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July/August 2009

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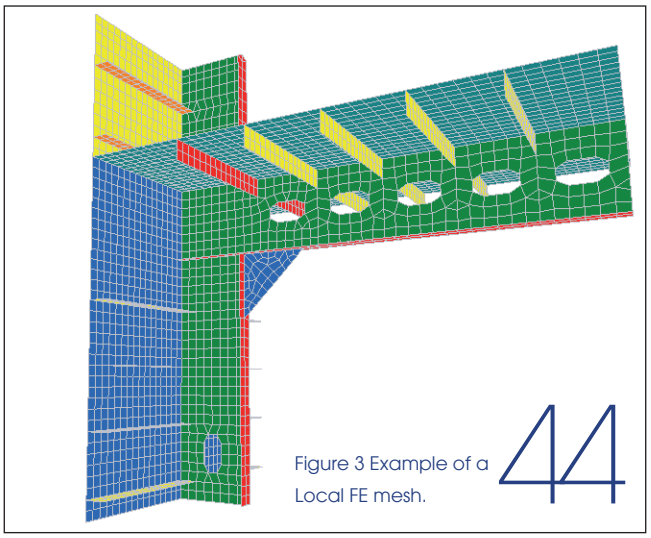

Figure 3 Example of a Local FE mesh. 44

58 Mewis Duct system from Becker Marine Systems.

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27-81 Features

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.

Stand back, commissioners at work

Oh Kong-gyun: "Although we do not agree with the Commission's views, we have offered these commitments in the interests of putting an end to the investigation."

The European Commission's (EC) bizarre competition case against the International Association of Classification Societies (IACS) reached a new level of absurdity in June, after the Commission emerged triumphant with assurances from IACS that, in large part, it would continue to do what it has always done.

The EC's preliminary remarks on its investigation into the membership criteria of IACS suggested that the approach taken by the class body "may have resulted in a restriction of competition in ship classification services".

Classification societies which were not a member of IACS "may face significant competitive disadvantages".

The Commission's views focused primarily on the manner in which IACS establishes and applies its membership criteria and the transparency associated with developing and publishing IACS Unified Requirements and other technical requirements.

It is worth quoting the EC's statement word for word, in order to get a feel for the fact that it has been framed by lawyers obsessed with what they see as a failing in procedure, perhaps because they now realise that there is no real substance to their argument, because IACS is perhaps the most transparent organisation in shipping.

"In particular, the preliminary assessment expressed the concern that IACS may have failed to: (a) enact requirements that are objective and sufficiently determinate so as to enable them to be applied uniformly and in a non-discriminatory manner concerning admission to, as well as suspension and withdrawal of, membership of IACS; (b) apply these requirements in an appropriate, reasonable and non-discriminatory way (including the establishment of sufficient safeguards to ensure such kind of application through an independent appeal/review mechanism); (c) provide an adequate system for including non-IACS members in the process of elaboration of IACS' technical standards (i.e. IACS' resolutions), (including the establishment of independent complaint/grievance and appeal/review mechanisms ensuring access to IACS' technical working groups); (d) provide for proper dissemination to non-IACS members of technical background documents relating to IACS' resolutions."

IACS does not agree with the Commission's preliminary assessment. However, its members have offered commitments to meet the Commission's competition concerns.

"All IACS members are pleased that this investigation appears to be nearing a satisfactory conclusion and that the activities of the Association, and the reputations of its member societies, have been maintained without being damaged by this investigation," said Oh Kong-gyun, the current Chairman of IACS.

IACS stressed its belief that its activities have been compliant with all applicable laws and disputed the specific concerns that the Commission has expressed. However, it has also offered a series of commitments to the Commission that it believes will enable the Commission to close its investigation on mutually acceptable terms.

"Although we do not agree with the Commission's views, we have offered these commitments in the interests of putting an end to the investigation to avoid any further diversion of IACS' and its members' resources away from their principal mission," said Mr Oh.

These Commitments lay out a new approach to assessing applications for membership based more on qualitative rather than the existing quantitative criteria. They also propose opening access to IACS' technical working groups to non-member classification societies and further developing the sharing of background information used in the development of IACS technical requirements.

"The primary concern of all IACS member societies is to promote the safety of life, property and the natural environment," Mr Oh said. "We believe that the commitments we have offered to the Commission are in line with these core principles and are also closely aligned with the Commission's own approach to evaluating Recognised Organisations (RO) under the recently adopted new EU RO Directive and Regulation."

IACS members are confident that representatives of the other members of the maritime safety regime, particularly underwriters, flag States, ship owners, major charterers and others who place their trust in the classification sector, will use the comment period to communicate their support for IACS' position to the Commission. *NA*

Shipbuilding

CESA has the blues

The Council of European Shipbuilders' Associations did not pull its punches in remarking "Driven by ill-informed speculation, massive overcapacities have built up in global shipping and shipbuilding" in a statement issued in June. "All three main markets for standard ships, containerships, bulk carriers and tankers, are substantially oversupplied," said CESA.

"While shrinking cargo volumes cannot fill existing ships, the orders for new ships placed over the recent years trigger a global fleet growth of nearly 50% by 2012. Now buyers and their bankers challenge signed contracts and urging shipyards to accept delays and cancellations or face prolonged order drought. Naturally yards are reluctant to follow such requests, but often have no choice as many orders lack financing and often buyers face illiquidity."

CESA said that, as long ago as 2006, its experts had warned that a massive supply and demand imbalance of at least 50% was building up. However, the expansion course mainly in Asia further accelerated, stimulated by a distinct absence of globally applicable trade rules. "Since September 2008, demand for new ships declined by 92%. During first quarter 2009 a global production volume of 11.5 million cgt was contrasted by new orders of only 1.1 million cgt. In this situation, substantial parts of the global shipping and shipbuilding community will face bankruptcies."

Despite the gloom, CESA said European builders could find some succour in having concentrated on niche markets with high technology requirements. "The financial crunch is currently causing substantial difficulties also in these markets but a relatively fast recovery is expected once financial resources are obtainable again," CESA said. "However, with significant lead time needed to launch new innovative shipbuilding projects, also many high tech yards in Europe will need new orders in the coming months in order to avoid or at least limit temporary or permanent lay-offs. It is not acceptable that the absence of a global level playing field should cause irreparable damage to this skill base."

CESA said it anticipated that the current demand and financing gap would lead to structural damage in the European maritime industry. Particularly SMEs and technologically less advanced companies would face severe, in some cases fatal challenges. "A united approach of European producers is needed to ensure that feasible and competitive companies do not become victims of ill-advised business practices elsewhere. Comprehensive government interventions in some parts of the world are likely to aggravate the situation."

CESA called for concerted European action "to facilitate a decisive push for the application of green maritime technologies. Europe must take leadership for a green – blue revolution."

Heavylift

New Heavyweight club

A new International Council of Heavy Lift and Project Cargo Carriers has been formed, also referred to as the Heavy Lift Club, to promote education, technological innovation, environmental concerns, security and the awareness of considerations involved with the marine transport of heavylift and project cargoes.

Jan Steffens, of Rickmers-Linie, has been selected as chairman of the group. He said: "Heavylift and project cargo carriers are crucial to world infrastructure, which affects everyone. The work of heavylift and project cargo carriers is not only important, it is specialised. There are technical, operational and safety considerations in the heavylift and project cargo sector and important challenges, which are not always considered or understood. The Heavy Lift Club provides a forum for exchanging ideas on industry matters that are of interest and concern to heavylift and project carriers."

HLC membership is open to ocean carriers who are routinely engaged in the international transport of heavylift and project cargoes through the use of a long-term controlled fleet of self-sustained heavylift vessels.

The Heavy Lift Club has a non-rate discussion agreement filed with the Federal Maritime Commission. All of the following carriers are or will be members of the Heavy Lift Club following Federal Maritime Commission approval: Australia Asia Line; BigLift Shipping BV; Beluga Chartering Gmbh; BBC Chartering & Logistic GmbH & Co KG; Chipolbrok; Clipper Projects A/S; Conti-Lines; Hyundai Merchant Marine; Intermarine, LLC, representing Industrial Maritime Carriers, LLC; K/S Combi Lift; Nordana; Rickmers-Linie GmbH & Cie KG; Scan-Scott; Scan-Trans; and Universal Africa Lines Ltd.

Environment

BIMCO's index thinking

BIMCO has thrown its weight behind the proposals for an Energy Efficient Design Index for new ships as a mechanism for emission reduction.

The shipowner association said it supported the tool as a broad measure of energy efficiency, although it recognised that there may be issues with ship types designed specifically to cater for particular transport needs. Nevertheless such a scheme provided a direct incentive for technical advances in fuel and thus ship efficiency.

The organisation, however, said it could not support any form of mandatory application of the proposed International Maritime Organization (IMO) operational

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indicator, "but strongly endorses the Ship Efficiency Management Plan as a vehicle to gauge performance".

BIMCO believes that measures to manage the emission of greenhouse gases from shipping should be regulated through the IMO.

Of the proposals for Market Based Instruments submitted to the Marine Environment Protection Committee (MEPC 59) meeting, BIMCO said it believed that the Danish proposal for an IMO International Compensation Fund was the instrument that best met the nine IMO principles.

