worked in association with the Scottish consultancy, Safety at Sea, on a safety based approach to ship design, and the latter company's input has been of great help in evolving the 3D product model concept. This has been used in the stages leading up to basic design –outline project, project development and contract project. *NA*

Napa CAD spin-off powers NCL

Napa Power, the operating and monitoring tool developed by Onboard-Napa, Ltd is now installed across the entire Norwegian Cruise Line (NCL) fleet.

Initial piloting of the Napa Power monitoring tool provided such positive feedback that Norwegian Cruise Lines has extended its use across its entire fleet.

The system is installed with the Speed Pilot module, which allows automatic control to optimise ship speed. Precise speed control saves fuel and will reduce workload on the bridge.

"Conserving fuel on our ships sailing around the world is particularly important," says Captain Niklas Peterstam, NCL vice president, nautical operations. "Napa Power has enabled us to optimise speed, and in doing so, we are minimising our fuel consumption."

Acual fuel consumption, engine and navigational data are collected and forwarded to the Napa office web portal for further analysis and reporting purposes.

Norwegian Gem, one of the ships to use Napa Power.

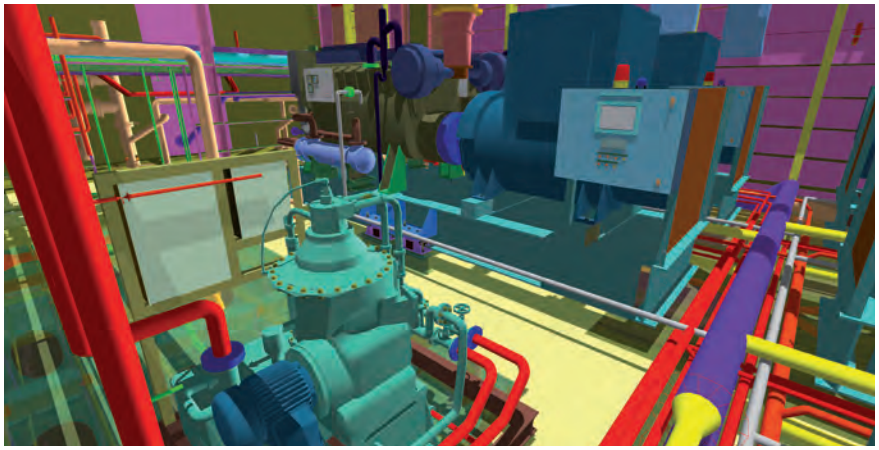
Napa Power is based on an accurate Napa model of the ship. The model, combined with weather and current forecasts, gives precise performance calculations. Napa Power is based on the same ship design system that is used by shipyards, ship design consultancies, navies and classification societies. In addition to the Napa model, all available model test data and full-scale trial data are used to perfect Napa Power's accuracy. *NA*

Shipbuilding in the fourth dimension

Online CAD sharing site with powerful partners launched to support forward thinking shipbuilding.

ShipConstructor Software Inc. (SSI), in collaboration with its US-based subsidiary ShipConstructor Software USA, Inc., the National Shipbuilding Research Program (NSRP), and several US shipyards including Northrop Grumman Shipbuilding (NGSB), has launched its online sharing site SC4D.

The ability to create and design 4D outfitted CAD models via the internet is now achievable. With the fourth dimension of 'attribute data and PDF documentation' added to the 3D model; the site will also allow access to a free online outfitting library that will be available to all shipbuilders, designers and equipment management companies.



SC40 allows one user to add the fourth dimension.

The site will be accessible to all software users, fostering an open community, and will allow the user to upload or download in any CAD format, such as DWG, Inventor, ProE, Solidworks, STEP or ShipConstructor XML format. The XML format will add the attribute and documentation data to create a 4D model. The CAD data inside the XML container currently supports DWG, but will be extended to Inventor file format later this year.

Attribute data is grouped into general data, such as manufacturer, weight, performance ratings, description, and complex data, such as logical connections for pipes and HVAC systems. For example, piping connections not only include the connection location, but also the direction, connection type, size, pressure class, and more. Electrical connection attributes will be added later this year when the ShipConstructor Electrical module is released. ShipConstructor data can be extended by user-defined data. ShipConstructor will be looking to streamline the process of browsing with uploading and downloading.

The SC4D has a built-in quality control system, allowing users to rate models that have been uploaded by others and allowing for a rating system that will be built upon from feedback of users of the site.

Future plans for SC4D include direct integration with the ShipConstructor equipment library. This will allow ShipConstructor users to publish and download equipment models directly to/from SC4D, provided they have access to the Internet.

The foundation of the SC4D technology was developed with the help of funding by the US National Shipbuilding Research Program (NSRP). The project team included US shipyards Northrop Grumman Shipbuilding, Austal USA, Bollinger, VT Halter, Marinette Marine, Bender Shipbuilding and Todd Pacific, as well as the design companies Gibbs & Cox, Elliott Bay Design Group, Genoa Design, Murray & Associates and Art Anderson.

ShipConstructor (SSI) says that the SC4D provides a platform that lets manufacturers reach the largest number of potential buyers with the smallest effort and expects that SC4D will grow the number of suppliers providing and maintaining high quality outfit models for the shipbuilding and offshore industries. *NA*

Rhino on the edge

Rhino has launched an update of its paneling tools plug-in for Rhino 4.0 SR5, which is now available for download. Its new ptSerializeObjects function allows an additional serialising tag or name to objects (points, curves, surfaces, etc) relative to selection order, world coordinates, user-defined direction, and reference surface.

ptExtrudeEdges will extrude paneling edges in a way normal to a base surface, or through a user's defined direction. Meanwhile, ptOffsetEdges offsets paneling edges using the base surface; while ptFinEdges fin-panels edges using base surface.

New features of Rhino 4.0 SRC include the "Connect" option, to offset points commands to draw connecting lines. Labels for faces and edges now have a new prefix, or layer name. Changing the name of the command ptRemoveOverlap to pCleanOverlap has added overlap tolerance to ptCleanOverlap command, which will delete grid points that are within tolerance in the 'u 'direction, and allow the user to move points within tolerance in the direction to overlap.

SwiftCraft offers more

Hydrocomp has announced the launch of SwiftCraft 2009, a package it says will provide more tools for the ship designer.

SwiftCraft is a new designer's tool for the speed and power prediction of propeller-driven monohull vessels. It has been developed specifically for designers and builders of motoryachts, patrol craft, small ships, supply vessels, smaller ferries and other transit craft.

The effect of high shaft angles can greatly affect a propeller's thrust and torque, and the new package enables the avoiding of unexpected overload and peak cavitation surprises, through applying an 'inclined flow' algorithm. One click will export a representative propeller CAD shape in IGES format, taking into account the proper diameter and number of blades.

SwiftCraft employs what are claimed to be the most advanced parametric prediction capabilities available. Complementing the strength of its calculations is its interface, which is modelled on web navigation, which is claimed to be ideal for new users where a rapid learning curve is important.

The development of SwiftCraft sees a newly integrated report viewer providing enhanced reporting options, including direct to PDF presentation, as well as the exporting to RTF (for word processing) and CSV (for spreadsheets).

Many of the improvements for calculation updates made to the resistance and propulsion code for NavCad and PropExpert take advantage of new cavitation correction and cupping calculations, along with various improvements in drag prediction. *NA*

Aveva gets Samsung endorsement

Aveva and Samsung Heavy Industries have signed a contract valued at over US$3m to extend the South Korean yard's subscription to Aveva Engineering, Design and Lifecycle Management solutions, to be implemented in Samsung's Marine Engineering Offshore Operations.

Peter Finch, president, Aveva Asia Pacific, said: "The Aveva range of products covers the full lifecycle of complex engineering projects from early project definition, through the design and production stages into operational management of the vessels and facilities. These projects are often carried out in a global collaborative environment supported by the Aveva portfolio of products. By implementing the Aveva suite of products, Samsung Heavy Industries will now have the tools to successfully drive every phase of their projects."

Samsung shipyard.

Let there be light

To debut in April, *Costa Luminosa's* interior spaces ensure that the ship lives up to its name.

Costa Luminosa, due delivery from Fincantieri's Marghera in April, will become the latest ship to join the Costa Cruises fleet, and the owner draws attention to the detailed thinking that has gone into ensuring that her unifying theme of 'light' is reflected in all aspects of her interior public spaces design.

With capacity for 2828 passengers, the 92,700gt *Costa Luminosa* will be the first of the fleet's new 'flagships', representing "the most exclusive and innovative vessel designed for Costa's 'high end' customers", according to the owner.