Design

Wärtsilä combines design

Wärtsilä is to combine all its ship design units into a single entity, to be known as Wärtsilä Ship Design. The units involved in this re-organisation include the recently acquired naval architect companies Vik-Sandvik of Norway, Conan Wu & Associates (CWA) of Singapore, and SCHIFFKO of Germany, as well as the company's conceptual ship design unit in Finland.

The new set up will generate a variety of new designs, from simple, low-cost, standard vessels to more high-end tonnage. Wärtsilä said it expected to increase its share of the ship design market, with the main focus being on a full design scope approach.

"There will be close collaboration between our Ship Design unit, other parts of the Ship Power organisation, and other Wärtsilä businesses," said Arne Birkeland, vice president, ship design, Wärtsilä Ship Power. "Our long term ambition is to create standard proven designs with predefined solutions, and to provide operational services with performance guarantees and fixed prices. This may also include extended services, such as yard selection and supervision support in the construction phase.

"We will gradually launch a series of designs developed as a result of the knowledge sharing between the different units, and these will be branded as Wärtsilä Ship Designs. It is our goal to establish Wärtsilä as an independent ship design brand, which will become the customer's first choice".

One of the first designs to be fully accredited as a Wärtsilä Ship Design is the W Tug 80. This is an escort tug of 35m, capable of carrying out ship assist duties at offshore terminals, as well as high-speed escorting, push-pull operations, and coastal towing.

Design

Sandwich combo

Fintry Marine Design AG and Kockums AB, part of ThyssenKrupp Marine Systems, have reached an agreement to cooperate in the marketing, design and construction of fast ferry, work and pilot boats built in carbon fibre reinforced sandwich structure.

Swiss company Fintry has focused on supplying carbon fibre materials to the catamaran sector. For the past five years the company has been involved in designing special workboats to transport supplies and service personnel to, from and within offshore wind parks in the waters of Northern Europe. The low displacement of the vessels, due to the composite material, reduces the risk of damage to the turbines when docking.

Kockums has hitherto focused on naval technology - above and below the surface. Its experience in carbon fibre reinforced sandwich includes the Visby Class Naval Corvette, which is the world's largest surface vessel built in

One of the first designs to be fully accredited as a Wärtsilä Ship Design is the W Tug 80.

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this material. The company operates shipyards in Karisk-rona, Malmo and Musko.

Kockums said it would build Fintry CarboCat vessels, which are up to 30% lighter than aluminium and far stronger than either aluminium or steel. Fuel savings are expected to reach more than 20%. The carbon fibre material is non-corrosive and the sandwich formulation possesses a low maintenance cost with an extremely high safety factor. In addition to the savings in fuel and maintenance costs, these lighter vessels will require smaller engines to achieve performance equivalent to similar sized builds in aluminium, thus enhancing their environmental footprint.

Classification

New sloshing guide from LR

Lloyd's Register has published a new guidance document for the design of membrane-technology liquid natural gas containment systems.

The document is aimed at improving design procedures with respect to sloshing forces, and is the result of a long programme of research and development, including extensive consultation with industry, and an investment of over £700,000. The document has been used as part of the appraisal process for the approval of the largest LNG carrier built to date – the Q-Max type ships, of which Lloyd's Register is the lead class.

'Sloshing Assessment Guidance Document for Membrane Tank LNG Operations' provides guidance and recommendations on the assessment of sloshing in membrane LNG tanks. It provides design teams with an overview of suitable procedures for assessing the strength of Gaztransport and Technigaz NO96, Mark III cargo containment systems (CCS) and also new containment systems.

Nigel White, technical manager, hydrodynamics, with Lloyd's Register's Marine Product Development team, said: "LNG sloshing is a very complex issue as there are many aspects that are difficult to address explicitly by calculation or testing. Consequently, the assessment of the cargo containment system of membrane LNG ships for sloshing loads is very complicated and there is no single definitive assessment procedure that may be applied. The new document is written as guidance and it provides best engineering practice on the assessment of the CCS and the supporting hull structure.

The guidance mainly applies to membrane tank LNG ships with a barred fill range typical of the vast majority of membrane tank LNG ships in current operation.

Recently there have been several incidents involving damage to LNG membrane tanks and the approach adopted in the document provides guidance on the processes necessary to ensure that these incidents will not recur. Hence, as part of the design process, the designer should undertake a risk assessment and a hazard review to determine all possible failure modes. Having done this, it is then possible to set suitable design appraisal methods and acceptance criteria to show that these potential hazards are clearly controlled.

Research and development

MOL Technology to move

Mitsui O.S.K. Lines, Ltd has announced plans to move its MOL Technology Research Centre from its current site in Nishikojiya, Ota Ward, Tokyo, to Aso Ward in Kawasaki, Kanagawa Prefecture.

The MOL Technology Research Centre has taken a proactive approach to analysing vessel fuel oils and lubricants, developing a fuel oil pre-treatment device, research and development on CO_2 reduction, and other R&D efforts to improve storage and transport technologies such as advanced reefer containers.

MOL decided to move the centre to Micom City at Kuriki in Kawasaki's Aso Ward because of the age of the current buildings and changes in the surrounding environment.

The new centre will be an environmentally-friendly research facility using energy-saving technologies such as solar energy, natural lighting, and an ice thermal storage system, using electricity to make ice at night, when demand for power is low, and then melting the ice for air conditioning.

Ancillary equipment

PureBallast first on tankers

Alfa Laval has received an order for its PureBallast system to be installed onboard two newbuild bitumen tankers to be built at China's Wuhan Nanhua Huanggang Jiangbei Shipyard, for owner Nynas. This is reckoned to be the first ballast water treatment installation to be adapted for a hazardous tanker environment.

Scheduled for delivery in 2010, the Nynas vessels will each have a ballast tank capacity of 2150m^3 and a treatment system flow of 500m^3/h. Due to the cargo and the resulting gas risks onboard, the vessels will have their PureBallast systems above deck rather than below. The ballast water treatment solution, which involves a specially designed enclosure, is also said to be the first to be certified for use onboard petroleum tankers.

The finished design for the Nynas tankers places PureBallast in a pressurised structure on deck, rather than in the engine room. With a double-door construction that will act as an airlock and an over-pressurised ventilation system, the housing eliminates the need for an explosion-proof treatment system, allowing PureBallast to be certified by Bureau Veritas for use in this environment.

Contact Alfa Laval Corporate AB, PO Box 73, SE-221 00 Lund, Sweden.
Tel +46 46 36 65 00
Fax +46 46 32 35 79
E-mail info@alfalaval.com
www.alfalaval.com

PureBallast breaks in to gas market.

Lifesaving equipment

Viking floats with Donut

Viking Life-Saving Equipment has signed an agreement with UK-based Donut Safety Systems Ltd to distribute the 'last man overboard' Donut safety device.

Originally designed for high-rise buildings, the Donut has subsequently been applied as a tertiary means of escape from offshore platforms. Now, its potential is being tapped for commercial ships.

The Donut enables personnel to escape by means of individually controlled descent, once it has been attached to a handrail or other load bearing structure. It is said to require little physical effort to use.

Viking global sales manager, Jorgen Holm, said: "The Donut is a safety measure for unforeseen circumstances that suits our current range of high quality lifesaving appliances well. It's already popular in the offshore market, but the advantages for commercial shipping are clear as it enables the last person onboard to evacuate directly from the ship into a throw-overboard liferaft in a quick and safe manner. It is also a very good alternative to evacuation ladders and knotted ropes, because it is compact and has a lower risk of tearing immersion suits during descent."

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

Viking is now offering the 'Donut' as an additional product.

Propulsion

Rolls-Royce goes electric

Roll-Royce, Power Electric Systems Division has formally launched a means of converting existing diesel mechanical propulsion systems so that they can exploit more efficient electrical technology.

The conversion package is designed for the type of platform supply ships, coastal vessels and offshore patrol boats that operate at low speeds or in standby mode. It uses Active Front End (AFE) frequency converters to control and make the shaft generators (SG) into motors.

The shaft generator, when used as an electric motor will boost the vessel's performance and energy efficiency. When less power is required, the main engine can be clutched free from the drive gearbox. The frequency controlled SG will serve as the vessel's main propulsion. This could also be utilised as a take–me–home safety device if the main engine were to fail.

Previous installations have proven that zero pitch losses and idle running of the main engines have been reduced by up to 90%, according to Rolls-Royce, and the return on investment has taken less than two years due to fuel savings and reduced maintenance.

Trials of the new system have been carried out onboard the Norwegian Coastguard vessel *Harstad*.

Contact: Roll-Royce, Power Electric Systems (former Scandinavian Electric Systems)
Rolls-Royce Marine AS, Box 22, 6025 Alesund, Norway.
Tel +47 815 20 070
www.rolls-royce.com

Coatings

Mercator gets sleeker

Mumbai-based Mercator Lines Limited is seeing the benefits of using International Paint's fluoropolymer foul release coating, Intersleek 900, on the Aframax vessels *Prem Pride* and *Prem Divya*.

The vertical sides of *Prem Pride* were coated with Intersleek 900 in October 2007. The owner subsequently recorded a 6% reduction in fuel consumption, leading Mercator .to coat the entire underwater hull of *Prem Divya* during her second special survey in June 2008 with Intersleek 900. Now, Mercator has reported a 9% cut in fuel consumption for *Prem Divya* and, as a result, reckons to have reduced emissions to the environment equating to almost 11,000tonnes of CO_2, 100tonnes of SOx and 200tonnes of NOx.