Interior public spaces onboard this ship have been designed by Joe Farcus.

TECHNICAL PARTICULARS

Costa Luminosa

92,600gt, Length 294m, Width 32.25m, Cruising speed 21.6knots, Max speed 23,6knots

1130 cabins including 56 with direct access to the spa, 718 with private balcony, 44 suites with private balcony, four suites with direct access to thespa
4 restaurants, including the Club Luminosa and the Samsara Restaurant
11 bars, including a Cigar Lounge and a Coffee & Chocolate Bar
2 swimming pools: one with a retractable roof
4 Jacuzzis
Multi-purpose sports court
Samsara Spa: 3500m^2 Wellness Centre on two decks, with gym, Thalasso pool, treatment rooms, sauna and steam room, UVA-ray solarium, Cabins and Suites.
Cinema 4D
Theatre on three decks
Casino and discotheque
Internet point and library
Shopping centre
Video arcade, children's splash pool
Grand Prix simulator

A Costa spokesman said that the over-arching 'light' theme was reflected in the use of materials selected for interior surfaces. With Murano glass chandeliers from La Murrina, profiles in the atrium have been made of stainless steel, while ceiling sections have been rendered in glass-effect aluminium, and metal-effect paints are also a feature of the the decoration of stairs and atrium bulkheads, lit by red green and blue light emitting diodes (RGB LED), while even sofas will feature silvered leather.

Overall, the ship's premium materials include 20 different kinds of marbles, granite, quartz, 3100m of innovative LED lights; and 120 chandeliers made of Murano glass.

Luminosa's main theatre will be lit by 14,000 LED lights, managed by a Light Designer, and feature a shimmery, opalescent leaf ceiling, and an iridescent tapestry. Meanwhile, the Club Restaurant Tavernetta will feature 500m^2 of mother-of-pearl mosaics, as well as iridescent mosaics and iridescent metal paints, Murano glass chandeliers and LED lights.

The Piano Bar, too will feature glass-coloured mosaic table tops and bar, while stainless steel is being used for table legs and door profiles. The Grand Bar will also benefit from lighting effects, stainless steel stairs and glass effects.

The ship's casino will feature iridescent green paint decorations, while the discotheque: will be characterised by flamboyant stainless steel bulkheads and glass decorations on the ceiling, as well as lighting effects.

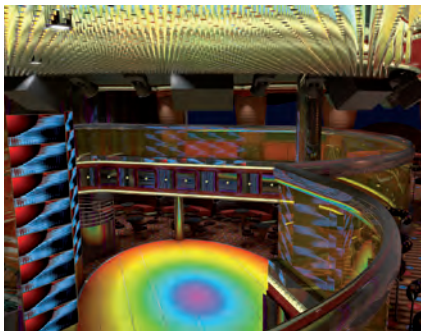
Even *Luminosa's* buffet area fits in with the overall theme, being imbued with crystal drop lamps, and coloured mosaics.

March also saw the technical launch of sistership *Costa Deliziosa*, also at Fincantieri's Marghera yard, due delivery in January 2010, after an interior fitting out. While declining to offer an overview of the unifying theme for interior design of this ship at this point, Costa terms Deliziosa's interior design "avant-garde", while also emphasising the use of premium materials, such as marble, wood, mother-of-pearl and Murano glass.

What is known is that *Costa Deliziosa's* atrium will feature the artwork 'Sphere' by

Light is the unifying theme onboard *Costa Luminosa*.

Rendering of the atrium onboard *Costa Luminosa*.



Rendering of the discotheque onboard *Costa Luminosa*.

Arnaldo Pomodoro, a '4D' cinema; a roller skating track; a golf simulator with 'putting green'; a Grand Prix race car simulator; and the 3,500m² 'Samsara Spa' wellness centre, with a 'Technogym Kinesis room' making its debut.

Meanwhile *Costa Pacifica*, built in the Genova-Sestri Ponente yards, will be delivered at the end of May 2009. On 5 June 2009, *Costa Luminosa* and *Costa Pacifica*, will be christened at the same time.

In all, Costa Cruises has five new ships due delivery from Fincantieri by 2012, with its total investment amounting to €2.4 billion. *NA*

Fabric for new yacht partnership

An Italian partnership of textile companies and yacht building yards is developing new ranges of textiles for the large yacht construction and outfitting sector.

Navaltex, is a new umbrella initiative being coordinated by Genoa-based classification society RINa, which believes that, over the coming three years, textiles can be developed to provide a ready alternative to other materials, in a surprising range of marine applications.

In one initiative, the grouping is working towards the marinisation of well proven materials that change colour during the day in relation to varying levels of sunlight, and which minimise environmental impact but continue to exhibit good comfort characteristics. Smoke and fire tests are proceeding, but RINa said that it believed that applying the land-based materials to marine would not prove problematic.

In another, more radical scheme, the plan also foresees natural fibres yielding higher structural strength and fire resistance characteristics for non-load bearing cabin partitions than is the case for hard-to-work-with fibre glass/composite materials. RINa spokesman, Mario Dogliani said: "We have completed a feasibility study which suggests that replacing fibre glass with natural fibres will be practical and that these materials will be easier to work with. I have to admit that when the possibility first arose, our naval guys were surprised, as they had never thought to use textiles in this application."

RINa chief executive Ugo Salerno.

Mr Dogliani said that work was also focusing on how to apply especially-woven "nano-technology" textiles for anti-ballistics capability. He suggested that easy-to-shape textiles could be applied to security officer apparel, but also to provide bullet-proof cladding for yacht superstructures.

All textile applications could be developed within the scope of existing International Maritime Organization regulation, Mr Dogliani said.

The initiative is being promoted by the region of Piedmont and has been endorsed by the Unione Industriale di Biella (UIB), which includes groups such as Ermenegildo Zegna, Sinterama and Arazzo-Gruppo Parà Tempotest and also small specialised textile makers that traditionally have a strong industrial presence. The yachting partners, coordinated by RINa, include Azimut-Benetti and Fincantieri.

Andrea Bairati, councillor for research and innovation for the region of Piedmont, said: "Textiles and shipbuilding have never come together until now. Navaltex promotes this synergy by joining the two ends of the chain."

Ugo Salerno, RINa chief executive, said: "It is…natural that, like important fashion designers, we also share our innovation strategies with textile producers focusing on the quality of the materials and on safety and protection of the environment, two elements which neither sector can forgo". *NA*

The Royal Institution of Naval Architects

SURV 7 - SURVEILLANCE, SEARCH AND RESCUE CRAFT

27 - 28 May 2009, Poole, UK

Second Notice

The Royal Institution of Naval Architects will continue its successful SURV series of International Conferences in 2009 now in its seventh edition. Held at the home of the Royal National Lifeboat Institution in Poole, this is an apt venue for the discussion of such vessels and there will be an opportunity to view the RNLI's facilities and a range of equipment during the course of the proceedings.

With ever greater recreational and commercial use of the marine environment there is inevitably a higher rate of incidents where external assistance is required. This increased pressure on resources provides a new set of challenges that organisations need to adapt to, in order to continue to provide their high level of service.

The conference will provide a forum for discussion of both military and civilian vessels. We hope to include papers across the full range of vessels, equipment and methods, used by pilot craft, coastguards, and police as well as search and rescue organisations. Topics will include analysis of new designs, applications, and operations of these vessels, as well as review existing vessels and their use across all marine environments.

RINA invites papers from designers, builders, lifeboat institutions, police forces, coastguard organisations and operators on the following topics:

Design: Practice, philosophies, testing and development
New Vessels: Innovative features, trials and evaluation
Construction: Materials, techniques and quality control
Equipment: New ideas & products, control systems, navigation, auxiliary equipment
Machinery & Propulsion: Power plant, system layout, propulsion
Operation: Practices, training, health & safety, reliability, and vessel deployment

We are also interested to hear from any organisation wishing to exhibit craft during the conference.

☐ I wish to receive details on exhibition space and sponsorship opportunities

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Brintons scores AIDA repeat

UK-based Brintons has secured a contract to be the exclusive supplier of woven Axminster carpet for the next three cruiseships to join the AIDA Cruises fleet.

Brintons, of Kidderminster, has already played a major role in shaping the interiors of *AIDAdiva*, *AIDAbella* and *AIDAluna*.

In the case of *AIDAbella*, for example, the company supplied some 35,000m^2 of IMO-approved, 80% wool, 20% nylon Axminster, to cover all public spaces and cabins.

Now Partner Ship Design, the appointed interior designer for AIDA Cruises, has commissioned the company to provide the same supply and contract management services for the next three ships, starting with *AIDAblu*, to be launched in 2010.

Brintons has had a relationship with Hamburg-based Partner Ship Design for more than a decade, and also with Meyer Werft.

Carpet onboard *AIDAbella*.

"To deliver a successful interior to a cruiseship, the relationship and understanding between the supplier, the owner and the shipyard is vital," Partner Ship Design senior partner, Kai Bunge, said. "The quality that Brintons delivers is exceptional on every occasion and that is accepted and appreciated by everyone involved." *NA*

Wing chair upgrade

Morgan Contract Furniture chose the Seatrade Miami event, staged in March, to launch 'Seville', which it presented as a "modern take on the traditional wing armchair". The armless lounge chair was said to offer a "versatile choice for any interior scheme", by virtue of its modest footprint, but also because it is available with a variety of detailing, such as nail trim, contrast piping or buttoned back attributes. Designed to match, and also new for 2009, is the Seville coffee table – available in a round or oval topped model, and featuring tapered legs and chrome steel detail. The top can be of veneered or frosted glass, according to specification.

The new Seville wing lounge chair from Morgan.

Depicting the *Spirit of Tasmania*

Ro-ro passenger ferry *Spirit of Tasmania II* has taken Tasmania as its interior theme as part of a refit completed for the recent holiday season.

TT-Line's 1400 passenger capacity *Spirit of Tasmania II* (ex-*Superfast II*) features the new Seasons Restaurant, offering setting lighting, leather seating, and Tasmanian artworks. The Horizon's Lounge has a new ceiling and architecture.

The interior renovations showcase Tasmanian industrial talent. Jennifer Knox, managing director of Lightning Naval Architecture, which project managed the refit, said: "This ship is a Tasmanian icon, and we felt it was important to employ as much Tasmanian talent as possible in the process."

Several local companies joined forces on the project. Tascot Templeton, for example, supplied over 2770m^2 of carpets, made from 5500km of yarn. Before drydock, the team at Devonport's Streamline Upholstery re-upholstered chairs, manufactured new chairs and cut fabric for the refurbishment.

LNA also designed and supervised construction of new 150-seat business class lounges by enclosing the aft open deck. It created covered promenades on the ex-pool deck, with this work done while the ship remained in service. LNA also provided design assistance, supervision and approval documentation for fitting new car platform decks.

Spirit of Tasmania I will undergo the same refurbishment when she is drydocked in 2009/10. *NA*

Sample of artwork onboard.

Tasmanian artworks are central to the interior spaces onboard the refurbished *Spirit of Tasmania II*.

Protec ahead of the runners

Hitherto largely focused on the construction sector, UK-based Protec International Ltd is bringing its new flame retardant, temporary self-adhesive carpet protector, Carpet Shield FR to a maritime audience.

Darren Moore, Protec commercial director, said: "On the back of some recent sales into the marine sector for this product and one or two other products, we have decided to investigate other possible opportunities. We are aware that temporary protection is already widely used, and are in the process of establishing what accreditation is required over and above the LPS standard.

LPS1207 is the recognised industrial standard for temporary protection materials. It is governed by the Building Research Establishment.

"Having sold LPS1207 approved materials into DML (now the Devonport Royal Dockyard) and other organisations, we have been reassured to discover that our products meet with their approval," said Mr Moore.

Carpet Shield FR adheres directly to the carpet without the need for taping or jointing. It features an embossed surface for slip resistance. Available in a variety of widths Carpet Shield FR can be used in corridors, carpeted walkways, staircases and large areas and can be removed without any residue.

New flame retardant, temporary self-adhesive carpet protector, Carpet Shield FR.

Battery power for blinds

South Shields-based Solar Solve Marine has taken advantage of new potential to use battery power to drive blind motors to launch battery-operated versions of its Solasolv roller sunscreens for marine applications.

Spring and clutch operated Solasolv roller screens were introduced in 1987, followed a few years later by electrically motorised options in both low voltage and mains voltage formats. However, the demand for electrically operated screens has never been particularly strong, due in part to the cabling requirements, according to the supplier.

Now all this is set to change. "These obstacles are totally eliminated with the battery-operated screens and the 20metre-range hand held remote control that operates using radio frequency, eliminating the need to be in direct line of site with the screens," the company now says.

The compact tubular motor is powered by eight standard 'AA' batteries, which can be either disposable or re-chargeable, and the screens can be programmed to operate in groups or individually. With lithium batteries, one charge is expected to last 12 to 18 months of normal operation.

Battery operated rollers are also now available for the Rolasolv range of marine roller blinds for the accommodation areas of a vessel. *NA*

Battery operation is ideal for CASSLITE roller blinds located behind window drapes in a vessel's accommodation areas.

F. Ball launches great leveller

F. Ball and Co. Ltd has augmented its marine-certified range of sub-floor preparation products and flooring adhesives, with the launch of the new 'Stopgap Blue Bag' - a general purpose self-smoothing underlayment. A low odour, cementitious underlayment, Blue Bag can be applied over adhesive residues without priming, is mixed with '114 Liquid' to create a slurry, and takes around 24 hours to set on a non-absorbant surface.

Designed to eliminate surface irregularities before the installation of floorcoverings, Blue Bag is said to be ideal for use on steel decks in light and medium-duty areas and is type-approved by Det Norske Veritas.

Stopgap Blue Bag is said to be an advance on F. Ball's other products targeting the marine market and, while 'self-smoothing' technology is not appropriate to the marine setting, given vessel motions and the potential for non-level surfaces at the setting stage, the product is said to offer superior smoothening properties.

WAVE MONITORING

WAVEX - THE DIRECTIONAL WAVE MONITORING SYSTEM USING A MARINE NAVIGATION RADAR

- For use on high speed crafts, fast ferries, shore installations for ports and coastal waters, traditional vessels, naval vessels and research and service vessels.
- Providing real time and historic wave data.
- For optimized vessel speed and course, improved regularity and reduced heavy weather damages.

Type Approved Product

- measuring the ocean surface

WAVE PROFILES / RIDE CONTROL

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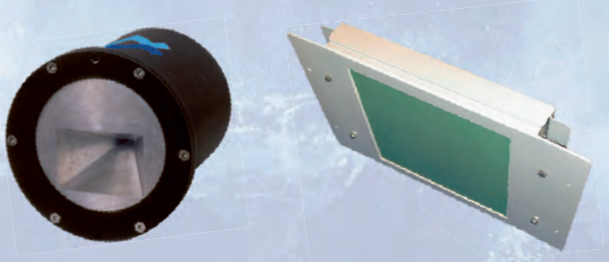

- Designed for very accurate measurements of wave profiles and air gap from high speed vessels.
- In use on commercial and military vessels of single hull, catamaran, SES and SWATH type as input to various types of ride control systems.
- Analogue or digital output 1-50 Hz with 1 mm resolution.
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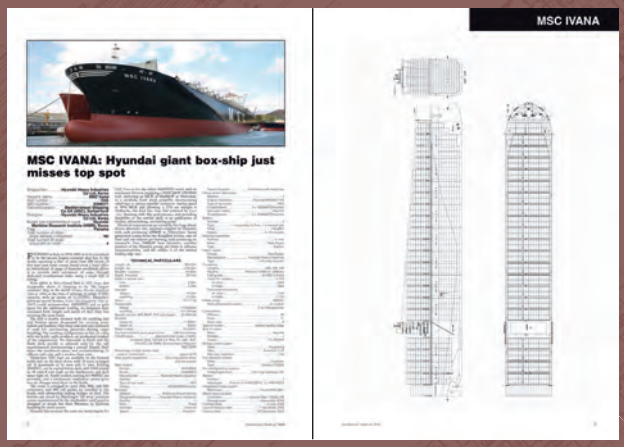

available in printed or cd-rom format

SIGNIFICANT SHIPS OF 2008

The Royal Institution of Naval Architects published the 19th edition of its annual Significant Ships series in February 2009. Produced in our usual technically-orientated style, *Significant Ships of 2008* presents approximately 50 of the most innovative and important commercial designs delivered during the year by shipyards worldwide. Emphasis is placed on newbuildings over 100m in length, although some significant smaller cargo ships, fast ferries and offshore vessels have been considered, including a cross-section of ship types, with each vessel being either representative of its type or singularly significant. Each ship presentation comprises of a concise technical description, extensive tabular principal particulars including major equipment suppliers, detailed general arrangement plans and a colour ship photograph.