Contact International Paint Ltd, Stoneygate Lane, Felling, Gateshead, Tyne & Wear, NE10 0JY, UK.
Tel +44 191 401 2257
Fax +44 191 438 3711
www.international-marine.com

Ancillary equipment

Grundfos pumped up

Pump specialist Grundfos A/S has received an order from Zhejiang Yangfan Shipyard in China to deliver 126 pumps for six 9500dwt multi-purpose cargo vessels for Clipper in Denmark, to be delivered in 2009 and 2010.

The order, worth US$675,000, is the first Grundfos order to be secured from a shipyard.

The Grundfos pump that will be supplied to six multi-purpose vessels.

Contact Grundfos Management A/S, Poul Due Jensens Vej 7, 8850 Bjerringbro, Denmark.
Tel +45 87501400
Fax +45 87501402
www.grundfos.com

Ancillary equipment

TTS wins hatchcover deal

TTS Ships Equipment GmbH is working on an order for Hamburg-based shipowner MPC Steamship to design and deliver the main parts of the hatchcovers for a series of nine 13,100TEU containership newbuildings from Hyundai Heavy Industries Co Ltd. The order, which comprises 83 lift-on/lift-off panels covering 21 hatches per ship, is scheduled for delivery throughout 2010 and 2011.

The company has developed the use of advanced

stress calculation systems and computer aided design (CAD) technology to ensure its hatchcover panels can accommodate higher container loadings, while keeping panel weights within the permitted maximum for handling by shore cranes.

Contact TTS Ships Equipment GmbH, Wachtstr. 17-24, 28195 Bremen, Germany.
Tel +49 421 3 35 84-0
Fax +49 421 3 35 84-98
E-mail info@tts-se.de
www.tts-marine.com

Propulsion

MAN ups the power

The business unit Power Plant at MAN Diesel has announced a substantial increase in the power output of its type 48/60 engine.

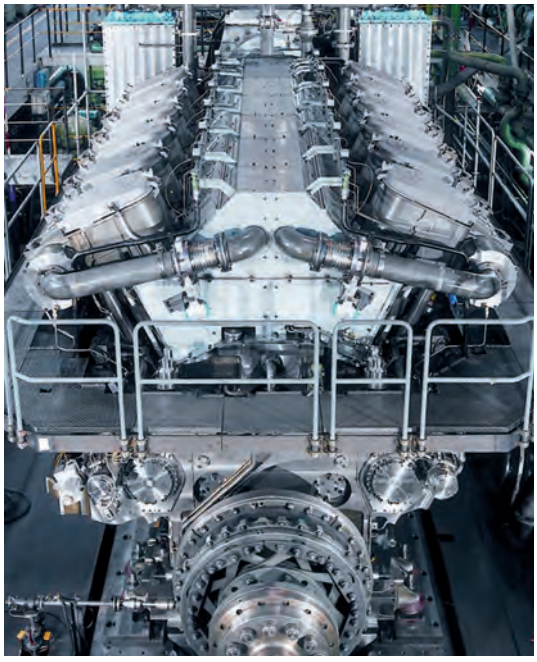
The latest 48/60 version from the Augsburg-based company offers 1200kW per cylinder, compared to 1050kW/cylinder in the existing version and is aimed especially at peak load power generation applications.

The new rating represents an increase of just over 14%, and will allow an increase in power demand to be covered without starting additional generators and the power plant operator to benefit from higher rates for the power delivered.

The 1200kW/cylinder type 48/60 engine rating has been extensively tested in a land-based application subject to periodic load peaks.

Offered in an inline version with 9 cylinders and 'V' configuration versions with 12, 14, and 18-cylinders, the type 48/60 engine now offers an overall mechanical output range of 9450kW to 21,600 kW at 500revs/min or 514revs/min for 50Hz and 60Hz power generation respectively.

The main elements of the 48/60B upgrade was an increase in engine efficiency, reduced emissions of smoke and NOx, reduced engine width and reduced power house dimensions, as well as improved ease of maintenance and greater simplicity, including a reduced component count and the use of only one turbocharger.



Seen here is the 18-cylinder type 18V48/60.

Contact MAN Diesel, Teglholmsgade 41, DK-2450 Copenhagen SV, Denmark.
Tel +45-3385 1100
Fax +45-3385 1030
E-mail mandiesel-cph@mandiesel.com
www.manbw.com

Ancillary equipment

Aalborg invests in ballast water

Aalborg Industries and Aquaworx have signed a joint venture agreement to develop and market the latter company's water treatment systems for shipboard ballast water applications.

Aalborg Industries will hold 60% as majority shareholder of a new company and Aquaworx the remaining 40%. The venture foresees the transfer of IMO approval and patent rights regarding the technology to the new company in joint ownership. The joint venture company will be established in Singapore and the share capital amount to approximately DKK75 million (€10 million).

Contact Aalborg Industries A/S, P O Box 661, Gasvaerksvej 24, 9100 Aalborg, Denmark.
Tel +45 99 304000
Fax +45 98 102865
E-mail aal@aalborg-industries.com
www.aalborg-industries.com

Lifesaving equipment

Noreq wins Dubai contract

Norwegian-based Noreq AS has won a contract to supply complete lifesaving equipment to a new safety training centre in the United Arab Emirates (UAE).

The contract is to supply a complete lifesaving package to the new safety school, located in Dubai Maritime City, based at the multi-purpose maritime centre.

The complete package will consist of lifeboats, rescue

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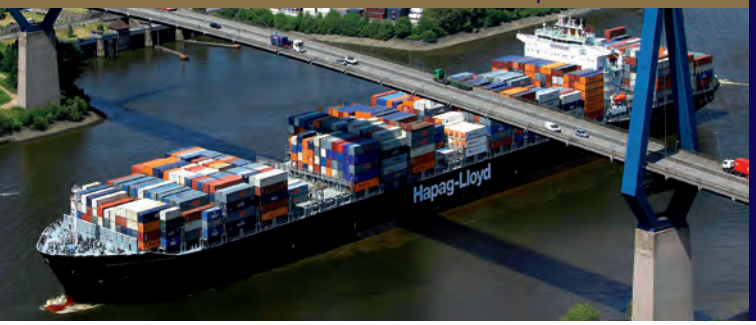
Costs and emissions → How to make ships more efficient



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To register and to be kept updated on programme details and speakers, go to www.ship-efficiency.org

Ship Operation and Ship Design

- **Fuel Efficiency versus Safety in Ship Design (FSG, D)**
  Main dimension restrictions vs. fuel efficiency, design optimization for various operational conditions, how much fuel is safety allowed to cost?
- **Energy Efficiency Design Index – EEDI (TUHH, D)**
  Principles, base line definitions, application consequences
- **Cost Savings by Hydrodynamic Measures (Grieg Shipping Group, N)**
  Reduction of speed, trim optimization, power saving devices incl. newly developed pre-swirl duct
- **Summary of the A. P. Møller-Mærsk Energy Efficiency Initiatives (DK)**
  Ship design, retrofit, performance management, operational optimization
- **Cost Efficient Ship Operation (DNV, N)**
  Voyage planning, bunker management, hydrodynamics, management and organizational aspects
- **Reduction of Ship Operation Costs (FutureShip, D)**
  Saving potentials in resistance, propulsion, main engine,auxiliaries and other onboard consumers
- **CO_2 Maintenance Index for Ships (Propulsion Dynamics, USA)**
  Optimal Intervals for hull/propeller husbandry, spot blast versus full-blasting of hulls, setting fleet targets for hull and propeller performance
- **Ship Service Performance (MARIN, NL)**
  Ship performance monitoring including measurement parameters, effect of fouling, how to save fuel using performance monitoring and analysis results
  Shipboard Weather Routing – Operational Benefits (GL, D)
  Prevention of damages, hull response monitoring, efficient ship scheduling, experience and further development
- **Increased Efficiency by Crew Training Simulation (MTC, D)**

Future Fuels and Efficient Power

- **Gaseous Fuels – Operational Aspects (Wärtsilä, FIN)**
  Dual fuel versus pure gas engines, efficiency and emission aspects, cold ironing versus gas driven engines
- **Gaseous Fuels – Safety Aspects (BV, F)**
  Safe operation of gas engines, risk analyses, rules and regulations
- **Use of Wind Energy (SkySails, D)**
  Potential of Sky Sail system, first operational results, future developments
- **4 Stroke Engines – Efficiency and Emissions (Cat, USA)**
  New developments, NOX reduction, external exhaust gas treatment
- **2 Stroke Engines – Efficiency and Emissions (MAN Diesel, DK)**
  New developments, gaseous fuel and low sulfur aspects
- **Energy Efficient Engine Room Ventilation (Witt & Sohn, D)**
  Saving potentials, fan selection strategies, retrofit, recommended measures
- **Heavy Fuel Oil Additive Options (Neo Petcon, India)**
  Quality issues in HFO, role of fuel additives, case studies

Conference Language: English

Venue: Hotel Hafen Hamburg (www.hotel-hafen-hamburg.de)

Special Hotel Rates: If booked prior to August 21 at
Hotel Hafen Hamburg (STG-HH-240909)
Madison Hotel Hamburg (STG Ship Efficiency)
Maritim Hotel Reichshof (STG-HH)
Empire Riverside (Ship Efficiency280909)
Hafentor (STG)
Lindner (Ship Efficiency 2009)
For booking and rates, see www. ship-efficiency.org

Programme:

September 28	
9:00 – 10:00	Registration, Welcome
10:00 – 13:00	Papers on Ship Operation and Ship Design
13:00 – 14:30	Lunch
14:30 – 17:30	Papers on Ship Operation and Ship Design (cont'd)
19:00	Conference dinner with keynote speaker
September 29	
9:00 – 13:00	Papers on Future Fuels and Efficient Power
13:00 – 14:30	Farewell buffet

Conference Fees:

	If booked prior to August 21	Full fee
Participants	€ 650	€ 750
STG-Members	€ 500	€ 600
Members of RINA/SNAME/JASNAOE/SNAK IMarEST/SSNAME/IME/HIMT	€ 500	€ 600
Students/Pensioners (STG members only)	€ 100	€ 100

The conference fee includes proceedings on a CD, admittance at all technical sessions, lunches and refreshments, conference dinner and farewell buffet.