Newbuildings include:
Al Ghuwairiya, Combi Dock 1, City of Hamburg, Trinity Arrow, Mystic, Brasil Maru, Mari Ugland, Gypsum Integrity, Safmarine Ngami, Color Superspeed 1, plus many more

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Nordic contract calls for capacity boost

Ship conversions and the prospect of a new aluminium fast catamaran for Nordic Ferry Services.

Nordic Ferry Services A/S has emerged victorious after Danish Ministry of Transport put out ferry services between the island of Bornholm and the Danish mainland to tender, covering the period September 2011 to September 2017.

In securing the tender, the shipowner has ordered a new fast ferry from Austal, and increasing the capacity of two existing ships.

The routes involved are currently operated by Bornholmstrafikken A/S but, to meet future demands, the company joined forces with Clipper Group to form Nordic Ferry Services, headquartered in Bornholm.

In its tender, the Ministry of Transport made plain that it required the successful bidder to increase service capacity substantially.

The route between port of Roenne (Bornholm) and Ystad (Sweden) is now served by the high speed craft Villum Clausen, which offers capacity for 1038 passengers and 200 cars), and a ro-pax ferry offering capacity for 400 passengers and 1200 lane metres. To meet the new requirement, a larger newbuild fast ferry is needed, with capacity for 1400 passengers and 357 cars, or 300 lane metres as truck/trailer capacity, plus 269 cars. The requirement from the Ministry is that the service will be able to transport 10.000 passengers, 2200 cars and 300 lane metres of cargo per day during the high season, in both directions.

After redelivery, *Hammerodde* will feature an extra ro-ro deck aft of her funnel.

To meet this target, Nordic Ferry Services has ordered an aluminum 112.6m long catamaran from Austal, for delivery as soon as May 2011. The ship will be able to operate at 37.6knots at 90% MCR. Classed in line with the IMO's High Speed Craft Code 2000, the ship would be capable of operating in wave heights up to 4.5m, and would feature bulbous bows, a symmetric hull and a round bilge.

Meanwhile, the overnight route between the port of Roenne (Bornholm) and Koege (Seeland) is currently served by two ro-pax vessels, offering capacity of 1200 lane metres and 400 passengers. The new requirement from the Ministry on this route is that, from 2011, services must be able to accommodate 1500 lane metres plus 400 passengers each way every day. To meet this requirement, it will be necessary to upgrade the in-service, 124.9m long ro-pax vessel *Hammerode*, built in 2005 at Merwede, and to ensure that it achieves one round trip a day. The required space will be created by adding a further ro-ro deck aft of the funnel. Some existing cabins will also be converted into seating areas. Conversion will take place in 2010.

Mr Hansen said that *Hammerode's* manouevrability would need to be improved as part of the project. He said that the conversion would therefore also entail the beefing up of power for her bow thrusters. He added that it was also imperative that service speed was maintained at the current 18.5knots. "This is to be solved by underwater hydrodynamic improvements," said Mr Hansen, "for example, by adding a new ducktail and interceptor, and new bulbous rudders in a new position, in line with the propeller shafts."

The ducktail will also play its part in addressing demand for about 10% more displacement, Mr Hansen said, where ship's draught will also be increased, and a set of sponsons added.

A second ro-pax vessel, *Dueodde*, will be upgraded, in order to offer capacity for 770 passengers, against her current capacity of 400 passengers, through converting part of its cabin space to open seating areas. She will be redelivered into service between the island of Bornholm and the German port of Sassnitz after conversion, expected in late 2011 or early 2012. *NA*

TECHNICAL PARTICULARS

Hammerodde and Dueodde

Construction year	2005
Shipbuilder	Merwede (NL) NB702 & NB703
Classification	Bureau Veritas I X HULL X MACH
Ro-ro passenger ship	unrestricted navigation
Ice Class	400
Beds in cabins	108
Lane metres (Lorries and trailers)	1.200 M
Dangerous goods (IMDG)	Upper deck
Deadweight	2.945tonnes
Design draught	5.3m
Length, oa	124.9m
Length, bp	114.95m
Engines	2 x MaK 9M32C; 4.320kW
Bow thrusters	2 x 900kW
Service speed	18.5knots
Manoeuvring- & crabbing ability	14-15 m/s cross wind

The Royal Institution of Naval Architects

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28 - 29 September 2009, Busan, Korea

First Notice & Call for Papers

Vast reserves of oil and gas are expected to be exploited in the Russian Arctic, including the Barents Sea, the Pechora Sea and Kara Sea. There are also new gas fields being developed on the Yamal Peninsula. There is a need for large tankers, LNG carriers and associated support vessels to transport the oil and gas and maintain operations in these far northern locations. Increasing numbers of passenger ships are also operating in low temperature environments.

Vessels operating in the Arctic regions are exposed to a number of unique demands. The pressure of first year and multi year ice imposes additional loads on the hull, propulsion system and appendages. New designs have evolved such as the Double-acting principle. The extreme environmental conditions can also have significant effects on vessel systems and machinery.

Low temperatures and poor visibility can have profound effects on the crew and vessel operations. Current operational experience in the Arctic is limited to much smaller vessels than those that are envisaged. There is great probability that new owners and operators without operational experience in these harsh conditions will enter the market. This will impose a need for guidance for these owners and operators, as well as shipyards building vessels for cold weather service.

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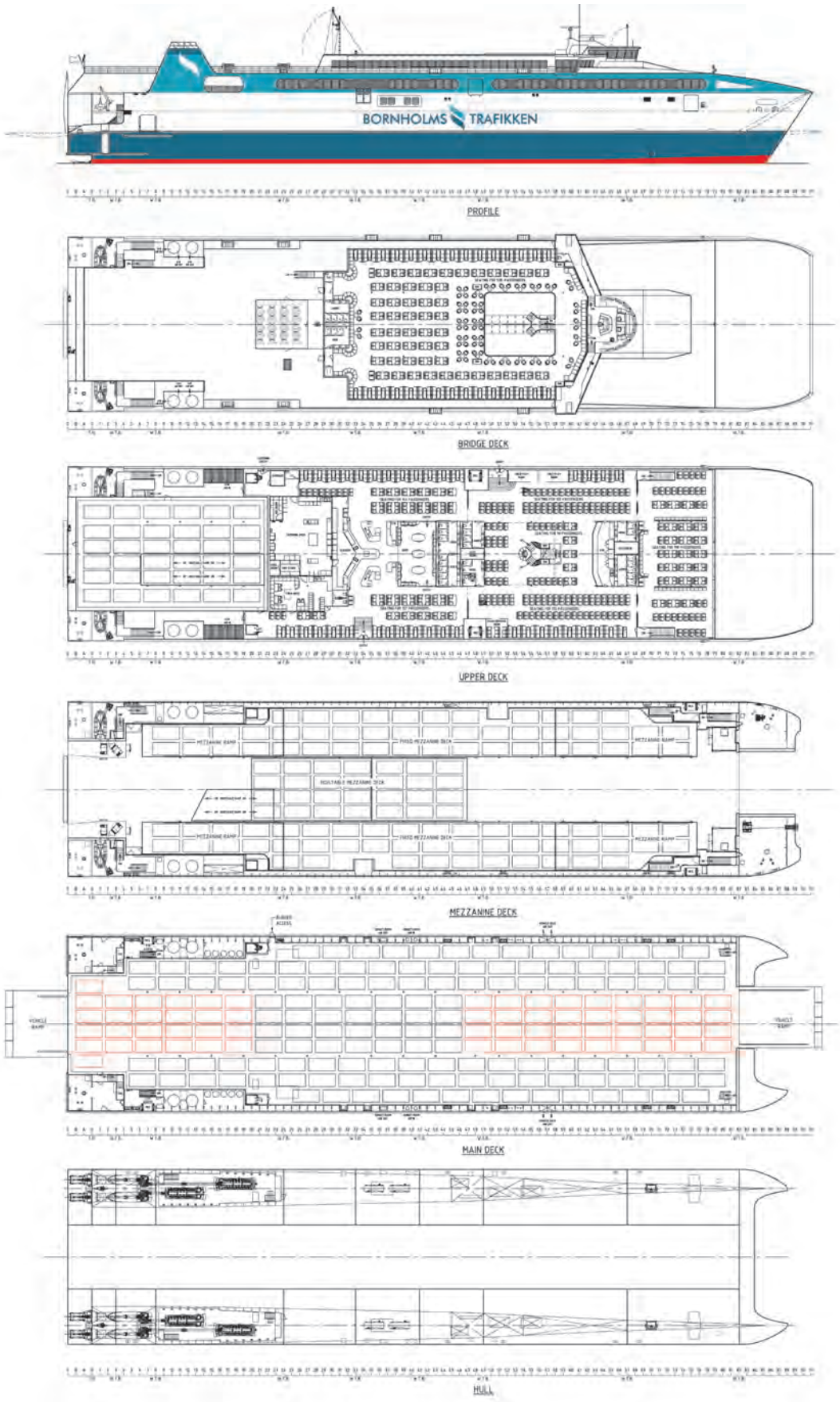
General arrangement, new Nordic Ferry Services ship from Austal.