The German Society for Maritime Technology
Schiffbautechnische Gesellschaft e.V.

boats and davit systems and is scheduled to be delivered in October 2009.

Contact Noreq AS, P.O. Box 144, Bogsnes Industriområde, N-5460 Husnes, Norway.
Tel +47 53 46 47 50
Fax +47 53 46 47 51
E-mail noreq@noreq.no
www.noreq.no

Ancillary equipment

Aker Solutions on deck

Aker Solutions has been awarded three contracts to supply deck machinery for a total of 34 vessels, worth around NOK100 million (US$15.6 million), built by subsidiary Aker Pusnes AS.

The contract awards are from Hyundai Heavy Industries (HHI), South Korea, and Dalian Shipyard, China, for the supply of Pusnes electric deck machinery and Pusnes hydraulic deck machinery.

The HHI contract calls for frequency controlled electric deck machinery for 4500TEU container carriers ordered by a major European shipowner. Aker Solutions also recently secured another order from HHI for the supply of deck machinery to six 22,500m^3 LPG/NH3 carriers from the same owner.

The two contracts from Dalian Shipyard consist of high-pressure Pusnes hydraulic deck machinery for 298,000dwt VLCC's and 76,000dwt petroleum carriers, ordered by various shipowners. With these two contracts, the number of Dalian-built VLCCs to be fitted with Aker Solutions deck machinery amounts to 26 vessels, while the number of tankers similarly equipped at the same yard will be 23.

Contact Aker Solutions AS, Snarøyveien 36, Fornebu, P.O.Box 169, N-1325 Lysaker, Norway.
Tel +47 67 51 30 00
Fax +47 67 51 30 10
www.akersolutions.com

Ancillary equipment

MacGregor receives bulk order

Cargotec's business area MacGregor has been contracted to supply around €25 million worth of cargo-handling cranes for 24 bulk carriers under construction at ABG Shipyard in India for Asian and European owners.

The order will see cranes for series of 32,000dwt to 35,000dwt bulk carriers.

The scope of supply for each vessel includes four GLB3026-2 cranes with a SWL of 30tonnes. These cranes will be fitted with MacGregor's latest CC3000 control system, which has been designed for smooth, fast and stepless operations, according to the supplier.

The cranes will be manufactured in MacGregor's partner plants and delivery is planned to start at the end of this year and continue until mid-2013.

Contact Cargotec Corporation MacGregor, Sörnäisten rantatie 23, PO Box 61, FI-00501 Helsinki, Finland.
Tel +358 204 554 299
Fax +358 204 554 667
E-mail marketing@macgregor-group.com
www.macgregor-group.com

Ancillary equipment

ABB adds auto-mooring

ABB has augmented its stepless speed and torque control programme for anchor winches, mooring winches and ro-ro gate ramp winches, by adding auto-mooring capability for use with drives of between 0.55kW to 5600kW.

Auto-mooring provides new operating functionality when a vessel needs to be moored to a harbour via ropes. The new feature is integrated into drive application software as a ready-made option within adjustable parameters, depending on the set-up.

In hand-mooring mode, the winch operator controls drive speed manually to achieve pre-tension in the ropes connecting a vessel to its mooring point. Now, when the pre-tension is achieved, the winch operator can switch over to auto-mooring, so that the drive itself can take charge of maintaining stable tension in the ropes.

Auto-mooring is a speed control application with torque limitation, where the target of the control is to maintain the tension between the vessel and the mooring point. It can be used in three different ways:

- Time sequence mode, where a programmable re-mooring time can be set between mooring actions.
- Load-cell control mode, depending on real measured load cell information to control the mooring actions.
- Always on mode, where mooring actions are continuously on, without stopping the motor and closing the brake,

The rope tension set-point can be a fixed internal parameter value or can be sent via external digital input and analogue input signals.

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Tel +41 43 317 7111
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www. abb.com

Weather profits

A voyage optimisation package from Jeppesen based on thinking derived from naval architecture is making waves.

Marine cartography specialist Jeppesen Marine says its latest weather routing and voyage optimisation package draws heavily on naval architecture, while at the same time offering the type of up to the minute functionality demanded by users more familiar with the products marketed to airline customers by its parent group Boeing.

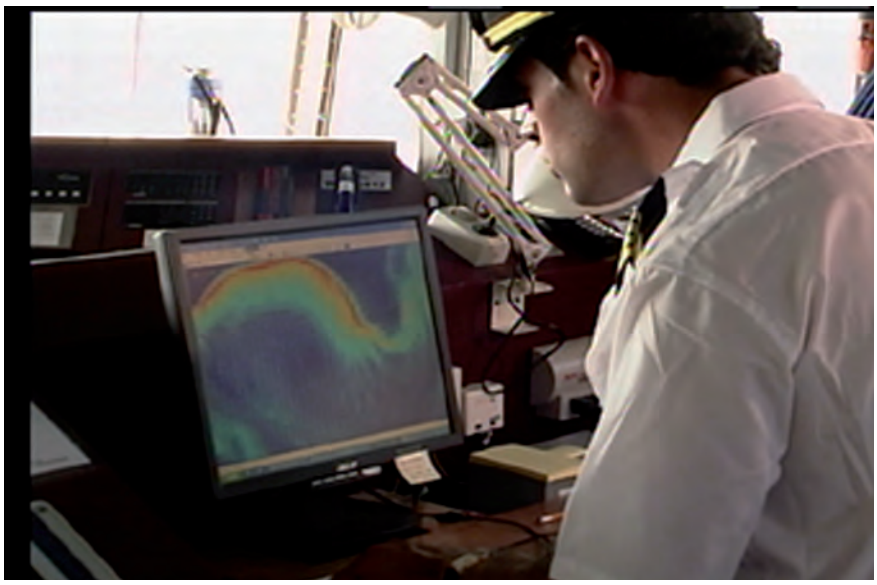
While bunker fuel prices today are lower than was the case this time last year, prices are on the rise again. Thus, cost and schedule-conscious shipowners must put in place the means of optimising vessel passage and routing.

Jeppesen has achieved some success in supplying its voyage optimisation solutions, with around 200 ships using the system to date, mainly in the deepsea container and reefer trades. Now, the company is ready to take its offering to a wider market.

Thomas A King, Jeppesen Marine's senior business development manager, marine operations, said that the company's VVOS (vessel and voyage optimisation solutions) used statistical analysis of a vessel's past voyages to deliver advice to shipowners on how they might adjust routing or performance parameters during a current or coming voyage. VVOS offered ship-specific modelling and calibration, and a proprietary optimisation process that measured optimal speed management against constant speed, on which a patent was pending.

Mr King said that, in general, Jeppesen analysis had shown that ship efficiency was "in the low 90% range" when considered in terms of the optimum possible means of getting from A to B. Using VVOS, owners to date had found that they could improve vessel performance to "around 96%-97%".

VVOS analysed ship performance based on as many as 100 voyages of a ship or class of ships, to establish how that ship performed in the context of whether it arrived on time, how much fuel it consumed, whether it operated safely at all times, or by any other parameter set by the shipowner. VVOS uses algorithms based on seakeeping and hydrodynamic performance to record the efficiency of the ship. Roll, pitch and acceleration forces can all be accounted for, and the system can even be programmed to gauge the effect heavy weather will have on hull stress and cargo damage, if the shipowner identifies this as something to be avoided in order to maintain the integrity of the asset.



VVOS voyage optimisation package from Jeppesen Marine shows a range of voyage options to meet the same objective of getting from A to B.

In detail, the system collects past passage reports from the ship's engine and deck logs, cumulatively tracking passages in different weather conditions. It then develops and calibrates baseline performance models for the hull, propeller and engine against actual recorded values, and simulates the passages using 'hindcast' wind, wave and current data, going on to compare fuel consumption to the optimised passage for the same ETD and ETA. Statistics can then be compiled showing results before and after adopting VVOS. The 'hindcast' is a means of normalising external environmental conditions post-voyage.

A sensor is mounted in the wheelhouse to record vessel motion information, with the VVOS also interfacing with the GPS onboard, ECDIS, and the automation and machinery system. including the engine or even with the cargo loading system. Thus, with thrust, fuel consumption, wave height, wind speed, ship speed, draught and trim all measured or observed, propeller and engine efficiency - or their degradation - and the effect of hull fouling can be calculated.

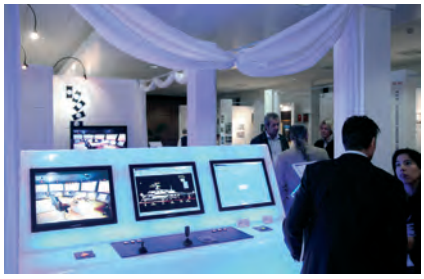
The system uses proprietary algorithms to offer advice on the way to minimise fuel consumption for a range of arrival times within 'user-set safe operating limits', and to offer en-route tactical guidance for ETA, fuel optimisation and safe seakeeping.

A ship's operating area could also be defined by ice coverage, insurance needs, navigation safety, expectation of attack by pirates, etc, with all of these factors feeding into the expected time

The story behind...
THE SUPERYACHT PAVILION AT METS 2009

What is the SuperYacht Pavilion? An expanding 'show within a show' at METS

The SuperYacht Pavilion (SYP) is a niche market exhibition area for suppliers of goods and services to the large luxury yacht market. Although part of the Marine Equipment Trade Show (METS) – the world's biggest trade-only leisure marine show – the SuperYacht Pavilion has its own exclusive identity. It is organised simultaneously with the Global Superyacht Forum (GSF). This combination offers the biggest platform for innovation, orientation and networking.



What is the GSF? The world's leading summit for superyacht industry professionals

GSF (Global Superyacht Forum) delivers in every way – with top profile presenters, excellent networking and a high level of interaction between speakers and delegates. Organised and presented by The Yacht Report Group in association with METS organisers, Amsterdam RAI, the Global Superyacht Forum attracts over 400 delegates and includes social highlights like the Global Superyacht Party. To find out more about the speakers and programme, visit superyachtevents.com/gsf.

Who visits? Superyacht captains, designers, builders, project managers, brokers and owners

The SuperYacht Pavilion is of interest to many of the thousands of professionals who visit METS every year and is well attended by all the speakers and delegates who take part in the associated Global Superyacht Forum (GSF). The Pavilion and GSF in tandem offer a varied and appropriate display of products, a vibrant conference programme and networking galore. All companies exhibiting in the SYP are vetted to ensure they are genuine suppliers to the large luxury yacht market. Your time is precious and we don't want you to waste it.

Check out the exhibitor list on metstrade.com

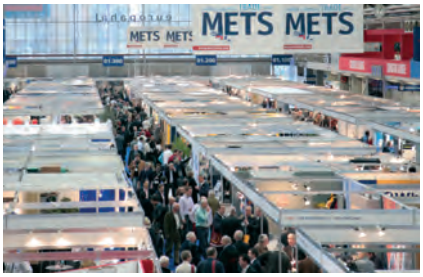
THE YACHT report the official magazine for the SuperYacht Pavilion

What's new for 2009? A new fully integrated layout and extended emphasis

For 2009 the SYP is concentrated in a single location – its own Hall. Although very much a part of METS, the SYP is now closely linked to the GSF venue to facilitate networking between the two. As the superyacht sector has unique specialist demands, companies in the SYP are allowed to market 'services' as well as 'products' in contrast to the rest of METS which is strictly 'products only'. As part of this policy, the SYP 2009 features an all-new 'Repair & Refit Boulevard', home to exhibitors offering vitally important maintenance services for large luxury yachts.

A word about METS

Visitors to the SYP are already at the heart of METS – the world's largest and best attended leisure marine trade event – held every year at the Amsterdam RAI exhibition and congress centre. METS 2008 had over 1,100 exhibitors from 36 countries and averages some 18,000 visitors per year from at least 100 countries. Thousands of new and proven products are on display throughout the halls and visitor surveys reveal that 97% of attendees are (very) satisfied with the event and 91% plan to return.



Register for your free entrance badge

To visit the SuperYacht Pavilion you need a FREE three-day entrance pass to METS 2009. Please pre-register for this on metstrade.com. Registration opens August 1. If you want to be kept up to date on METS in general, please subscribe to the METS e-newsletter via metstrade.com. To help with your planning, Amsterdam RAI can also book hotel rooms for you and assist with other travel requirements. Go to metstrade.com for all the details.

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of arrival, and offering advice on the best route achieving the lowest possible fuel consumption or, by the same token, the route that achieves the safest passage or, at the detailed level, avoids the potential for parametric roll.

Alternatively, or at the same time, ocean current information could be factored in to colour the ship master's judgment in selecting the optimum route.

Typically, a ship's master will run the ship at high speed until the ship hits bad weather, and then throttle back. This has consequences for fuel consumption, ship damage and cargo losses. With weather predictions available to the master twice daily, VVOS offers an alternative scenario that might persuade the master to run at slow speed during calm weather, waiting out the storms ahead, and then speed up once the bad weather has passed.

Mr King said that Jeppesen ran a 24 hour a day weather prediction centre in San Jose by way of back-up, which masters could call into at any time, should they require additional updates.

At the same time, via a quarterly key performance report, the fleet manager can track the performance of the ship in terms of its fuel consumption, its coatings performance, propeller fouling or hull stress. Mr King said the Jeppesen VVOS offered users a common visual reference that could be looked at by all parties in order to avoid confusion.

VVOS has even been used as an expert witness tool to support cases where owners have contested the quality of coatings work carried out by a yard.

Mr King said a 5000TEU+ capacity containership operating on the Pacific had demonstrated 6% fuel savings over a sample period by using VVOS. He said that the number of hours when heavy weather delayed operations had decreased by 80, while the number of damage claims due to heavy weather had decreased by 73% and the cargo damage claims due to heavy weather had been cut by 87%. Transpacific fuel savings of 5% to 11% were achieved over the comparable 'sprint and loiter' approach to seafaring.

He said that, on average, users of VVOS had achieved 4% fuel savings, and that the return on investment for the subscription-based service was palpable. Any user that could demonstrate that this was not so could have their money back, he said. *NA*

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LASS is more for composites

As a part of the LASS* project a study concerning the use of composite materials in selected parts of small cargo vessels has been performed by Kockums AB.

With a view to reducing structural weight and thus increase payload, Kockums AB has analysed the likely consequences of using composites in the cargo hatches, a grain bulkhead, and the deckhouse onboard a notional bulk carrier.

Part of the LASS ('Lightweight construction applications at sea') project, the study was devised to result in a "base line for composite structures", from which it will be possible to estimate the weight, the material cost and the manufacturing cost. No detailed design concerning battening or interlinking of hatch sections was performed.

Known requirements were that the cargo hatch and the grain bulkhead must have a robust design. The surfaces must be flat in order to achieve easy cleaning. The deformation when loaded must be limited in order to maintain the water tightness of the cargo hatch. The grain bulkhead is not water tight, but it may be unpractical with large deformations for this structural element.

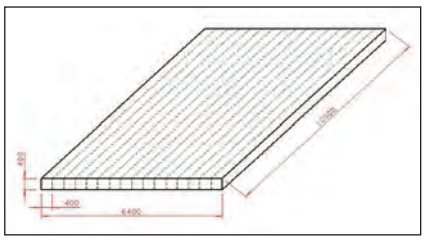
For the deckhouse, the prime goal was to decrease the structural weight.

All composite details had to be easy to manufacture and to repair and the material cost was "low". Design loads were based on the DNV Rules for Ships, while design of the composite structures was based on the DNV Rules for High Speed, Light Craft and Naval Surface Craft.

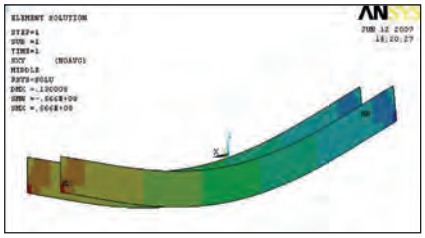
Laminates hatched

A typical hatch is assumed to be 10.4 x 6.5m, with the height 0.4m. The proposed cargo hatch design is of a traditional stiffened single skin structure, consisting of a number of joined square hollowed sections. The sections can be pultruded or manufactured by vacuum infusion on a mould.

Type of vessel studied.



Typical cargo hatch cover.



Web laminate shear stress.

The laminate design can be optimised when vacuum infused, saving weight. The size of the cross section may be limited when pultruded.

In the context of the study, to avoid local deflections and to create a tough upper skin laminate a layer of high absorbent fibres was used - "Lantor Soric XF6". The layer thickness was 6mm and the fibres located in the middle of the skin laminate. This increased the thickness and the bending stiffness of the skin laminate.

A FEM analysis was performed to obtain knowledge of the hatch deflections. The hatch was built up with a number of similar sections, with each section designed to carry itself and the design pressure. The FEM model consisted of only one single square hollowed section. The analysis was performed with ANSYS and the element used in the FEM analysis was Shell 181, a four-node finite strain shell.

The largest local bending deflection was found in the top side laminate - 3.33mm.