Herald of Free Enterprise revisited

Although 22 years ago, the capsize of *Herald of Free Enterprise* still has lessons for ro-ro ship designers today, says Dr Bryan Barrass, FRINA.

The design basic concept of a ro-ro vessel is that of a moving multi-storey indoor car park. They carry cars, lorries, trailers, trains, cargo and passengers. They may be single-screw or twin-screw design.

Ro-ro vessels are ideal for short fast trips across shipping lanes such as the English Channel, North Sea and the Irish Sea. Socially, as more people take early retirement and go on holidays in Europe, the demand for new ro-ro vessel designs has, in the last decade increased.

Cars and trailers can be driven into the ship at the stern, at the bow or through several side openings along the length of the ship. Following several recent disasters with this type of vessel, entering the ship via the Bow has become less popular for new orders for these vessels.

On this point of disasters, it should be remembered that the history of ro-ro ferries includes the fact that, after being involved in a collision with another vessel, they can capsize and **sink in only 1.50 minutes**. Mainly this is due to the very wide spaces athwart ships.

Their fully loaded deadweight values range from 2000tonnes to 20,000tonnes, their LBP values range from 100m up to 210m and their breadth moulded values range from 20m up to 32.26m (Panamax). Range of draft moulded is 5.00m to 9.00m. When fully loaded, their Cb values range from 0.525 up 0.575, with a service speed in the range of 18knots to 30knots.

Bulbous bows are usually fitted to give, for similar input of engine power, extra forward speed. Alternatively, for a similar forward speed, oil fuel consumption is reduced, thereby producing savings in operating costs. Generally, the faster the designed service speed, the lower will be the Cb value.

To facilitate turning characteristics, meanwhile, ro-ro vessels have larger than usual rudders working together with bow or stern thrusters. In port, this can lead to a quicker turn round without having to call for the assistance (and cost) of tugs.

TECHNICAL PARTICULARS	
Herald of Free Enterprise	
LOA	131.9m
Breadth Mld.	22.70m
LBP	126.1m
Service speed	22.00knots
Ship's displacement	8874 tonnes to 9250 tonnes
Mean draft (static)	5.68m to 5.85m
Draft forward (static)	6.06m to 6.26m
Draft aft	5.31m to 5.43m
Trim by the bow (static)	0.75m to 0.83m
VCG (fluid) with slack tanks	9.73m to 9.75m
GMT (fluid) with slack tanks	2.04m to 2.09m
Ship speed, just prior to grounding	18.00 knots to 18.50 knots
Cb @ Draft Moulded of 5.30m	0.525
Three props aft, one prop for'd	
Brake Power	20,142kW
Sulzer Diesel engines fitted	
CP propellers fitted	
Hinged stabiliser fins fitted	
Deadweight	2000 tonnes.
Cost	of the order of £30million.
Number of lives lost	193

HFE reconsidered.

On 6 March 1987, the ro-ro vessel *Herald of Free Enterprise* capsized shortly after leaving Zeebrugge in Belgium. She was a passenger and freight ferry and was bound for Dover. This Zeebrugge to Dover transit was scheduled to be 4 crossings per day with each crossing taking about four hours.

Herald of Free Enterprise left Zeebrugge at 6.05pm, about 78 minutes after high water. When static and when at forward speed she was trimming by the bow. She left the Port of Zeebrugge with both bow doors open. She turned to starboard and capsized to port. When capsized, her starboard side was above the water with approximately half her breadth moulded showing above the waterline.

She eventually ended up about 930m off the centreline of the navigation channel. The disaster unfolded in just **1.50 minutes** in calm water conditions.

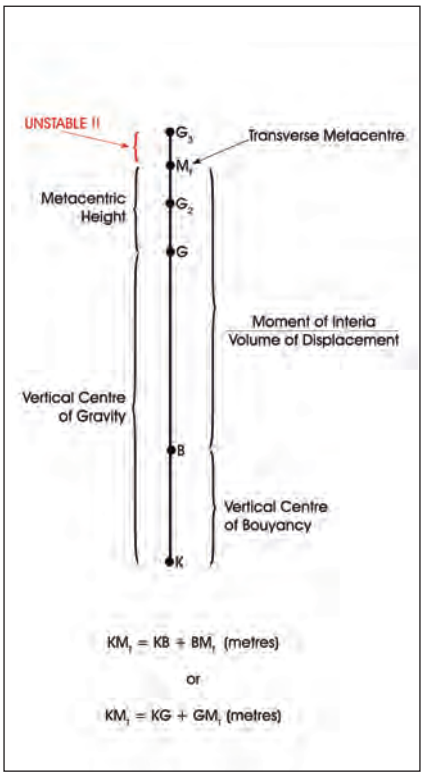


Figure 1. Transverse stability details.

At the time that she went aground it was suggested by the maritime press that her forward speed was of the order of 18knots to 20knots. 193 people lost their lives.

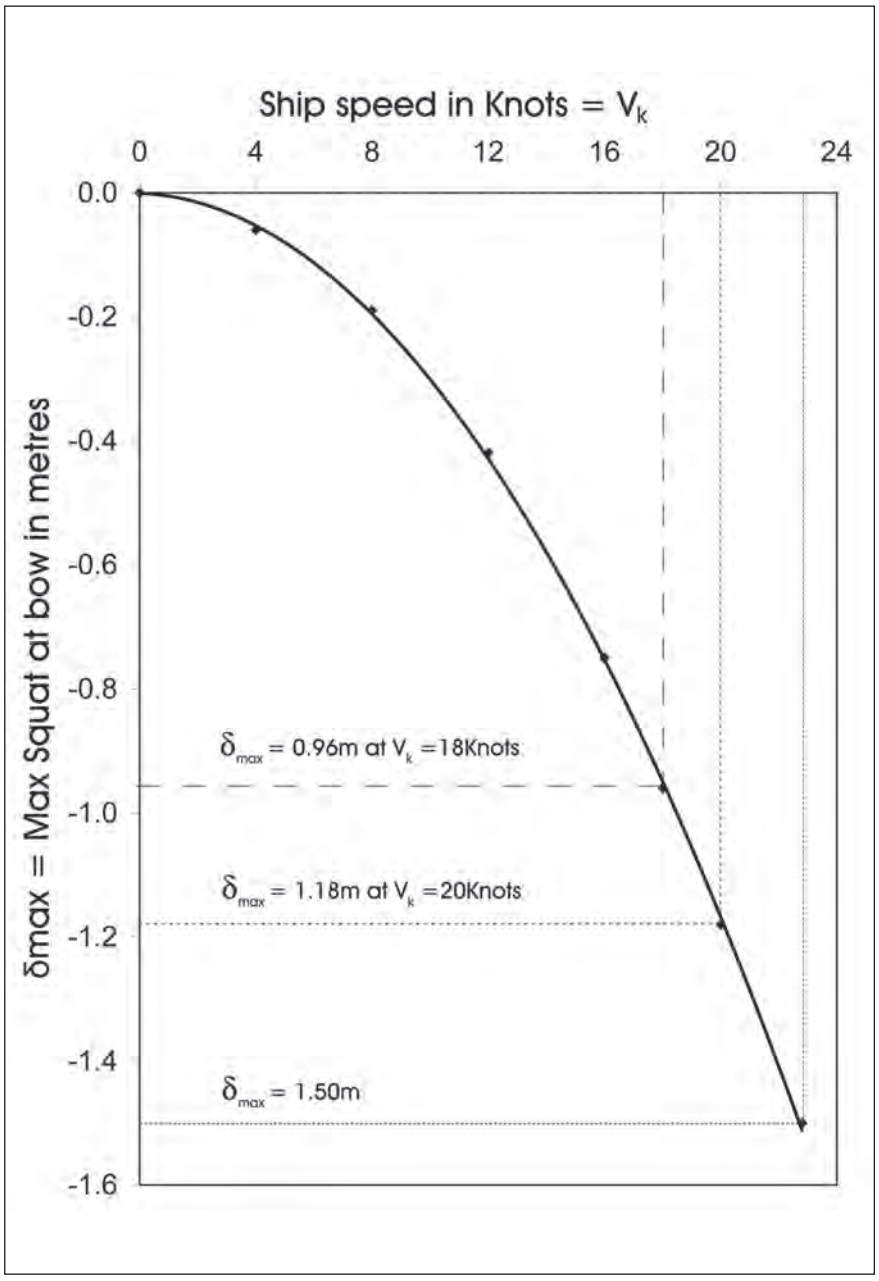
In considering the possible causes for this ferry to capsize in this manner, I suggest 30 factors. Drawing on these, I go on to consider improvements that could be made to existing ferries by way of retrofit, and future policy for new ro-ro ferry designs.