The maximum allowed local deflection was set to w=2t, where t = the laminate thickness. In this case t=14.94mm, including the Lantor soric ply of 6mm. The allowable local bending deflection will then be 29.88mm. This means that the deflection was within the rule limitations.

A shred section at the mid-span of the hatch showed the bending stress at the mid span in the top layer of the laminates. The compression stress in the top side laminate was 51MPa. The maximum allowed compression stress had been set at 118MPa. The tensile stress in the bottom side laminate was 14MPa, where the maximum allowed tensile stress was set at 158MPa.

The shear stress corresponded to the well known transverse force distribution over a beam subjected to a uniform pressure over the span. Maximum occurs at the ends and no shear at mid span. Maximum shear stress was 57MPa and the maximum allowed shear stress was 82MPa.

The estimated weight of each square hollowed section in the cargo hatch was approximately 180kg. One cargo hatch section will be built up by 16 of these, so the total weight for one hatch section could be seen to be approximately 2880kg.

The equivalent steel hatch would weigh approximately 6114kg. The ship envisaged features nine hatches, and therefore the total weight saved would be 29tonnes.

In this example a single skin design has been studied for the cargo hatch. Kockums said it may be possible to use a sandwich design with a suitable core, but that this fell outside the scope of the study.

Grain bulkhead

Turning to a grain bulkhead made of glass fibre reinforced polyester, the study envisaged an 11.6m x 1.93m bulkhead section that was

*The full LASS report can be downloaded from www.lass.nu while the 1st International Conference on Light Weight Marine Structures will be held 7-8 September 2009 at the Dept. of Naval Architecture & Marine Engineering, Universities of Glasgow and Strathclyde, Henry Dyer Buliding, 100 Montrose Street, Glasgow (see www.liwem.com).

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0.24m thick. The design follows the same principle as the cargo hatch cover i.e. a number of square hollowed sections on top of each other.

Here the study concluded that the composite bulkhead would, in fact, be of a larger weight than the equivalent steel bulkhead.

However: "The calculated bending deflection of the composite bulkhead will be approximately 0.4m. An analysis of the steel grain bulkhead gives the bending deflection 0.3m.

"In this study the bending deflection and flexural rigidity is the limiting factor. If the requirements of the grain bulkhead are more explicit it will be possible to further optimise the design. Designing against a strength requirement will result in a significant decrease in weight for this bulkhead. It is recommended to perform further studies."

Deckhouse scantlings

The core material to be used for deckhouse scantlings in the superstructure in the study was balsa with density 100kg/m^3 for all panels, except the first tier of the front bulkhead where the density 279kg/m^3 was used. The higher design pressure level demands an increase in core material density for this area.

The fabrics used in the panels are biaxial 0/90 800g/m^2, (BLT800). All equipment, such as windows, doors, doorframes etc., was excluded from the weight calculation.

The design presented was based on minimum requirements in accordance to the classification rules. This is to be regarded as a baseline for a weight study.

The composite weight was given as 10.1tonnes, and therefore the weight saving ratio, in this example, was estimated to be approximately 60% or 15.4tonnes

Kockums said that the study showed that it may be feasible to use composite material in the cargo hatch and the deck house structure without any major changes in the design.

"The grain bulkhead design needs to be adjusted to achieve the most benefit from changing material to composite," the company said. Further studies within the area will result in a more optimised design with a better weight saving ratio. *NA*

Copper-bottomed answers

New guidance offered on copper-nickel tube and pipe bending.

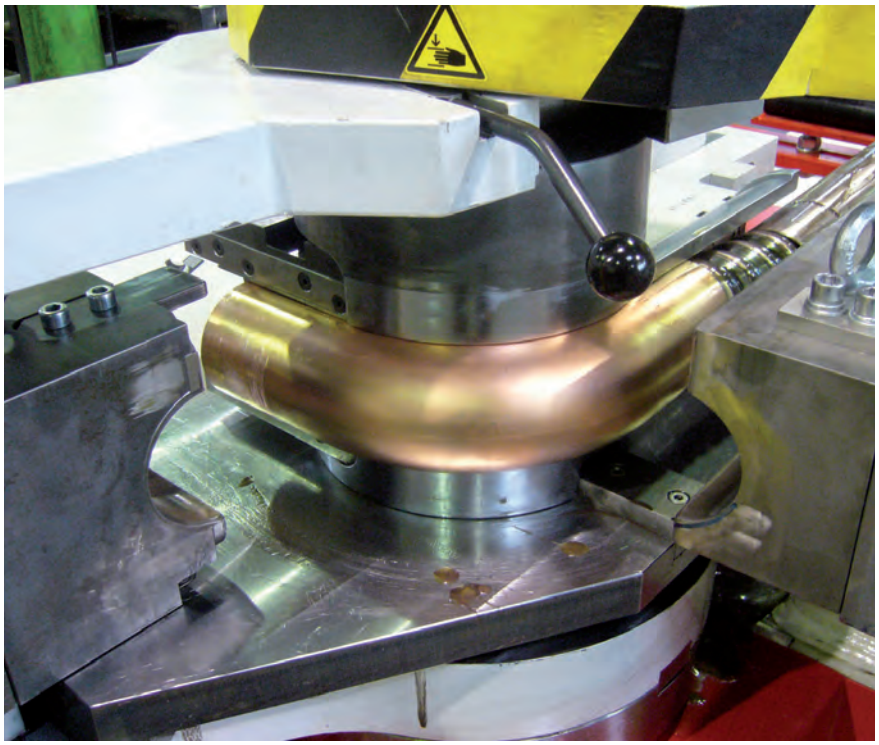
Designers of shipboard piping systems looking for materials offering resistance to seawater corrosion, high inherent resistance to bio-fouling and good fabrication properties are being reminded that all of the above can be achieved by specifying copper-nickel.

A new section on www.coppernickel.org, the global site for copper-nickel information, provides in-depth information on tube and pipe bending using these materials.

The section provides guidance for fabricators, installers and operators working with copper-nickel, including the good bending practices and smooth bends that are integral in obtaining the optimum service life of such systems.

Offering detailed illustrations of rotary draw bending and discussing the correction of bending defects, the section provides engineering insight into a subject seldom examined in this manner.

The section was written by Maik Macziek, a technical expert and member of the Copper-Nickel Task Group, a panel of international industry experts. To view the website, visit www.coppernickel.org and go to System Components, selecting Tube and Pipe Bending of Copper Nickel, or go directly to http://www.copper.org/applications/cuni/app_syscomp.html.



Guidance for copper-nickel tube and pipe bending gets release.

For those wanting further details of the applications of copper-nickels, www.coppernickel.org features an interactive presentation containing the most crucial and up-to-date information on these workhorse alloys for marine environments, and also addresses many questions on application and best practice. *NA*

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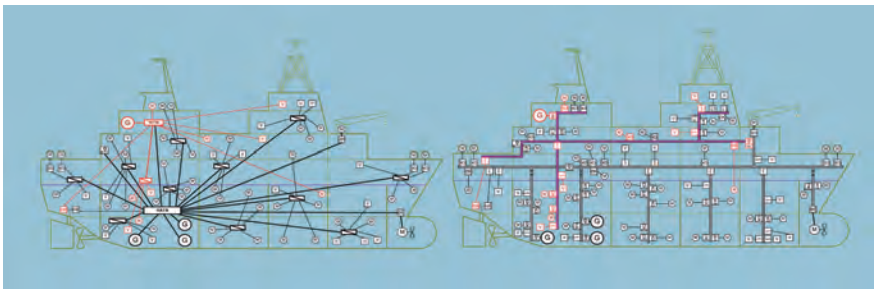
Are designers missing the bus?

Prescriptive regulations currently prohibit installation of power bus distribution systems onboard ships, but a risk-based approach to ship design offers the prospect of change.

Replacing cumbersome and space-hungry cabling with bus bar technology for power distribution has become commonplace onshore, but doing the same onboard ship challenges existing regulations.

One project within the risk-based 'Safedor' project recently completed under management of Germanischer Lloyd envisaged how a power bus distribution system might look if installed on a ro-pax vessel.



Conventional power distribution system versus power bus distribution.

Part of the thinking underlying Safedor is emerging at the International Maritime Organization as part of proposals submitted by the Danish Administration to the Maritime Safety Committee. In short, the Danish proposal looks to develop a 'preliminary approval' for a new aspect of ship design, based on equivalence to an existing safety regulation, where the 'approval authority' confirms that the design or system will – by fulfilling certain conditions – be deemed feasible for full scale approval at a later stage of development.

A conventional power distribution system features a 'radial structure', where the main switchboard is close to the machinery space. Here, the switchboard is split into two independent sections, with monitoring and control via a main switchboard or/and automation. Consumers are directly linked to the main switchboard or via sub-distribution boards, with connections made via cables from the main switchboard. Starter, switches and consumers mostly reach IP22 or IP44 standard, in being protected against contact and water drips/splash.

In contrast, a primary power bus system adopts a 'tree structure', where the distribution grid is equivalent to the switchboard. Featuring a backbone and branches, consumers are monitored and controlled via the bus system and are directly linked to the bus bars. Cable connections are only required for the 'last metres'. Again, start, switches and consumers mostly reach IP22 or IP44 standard.

Basic requirements under SOLAS demand that electrical installations onboard ship must observe the following criteria:

- All electrical auxiliary services necessary for maintaining the ship in normal operational and habitable conditions will be ensured without recourse to emergency source of electrical power
- Electrical services essential for safety will be ensured under various emergency conditions
- The safety of passengers, crew and ship from electrical hazards will be ensured.

As far as the main switchboard is concerned, this means that there must be indication and alarm circuits supplied from the emergency switchboard, while each steering gear needs to be served by at least two exclusive circuits fed directly from the main switchboard. For the emergency switchboard, cables connecting to fire pumps must be fire resistant where they pass through high fire risk areas. The electrical installation must also feature IP56 protection in wet spaces.

The study related to applying bus bar power distribution within Safedor was undertaken using input from SAM Electronics, which suggested that such an approach was very promising. According to SAM, its 'fault tree analysis' showed "the tendency of the PPB to have higher reliability with respect to normal operation".

SAM said that connections between single bus bars may have an increased impact on reliability if long PPB systems were installed. However, it also said that the generic PPB design contained redundancies for some consumers (steering gear, bow thrusters) leading to a higher supply reliability. These redundancies were not considered in the reference design for a ro-pax vessel used in the study. Furthermore, SAM said that the distribution of consumers in the PPB approach was "more homogenous". This is expected to be advantageous in cases of failures of the distribution grid, as well as of single consumers.

Before designers rewrite the rule book, however, "the results of the analysis for the systems in accidental conditions demonstrate that a further elaboration of the design is required before a final evaluation is possible".

In applying the risk-based approval process to the primary power bus, the Safedor project concluded:

"The quantative investigations are focused on the reliability of power supply for a representative selection of consumers in normal operation (sea mode, manoeuvring) and in accidental conditions

For accidental boundary conditions no satisfactory evaluation is possible for the present stage of development." *NA*

ABS revises LNG criteria

Revised liquefied natural gas carrier construction guidance sees ABS develop new criteria stretching from initial scantling evaluation, design load criteria and load combinations, through structural response prediction and strength acceptance criteria.

Class society ABS has revised and reissued its *Guide for Building and Classing Liquefied Gas Carriers With Independent Tanks.*, in the process developing 15 load cases for the strength assessment of the hull and cargo tank structures.

Type-A independent tanks were used on the first generation of LNG carriers and are now used for fully refrigerated LPG containment systems for vessels with capacities of up to 90,000m^3, of which several are currently on order. Latterly, Self-supporting Prismatic Type-B (SPB) independent tanks for LNG vessels have received special attention as the interest in floating LNG terminals and regasification unit increases.

Type-B spherical tanks continue to be selected for LNG carriers and considered for new floating LNG units. Type-C independent tanks used for fully pressurised LPG carriers and the new generation small coastwise LNG carriers are also covered in the Guide.

The newly revised ABS Guide provides a multi-level approach to the evaluation of the structure of a proposed design. This roadmap creates a structural evaluation hierarchy so that a practical, deterministic assessment of initial designs for these carriers can be made more quickly and easily. Where required, increased design confidence will also be gained by applying more advanced structural analyses, including the dynamic loading approach (DLA) and spectral fatigue analysis (SFA).

Criteria for the strength assessment of the hull and cargo tank structures should also take account of their interactions, explains Wei Biao (Bill) Shi, ABS director, engineering support. The current criteria, he says, encompass initial scantling evaluation, design load criteria and load combinations, structural response prediction and strength acceptance criteria.

"Industry has been calling for the use of advanced predictive models while at the same time asking for a format that will lend itself to quick determinations of initial designs and construction cycles," says Mr Shi. "A necessary balance must be struck between the incorporation of highly advanced technology methods and the need for practical, deterministic applications."

Liquefied gas carriers with independent tanks present their own set of technical challenges. Exemplary is the system that secures the independent cargo tanks within the hull structure. "The interaction between the hull and independent cargo tank structures needs to be explicitly considered during the strength assessment," says Mr Shi. "For prismatic tanks, the preliminary strength assessment of vertical supports, anti-roll chocks, anti-pitch chocks, collision chocks and anti-flotation chocks can be achieved at the initial design stage with the use of critical dynamic and accidental load cases when detailed engineering models are not yet developed.", he adds.

ABS provides a systematic way to evaluate the hull, cargo tank structures and support and securing systems with the use of specially developed engineering software systems. "Through the complete cycle of the structural evaluation, critical areas can be identified in both hull and independent cargo tank structures," says Mr Shi. These identified critical areas can also be used to guide enhanced monitoring during construction and scheduled surveys.

Mr Shi says large liquefied gas carriers with independent tanks are high-value assets requiring a high level of structural safety, robustness and longevity. The strength criteria contained in the revised Guide is used to verify compliance with the structural analysis requirements in the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code) and as a condition of classification. *NA*

Dust extractor for welding safety

Potentially dangerous radio-toxic dust generated during grinding of some types of welding electrode can now be collected and disposed of in complete safety, according to UK-based Huntingdon Fusion Techniques Limited (HFT).

The company has released a new vacuum dust extraction system for its TEG -3 tungsten electrode grinding machine. This more comprehensive Tungsten Grinder, has all the features of the non-extraction version with the added extraction system.

In re-designing the transport packaging for the Tungsten Grinding Machine, to accommodate the extraction system, HFT has taken the opportunity to introduce a new robust container that meets the requirements for international transportation.

FastROOT to success

Further development of FastMig Synergic welding systems with FastROOT process for effective root pass welding.

Welding systems specialist Kemppi continues to add power sources, processes and feeding system capability to its industrial 3-phase FastMig Synergic MIG/MAG welding systems, which are offered with either the SF 52 or SF 53 function control panel and optional FastROOT process software.

Designed for accurate weld root pass welding with mild and stainless steels used in industrial pipe and tube installations as well as heavy to medium fabrication work, including shipyards, offshore work and structural steel applications, FastMig Synergic provides the welder with a choice of energy saving KMS 300, 400 and 500 power sources. The system has power to weight ratios and MSF53, 55 and 57 wire feed units for 200mm or 300mm wire spools, plus the option of either the SF52 or 53 control panel for root pass welding, with all the basic functions plus crater filling, hot and creep start and memory for storing welding parameters.

Kemppi's FastMig Synergic MIG MAG welding system.

All the wire feed units have 4 x 32mm diameter feed rolls, a 0-25m/min wire feed speed for solid and cored wires as well as aluminium with diameters ranging from 0.6mm-2.4mm. Kemppi's FastCool 10 water cooling unit is also available as an option.

To date, key developments in the system by the finnish company have included the modification of FastROOT software, the short-arc welding process, where the power source's current and voltage parameters are digitally controlled for accurate and fast MIG/MAG root pass and thin sheet welding on mild steel and stainless steels. This enables plate and pipe welders to weld in all positions using the same equipment for root pass welding with good root surfaces and root side shape with minimal requirements for post weld finishing or capping.

This software can be retrofitted into existing FastMig Synergic machines having either the SF52 or SF53 control panels. It is installed using a special activation code through either control panel. It also comes supplied with a DVD providing both installation instructions and information about root pass welding techniques.

Mike Pixley, Kemppi (UK) Ltd managing director, said that further development of the system was in train. Kemppi is process testing a new feeding system at two UK yards, the so-called 'Supersnake', which is designed to be fed through bulkhead apertures. *NA*

Heavy metal-free SeaGuard

Sherwin-Williams Protective & Marine Coatings Division introduces SeaGuard heavy metal free antifoulant.

Sherwin-Williams Protective and Marine Coatings Division has launched SeaGuard Heavy Metal Free Antifoulant, which is presented as an environmentally responsible alternative to copper-based hull coatings that prevents the growth of marine organisms on commercial and military ships.

The new product, which has US EPA approval, is a solvent-based ablative coating that utilises a metal-free organic biocide agent, but nonetheless is said to provide equivalent antifouling protection capability as traditional copper-based coatings. "Because the antifouling agent in SeaGuard Heavy Metal Free has an extremely short hydrolytic half-life, it does not persist or accumulate in the marine environment and will not harm marine organisms," the company says. "The breakdown products are biodegradable."

Traditional antifoulings utilise metals such as copper as active antifouling agents. These metals can harm marine life as, over time, they leach from ship hulls and concentrate in sediment. The issue is of particular concern in estuaries and bays that flush slowly, such as San Diego Bay.

SeaGuard is also said to offer shipowners fuel savings compared to traditional antifoulings because it eliminating reduction in weight of 40% compared to traditional copper antifoulings.

"This is a first in our product offering to the US military and US commercial ship owners - an environmentally responsible alternative to metal-based antifoulings that not only meets performance expectations but can actually increase fuel efficiency", said Doni Riddle, vice president, Sherwin-Williams Protective & Marine Coatings Division.

Another environmental advantage of SeaGuard Heavy Metal Free Antifoulant is its lower level of Volatile Organic Compounds (VOCs) – less than 340 g/L. It may be applied at temperatures as low as 10°C.

Available in red or black, SeaGuard is an ablative coating, which allows the coating surface to slough off gradually, exposing new biocide that maintains the coating's effectiveness over time. It can be used to overcoat existing antifouling coating systems. *NA*

The Royal Institution of Naval Architects

ICSOT 2009: Ice Class Vessels

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Aker Arctic Technology Inc.