30 factors

1. Larger ship than normally used was selected for the run to Dover. *Herald of Free Enterprise* was usually on the Dover-Calais run. *Herald of Free Enterprise* was a replacement vessel for a smaller one that had developed engine troubles.
2. To bring cars on board, *Herald of Free Enterprise* had to be trimmed by the bow.

3. Larger ship meant smaller static underkeel clearances.
4. Just prior to the capsize, the vessel developed too great a speed. This caused a build- up of a pressure wave at the bow and also excessive squat.
5. Bow doors were left open.
6. Water entered through these open bow doors.
7. Ingress of water caused rise of 'G' due to loading. As shown in Figure 1, 'G' moves to G2. By definition, 'G' is the vertical centre of gravity above the keel. It is very dependant of the loading of the ship by the officers on the bridge.
8. Ingress of water caused a rise in 'G', due to Free Surface Effects (FSE). As shown in Figure 1, G2 to a higher position of G3.
9. Ship's G rose above ship's M because of the addition of loading and FSE. See Figure 1. Vessel is now unstable!.
10. At forward speed, squat is produced additional trim at the bow. This was added to the static trim. For values of ship squat at various values of ship speed, see Figure 2. Feedback observations indicate that dynamical trim is always added to the static trim.
11. To initially produce trim by the bow, water ballast was put into No 1 double-bottom tank. This was to lower the car ramp so as to be able to drive the cars onto the vessel.
12. At speed, an order was given to turn the ship. This would cause the ship to develop an angle of heel. This angle of heel will produce loss of underkeel at the bilge strakes, known as transverse squat. Transverse squat depends upon the breadth moulded and angle of heel. For angles of heel up to 70 and for breadth Mld up to 70m, see Figure 3. At an angle of only 70 *Herald of Free Enterprise* would have had a static transverse squat at the bilges of 1.38m. At forward speed, it would be even more.
13. To bring vessel nearer to even keel, a pump was used to transfer water from No. 1 double-bottom tank (located forward) to No 14 double-bottom tank (located aft).
14. A more powerful pump was requested. This was refused, because cost of the pump was £25,000.
15. Ship's Lightweight on 6 March 1987 was inaccurate. On 6 March 1987, it was 270tonnes more than at her delivery date.
16. Vessel was overloaded at time of departure from Port of Zeebrugge.
17. The exact number of passengers onboard was not known.
18. Aft draft was unable to be read.
19. No end draft indicators linked to the bridge were fitted.
20. *Herald of Free Enterprise* departed five minutes late. Was this why the bow doors were left open?
21. No stability data onboard regarding a condition with the vessel trimming by the bow. For even keel condition? YES. For bow trim condition? NO.
22. Estimates of individual car weights were incorrect. Some were assumed to be 1.00tonnes when in fact they were each 1.25tonnes - 25% underestimation for quite a number of cars.
23. No audio, telephone or television linkup between ship's bridge and the bow doors.
24. Other occasions had occurred when bow doors had been left open whilst leaving port. On some ships, this still occurs, in March 2009!
25. Fatigue problems with officers and crew.
26. Too many changes in sailing schedules.
27. Very wide open transverse spaces in car-deck levels, very much like a shore-based indoor car park. Incoming water can flood

Figure 2. Squat curves for *Herald of Free Enterprise*.



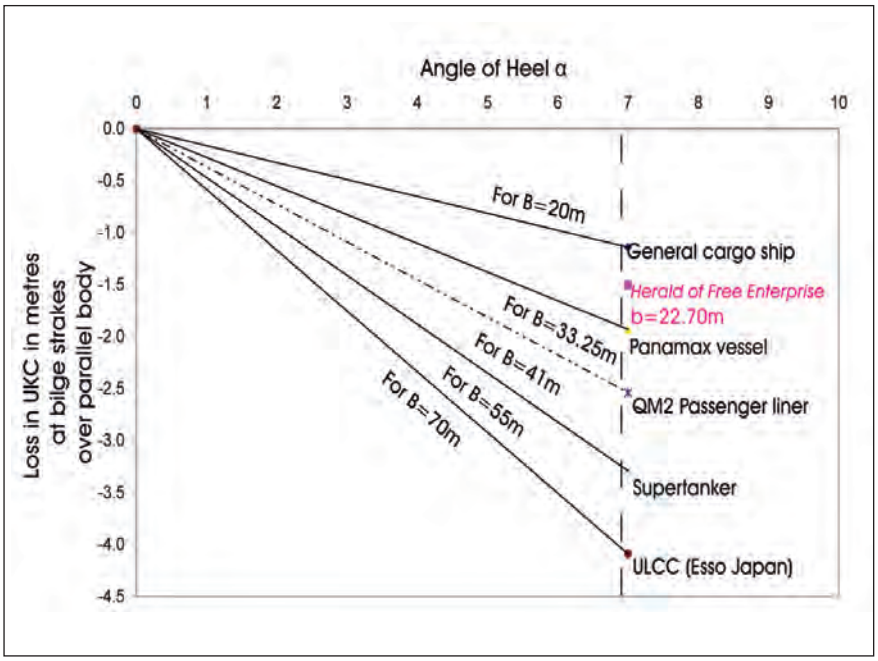


Figure 3. Loss of ukc @ bilge strakes relative to angle of heel.

from extreme Port side right across to extreme Starboard side.

28. Commercial pressures for quick turn around in Port.

29. Ship handling is less efficient in shallow water then in deep water.

30. Communication problems existed, producing human error, or as the Marine Inquiry Judge stated, 'sloppy seamanship.'

24 suggested changes

1. Close bow and stern doors before leaving port.

2. Fit or retrofit longitudinal and transverse bulkheads.

3. Fit polythene drums or spheres to reduce permeability in empty compartments that may be flooded.

4. Increase the breadth moulded for new ro-ro ferry designs.

5. Eliminate the entry of cars through the bow. Only have entrance and departure of cars through Stern doors.

6. Consider side-loading ramps for cargo, lorries and cars.

7. Improve escape facilities, for example chutes and capsules. A quick get-away for passengers from a stricken vessel is vital.

8. Have all cars/lorries firmly fastened to deck and encased in an inflatable padding.

9. Whenever possible, ships leaving a port must be upright and on even keel.

10. Fit television cameras to confirm that bow doors and stern doors are closed before the vessel gets underway.

11. Decide upon maximum ship speeds within a certain distance of a port during departure and arrival manoeuvres. This will minimise squat effects.

12. Fit cut-out mechanisms within the engine system if bow doors or stern doors remain open just prior to departure from a port. An analogy would be say similar to a car for limiting its speed to say 70mph on a Motorway.

13. Have larger GM values, say greater than 2.10m.

14. Have end draft indicators, linking readings to the ship's bridge.

15. Use hand-held instruments to count people and cars on and off ship for every voyage.

16. Fit high-pressure pump(s), to be used for quick transfer of water ballast or oil.

17. Improve onboard stability data to include conditions having trim by the bow and trim by the stern.

18. Re-consider all the working conditions of shipboard personnel to decrease fatigue and complacency.

19. Make officers and crew, via retraining courses, aware of the consequences of 'sloppy seamanship.'

20. Promote 'responsibility and accountability' attitudes onboard ship.

21. Pay utmost attention to ship speed, especially when ship is in shallow waters. Remember, if the ship's speed is halved, then the squat is quartered.

22. Do not attempt to turn ship at high speed in shallow waters. Transverse squat and grounding could occur at the bilge strakes.

23. If there is any danger of FSE with slack water tanks, then fill them up completely or totally empty them.

24. Do not request rudder helm if the ship is speeding in shallow waters. Ship response in shallow waters is less efficient than in deep water conditions.

IF.....

IF the ship's outward speed had not been as high as 18knots to 20knots, *Herald of Free Enterprise* would not have developed such ***excessive squat*** in these shallow water conditions. Halving the speed would have quartered the squat.

IF when static, there had been stern trim instead of bow trim on the vessel, then when underway she would have trimmed further by the stern. The open bow doors would have risen up above the water level with much less danger of ingress of water.

IF the bow doors had been closed before leaving Zeebrugge, this incident would not have happened. But this was only 1 of 30 factors!

IF human error had not occurred, then again this incident would not have happened. As with all accidents, be it a plane, a train, or a vessel, it is generally not just one fault but a series of faults coming together, unfortunately all at the same time.

To try and ascertain further the reasons why the *Herald of Free Enterprise* capsize took place, a sister ship, *Pride of Free Enterprise* undertook full-scale tests. This was in May 1987, about two months after the Zeebrugge incident. Ship-model simulation studies and mathematical modelling programmes were also carried out.

Herald of Free Enterprise was repaired. Using ship surgery methods, she was lengthened and renamed, *Herald of Free Spirit*. Later on, she was again renamed, this time as *Flushing Range*.

Her final voyage was to Alang in India. She was broken up for scrap in Alang in 1988.

Since the *Herald of Free Enterprise* capsize in 1987, following accidents/incidents involving ferries, over 3000 people have lost their lives. ***NA***

New gas ferry for Norway

Gas-powered ferry once more specified for operation in Nordic fjord.

A new liquefied natural gas-powered, double-ended ro-ro ferry designed by Norwegian company Multi Maritime AS has been ordered by shipowner Fosen Namsos Sjø AS. The ship's hull will be constructed at the BLRT Grupp Western Shipyard, in Klaipeda Lithuania, with outfitting to be completed in Ålesund, at the Fiskerstrand Werft yard, which now operates a 50/50 joint venture with BLRT (Fiskerstrand BLRT).

Proposed gas-powered, double-ended fjord ferry for Fosen Namsos.

The order envisages a single deck, all-steel car ferry, able to accommodate 120 cars (or fewer cars and up to 12 trucks) and 250 passengers, for operation in the Norwegian fjords in the Hordaland district.

At 109m long and 16.8m wide, the ship will be capable of a service speed of around 13.5knots, and will be classed by Det Norske Veritas as a gas-powered ferry to 1A1 class. Construction work will begin in November, 2009 and will go on until January, 2011. For ease of access, the passenger saloon will be positioned at the side of the cardeck, while two rows of cars of up to 1.5tonnes each in weight can be driven on top of the passenger saloon, for extra capacity.

LNG-fuel was a requirement from the road administration for the Halhjem-Våge route. In normal circumstances, the ferry will be powered by one 12-cylinder GS12R and one 16-cylinder GS16R, both from Mitsubishi Heavy Industries. Operating on one engine alone, the ferry will be able to achieve 11knots-12knots, according to Multi Maritime technical director, Arvid Holsen. To ensure full redundancy, the ferry will also feature a second engineroom, for 'take me home' diesel-powered engines, he said. Diesel plant has yet to be specified.

Three smaller, 48m long gas-powered ferries designed by Multi Maritime, and also featuring MHI main engines, are currently under construction at the STX Europe yard at Lorient, for Norwegian owner Tide Sjø AS. In this case, diesel plant has been supplied by Scania, while these innovative ferries will also be prepared to run on biodeisel, according to Multi Maritime. *NA*

Work starts on P&O giant

STX Europe has started construction of the English Channel's biggest ferry.

Work has started on what will become the largest ro-ro passenger and freight ferry to operate in the English Channel. The ship is the first of a pair to be ordered by P&O Ferries for the Dover-Calais route, with construction being carried out at STX Europe's Rauma yard, in Finland.

An artist's impression of the latest newbuilding for P&O Ferries.

The first ship is due delivery in 2010, with the second to follow in 2011.

At 49,000gt, these ships will be 210m long and offer 2700 lane metres of vehicle space. This amounts to space for more than 180 freight vehicles, as well as up to 195 tourist vehicles. The vessels will be capable of carrying up to 1750 passengers.

The new ferries will also be the first passenger ferries in the world to comply with the new International Maritime Organization 'Safe Return to Port' requirements, ahead of the international compliance date. These rules require that, in the event of a ship becoming a casualty, basic services are provided to all persons onboard and that certain systems remain operational for safe return to port. Performance standards are stipulated for a wide range of ship systems, including fire-fighting, power supply, propulsion, steering and navigation. The requirements come into force for vessels built after 1 July 2010.

The ships will have the Lloyd's Register class notation of PSMR (Propulsion and Steering Machinery Redundancy), which will be assigned where the main propulsion and steering systems are configured to ensure that, in the event of equipment failure, the ship retains availability of propulsion power and manoeuvring capability to provide a safe return to port. *NA*

Armorique makes Channel debut

STX Europe recently delivered a latest car-passenger ferry to Brittany Ferries for cross Channel operations.

Brittany Ferries took delivery of the car-passenger ferry *Armorique* at the end of January from STX Europe's Helsinki yard, with her maiden voyage taking place on 10 February.

The vessel, which cost around €110 million to build, provided some 700 man years of work for the yard. Her original delivery date was given as September 2008.

Named after the national park in Brittany, *Armorique* has been designed specifically for use between Plymouth and Roscoff.

The hull of the vessel is identical to that of *Cotentin*, delivered from STX Europe in Helsinki last year, but *Armorique* has a much larger upper deck passenger area.

***Armorique* entered service in February.**

TECHNICAL PARTICULARS

Armorique

Builder	STX Europe in Helsinki, Finland
Owner	Brittany Ferries
Flag	France
Length oa	168.30m
Length bp	155.40m
Breadth moulded	26.80m
Depth moulded, to main deck	9.30m
Depth moulded, to upper decks	15.60m
Draught, design	6.30m
Deadweight	4200tonnes
Gross Tonnage	29,500
Trailer lane metres (width 3.0 m)	980
Car Lane Metres (width 2.4 m)	1140
Free heights on Trailer/ car decks	5.20/3.00m
Passengers	1600 seats in public spaces 248 cabins
Crew	24 cabins for officers , 82 cabins for crew
Main engines	2 x 12000kW (MAK 12 M 43C)
Propellers	2 x Controllable pitch propeller
Speed, service	23knots (85% MCR output)
Fin stabilizers	1 x pair (Rolls-Royce)
Classification	UNRESTRICTED NAVIGATION, +MACH, +AUT-IMS, +AUT-PORT, SYSNEQ-1, MON-SHAFT

The ferry is said to be particularly fuel efficient, while CO_2 emissions have been kept to a minimum, by virtue of twin MaK 12 M 43 C engines, offering with 24,000kW of power.

The 168.3m long and 26.8m wide vessel has an operating speed of 23knots and top speed of 25knots. However, for environmental reasons, the ship's hull lines have been refined so that she can achieve 19knots running on one engine.

She has 980 lane metres of vehicle space, enough for 470 cars or 60 trucks. With capacity for 1500 passengers, *Armorique* features a large shopping area, dedicated areas for teenagers, a cinema, and a variety of bars, restaurants and lounges. There are reclining seats for day passengers. A total of 248 cabins provide overnight accommodation for a maximum of 780 passengers, including a small number of suites.

Armorique's two-deck loading and discharge allows for fast turnaround times in ports. A hydraulically-operated ro-ro equipment package from MacGregor is based on stern access and a bow door/ramp. Clear deck heights of 5.2m are offered on the main deck and upper deck and 4.6m on the tanktop.

The ship's bow door forms a weathertight part of the hull structure in the forebody and is divided into two sections with an intermediate joint at the ship's centreline. Each section is attached to the hull by hinge arms, which ensure parallel motion when opening or closing. The door is arranged to provide the required clear access for the bow ramp.

Each door section is operated by a double-acting hydraulic cylinder attached to the structure and opens outboard (port and starboard) in a parallel motion. Forward access into the main vehicle deck is arranged over a three-section hydraulically-operated bow ramp comprising two main sections and an additional folding end section. When closed, the first section forms a watertight door at the collision bulkhead.

The vessel's stern ramp and door are built in one section and hinged at the lower end of the stern in the threshold deck. They are supplied with hinged shore flaps and internal bridge plates to smooth the passage of vehicles driving over them.

MacGregor also supplied a hoistable tilting ramp which is arranged between the main and upper deck..*NA*

Seatruck bucks trend unaccompanied

Newbuilding programme gathers pace for freight-only Irish Sea operator.

While acknowledging tougher trading conditions, Seatruck Ferries has said that it expects to see an increase in unaccompanied shipments across the Irish Sea during 2009, as its latest new freight ferries enter service. The transport solution offered significant cost-savings over accompanied traffic, the shipowner said.

Clipper Panorama, the second of Seatruck Ferries' eight-strong newbuilding programme, entered service on the Irish Sea service linking Warrenpoint with Heysham on 25 January, after her delivery by Astilleros de Huelva, of Spain.

Delivery was delayed, with Seatruck Ferries managing director Alistair Eagles citing yard delays and an unavailability of main engines as critical factors.

The new freight ferry joined sistership *Clipper Point* on the route, boosting capacity on this service to around 120,000 freight units annually. During 2008 Seatruck Ferries' vessels carried nearly 90,000 units on this Irish Sea route.

The third 22knot vessel in the programme, *Clipper Pace*, entered service in March, also behind schedule, while the fourth, *Clipper Pennant*, due to enter service in May, now looks likely to be delivered "over the summer", according to Mr Eagles. Both of these ships are for Seatruck Ferries' Dublin-Liverpool route, with *Clipper Penant* due to replace the now operational *Clipper Ranger*.

Mr Eagles said: "In the current economic climate hauliers are looking for fresh opportunities to reduce door-to-door costs. By switching to unaccompanied shipments on a central corridor route, they can reduce their shipping costs and also achieve a significant reduction in road-miles."

The new 120-unit ships are the only purpose-built freight ferries for Irish Sea service to be introduced over the past 20 years. Their service speed of 22knots cuts the crossing time from nine hours to seven hours.

The new freight ro-ro ferry *Clipper Panorama*.

Mr Eagles added: "By the summer of 2009 Seatruck's Irish Sea capacity on the two routes will have risen to 240,000 freight units annually. We remain the only Irish Sea operator totally dedicated to freight movements and we believe there is plenty of scope to expand unaccompanied shipments. It makes good economic sense, especially in the current economic environment.

Clipper Panorama replaced *Moondance*, which was redeployed in early February to a new Seatruck Ferries service from Fredericia in Denmark to Moss in Norway.

Seatruck also has four other ro-ro ships on order with German shipbuilder Flensburger Schiffbau Gesellschaft. These four-deck vessels have been designed in such a way that all decks will be connected by fixed ramps, with a single stern door, and the fourth deck providing the eye-catching design feature for a vessel of this size. They will therefore offer capacity for 151 (13.6m) trailers in a length of just 142m, with breadth given as 25m Their design draught has been limited to 5.2m, in order to offer operational flexibility. The new ships will also be fast for their size, with a service speed of 21knots. Mr Eagles said that recently completed tank tests had confirmed FSG's hull line optimisation design, where "more cargo will be carried with a lower burden of fuel".

These ships are due delivery between November 2011 and June 2012.

Mr Eagles said: "We are still looking at options when it comes to these ships, and whether they will come under our operation or be offered to the charter market, but it is clear that there is a shortage of ships in the market of this size. There have been plenty of bigger ro-ro ships built in recent years, but there have been very few in terms of what might be called 'Handysize' ro-ros. Most of the ships that offer around 2000 or 2500 lane metres of freight capacity were built in the late 1970s or early 1980s, so we see a good opportunity here." *NA*

FSG in flexible shape

With 16 ro-ro ships on order of various description, Germany's Flensburger Schiffbau-Gesellschaft mbH & Co continues to reap the reward of its specialised approach.

The latest ship to leave the Flensburger yard, in March, saw the delivery of *Cuneyt Solakoglu*, the 13th of 14 ro-ro ships built for Turkish owner U.N. RO-RO.

The 193.30m, 26.0m wide ship features a draught of 6.45m, and 3735m lane metres of freight capacity, equivalent to 255 x 13.6m long trailers.

Powered by two 8400kW main engines, and with a crew of 23, the 11,636dwt vessel can achieve speeds of 21.5knots.

As well as the final freight ro-ro vessel for U.N. RO-RO, FSG also has six con-ro vessels on order for Cobelfret, four ro-ro freight-ferries for Seatruck Ferries Ltd., United Kingdom, three ro-ro freight-ferries for Ulusoy Sealines, Turkey, and two so-called 'ro-flex' vessels for Rettig Group Ltd subsidiary Bore, of Finland. These last ships are worthy of separate attention, given that they have been specially designed to attract a range of charterers. Initially, both ships will be chartered to Mann Lines for a period of five years, which owner also holds an option for a five year extension.

Perhaps their most distinguishing feature is the the 7.4m height of the main deck, allowing free height for double stacked containers. With the car decks in use, there is still enough space below them for conventional ro-ro cargo or trailers. *NA*

Cuneyt Solakoglu, the 13th of 14 ro-ro ships built for Turkish owner U.N. RO-RO, leaves the Flensburger yard.

Interferry hot on GHG

Ferry industry association Interferry has expressed itself dissatisfied with the way the proposed 'energy efficiency design index' (EEDI) for new ships shaped up at March's International Maritime Organization Greenhouse Gas Working Group.

Interferry chief executive, Len Roueche, found March's supposedly pivotal working group meeting on greenhouse gasses at IMO headquarters something of a let down. "I was not very happy with the outcome of the GHG working group. Rational debate took second place to raw politics," he said.

"The big UN conference on climate change takes place in Copenhagen in December. The purpose is to write the next 'Kyoto Protocol'. The EU is very keen to widen the scope to include shipping. The main topic at the working group at IMO was the so-called EEDI (see pp24-25). Basically it is CO_2 emitted divided by tonne-miles of cargo. However, the formula now is incredibly complex with all kinds of adjustments. The idea is that this would become mandatory for all new ships to ensure that they are energy efficient. There are huge problems with it especially for 'specialist' ships like ferries, cruiseships and anything with unusual propulsion like diesel electric.

"The EU strategy is to push it hard and ignore any calls for exemptions or delays. The EU didn't actually speak, however. It was Denmark that took the lead.

"Interferry together with CLIA (the cruise line industry association), CESA, (Council for European Shipbuilding Associations), and ICS (International Chamber of Shipping), argued for more time to try to improve the formula so that it would actually work for ferries, etc. We had a little bit of support from Sweden and Germany but we were stymied at every turn by Denmark and the rest of the EU.

"All we got was four weeks to prepare further submissions to MEPC59 in July. The only problem is that the submission deadline is only three weeks away."

In a briefing paper sent to the IMO, Interferry said the suggested calculation methodology – based on a ship's capacity - did not take account of power arrangements and trading patterns relevant to ro-pax and passenger ferry operations, and set out a sector-specific alternative. *NA*

Green backlash

Dear Sir,
Re: editorial comment - Jan 09 – Scrubbers, Mr Winkler.
We wish to comment on your editorial comment in respect of Mr Winkler's idea of marine scrubbers.

It is mentioned by Mr Winkler that these scrubbers need not cost "more" than US$1 million.

Considering about 90,000 ships we end up with an investment of US$90 billion, which is an astronomical figure.

Why not install huge scrubbers at the refineries to start with? This would be a lot cheaper.

Did Mr Winkler note that the yard which built for Maersk those ships with scrubbers, just went under? Where does he find an owner who will add in today's market US$1 million without any incentive to do so? Are all owners part of a charity organisation? Who will pay for that, and which yard will volunteer to add this cost when no ships are ordered presently?

We are all concerned with our environment but the measures taken should be economically sensible and viable.

Let alone the cost issue, has Mr Winkler given thought to the gradual accumulation of sulphur in the ocean waters through the scrubbing of the fuel? What will the "fish" say? We thought that this way of thinking was long abandoned by us trying to keep the oceans clean.

Capt Amos Cohen
Antares Shipping Ltd.

Dear Sir,
I was interested to read the article in this January's '*The Naval Architect*' about the experimental ship with an air cavity system along its double bottom. In the early 1950s I discovered, in the basement of Alexander Stephen and Son's Shipyard office, papers relating to a patent for releasing air bubbles to reduce a ship's bow wave. I do not know if the idea was ever tried, but the patent was considered to be of no value.

Our patent was held jointly with the designer and inventor John Tutin who patented hatchcovers and stabiliser fins and designed the rudder for the *Queen Mary*. His daughter, the late Dame Dorothy Tutin who was one of my favourite actresses, felt that her father never got the recognition he deserved. For some extraordinary reason we also held a patent for a Tutin Teapot. I hope the air cavity system proves more successful than the Teapot.

Yours Sincerely
Alexander Stephen

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