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.

Papers will cover the following related topics amongst others:

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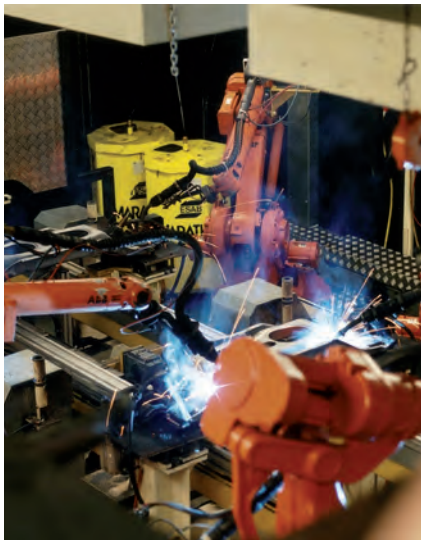
ESAB gives OK to cut costs

ESAB has developed its latest wire for welding thin plate to lower costs in mechanised and robotic fabrication.

UK-based ESAB, manufacturer and supplier of welding consumables and equipment, has started offering a new 1.2mm diameter metal-cored wire, the ESAB OK Tubrod 14.11, which is said to outperform solid wire in quality and productivity. The welding characteristics of the wire permit lower arc voltages, to reduce the risk of blow-through and spatter.

The wire is also said to offer superior feedability and arc stability to copper-coated solid wire and to deposit weld metal of the highest quality with Argon 8%-20% CO_2 shielding gas.

ESAB's OK Tubrod 14.11 is designed for situations that require faster welding to improve output and where high quality welds are necessary without the use of pulsed arc welding power sources.



ESAB OK Tubrod 14.11 in action.

OK Tubrod 14.11 is said to be able to cope with poor fit-up tolerances, even at high travel speeds, leading to less post-weld repair work and fewer rejects in serial fabrication operations.

ESAB offers a wide range of welding consumables including electrodes, cored wires, solid wires and fluxes for submerged arc welding, and welding processes for a variety of materials from mild steels to advanced alloys. *NA*

Prefabricated thinking from IHC

IHC Beaver Dredgers, part of the IHC Merwede Group, recently set up a new department to meet sustained high demand for prefabricated materials.

Located at Lelystraat in Sliedrecht, IHC Beaver Dredgers' new prefabrication facility can prefabricate about 400tonnes of fitting parts a year.

Prefabricated materials can be broken down into two categories: prefabricated parts for the hull and major structural components; and the prefabricated components for the ship's fittings. These fitting parts vary widely in terms of sheet thickness, profiles, dimensions and quantities.

IHC Beaver Dredgers said that establishing its own prefabrication facility had allowed it to respond in an optimal way to strong demand. "The flexibility of production is also enhanced because of the opportunity it gives us to intervene ourselves in the process and set priorities," the company said. "Ultimately, prefabrication is part of the primary production process."

The new department has the capacity to prefabricate about 400tonnes of fitting parts a year.

The new department consists of four people on location and an employee for support at IHC Beaver Dredgers, in Molendijk, Sliedrecht. The department uses a combined plasma/autogenous cutting machine that can cut sheets up to 150mm thick. There is also a profile line and various overhead travelling cranes. *NA*

Keppel puts safety first

Keppel Shipyard unveils plans for first dedicated safety training complex of its kind in Singapore.

Keppel Shipyard, a member of Keppel Offshore & Marine Limited plans to build a dedicated safety training complex to enhance safety competence across its entire 14,000 workforce.

The new complex will be completed at the end of 2009. The first facility of its kind in Singapore, the new training centre will be located next to the existing Keppel Offshore & Marine Group Training Centre in the premises of Keppel Shipyard's Tuas Yard, and will address the requirements of the yard's multi-national workforce, including all its subcontractors.

Tong Chong Heong, Keppel O&M chief executive, said, "Beyond equipping our direct workers, we will also be providing all our resident subcontractors with essential safety training at the complex for free. All our resident subcontracted workers will get to enjoy the same set of safety awareness and competency training as our own direct workers so that we can achieve a consistent safety standard and a common safety mindset across Keppel Shipyard."

The complex will cover all aspects of safety training with a special focus on height safety, confined space safety, electrical safety and materials handling safety. It will comprise three levels of classroom training, a fire fighting training simulator, a marine metal scaffolding training area, a rigger and signalmen training area and a six level mid-ship safety module built to simulate the work environment.

Keppel Shipyard's new Safety Training Complex will include a six level mid-ship safety module, which will facilitate lessons in height safety, confined space safety, electrical safety and material handling safety.

Keppel Group announced the move at the launch of its "Safety Starts with Me - Together We Care" campaign on 2 June, which aims to instill in everyone working in the yard the importance of looking out for one another and building up a safer work environment.

Since 2008, over 12,000 direct and indirect workers have been trained in observation and intervention skills by Keppel Shipyard with the support of its customers.

In the first quarter of 2009, the Keppel Group said it achieved a lower Accident Frequency Rate (AFR) of 0.33 reportable cases for every million man-hours worked, building on a track record of 0.4 for its 2008 AFR.

Choo Chiau Beng, chief executive of Keppel O&M parent group Keppel Corp, added: "Beyond mindset change and training, creating a safe workplace also involves enhancing and mechanising yard facilities. I am pleased to highlight that Keppel Shipyard is about to complete an automated pipe workshop which when operational will drastically reduce the manual handling of pipes. This will further minimise our workers' hands being exposed to possible hazardous situations when handling pipes. The workshop will also further improve working conditions and allow for the deployment of older workers." *NA*

Efficient hull girder FEA

Finite element analysis is an integral part of the ship structure design process at Vuyk Engineering*, Rotterdam. Senior structural engineer, Raymond Marchee, reports on how it was applied to a recent trailer suction hopper dredger project.

Nowadays, using finite element analysis (FEA) on a ship hull structure during the design process of a vessel has become quite common. Also commonplace, however, remains the misunderstanding that 'entering your ship in a finite element programme will solve all your structural problems'. In reality, though, it is often remarked that FEA is lagging behind the design process as a whole.

In fact, FEA can be effectively integrated in the design process, without delay. What follows is a presentation of a recent FEA involving a 190m long 32,000m^3 trailing suction hopper dredger design performed at Vuyk Engineering, which also showed some interesting particulars of the overall structural behaviour of such vessels. The analysis considered is 3D rule based, meaning that rule design wave loads are reproduced in a (3D) FEA, using a (3D) diffraction analysis. At the end, a short description is given of the hull girder analysis of a ship which is outside the scope of application of the ship rules.

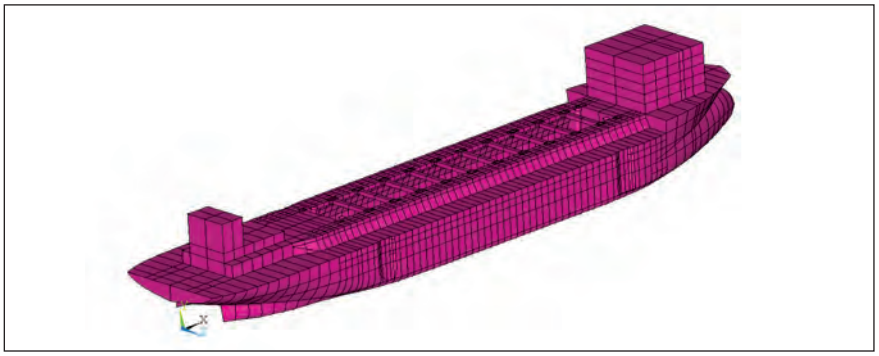


Figure 1 Area model (i.e. without an FE mesh) of the 32,000m^3 190m long Trailing Suction Hopper Dredger.

Setting analysis goals

The basic structural design of a sea-going offshore work vessel or dredger typically takes two or three months. The key to practical application of FEA in this process is not to wait for the structural drawings before starting the FE work.

Despite tremendous advances in computer capabilities, it is still not possible to model complete ship structures in FE. It would take too much time and the model would be impractically large. Fortunately, it is not necessary to model the complete structure. Efficient modelling can be achieved by determining in advance what is being looked for: which stresses are required, occurring in which members, due to which loads?

In an analysis of the governing load–effect, combinations can be made even before the basic design phase. Such an analysis identifies the parts of the structure which have to be modelled. The modelling process can then be started, requiring only a (preliminary) arrangement and a line plan, which are both usually available within the first two weeks of the basic design process.

Figure 1 shows the area model (i.e. without an FE mesh) of the 32,000m^3 190m long Trailing Suction Hopper Dredger.

The model shown has the following purposes:

- To check the efficiency in longitudinal bending of the mid ship region;
- To calculate the overall hull girder effects at the aft and fore hopper ends;
- To provide a basis for detailed stress analysis for fatigue check using sub modelling.

Although the model may look rather detailed, many structural parts are either not present or modelled in a simplified way (e.g. the deckhouses). On the other hand, the total ship is modelled, including a fairly accurate representation of the hull shape. This is done for reasons of accurate loading and to ensure proper load transfer to, and boundary conditions for the regions of interest.

The model is built using semi-automated batch files, facilitating easy modification at any stage of the process where the modelling should follow the progress of the structural design.

Still water loads

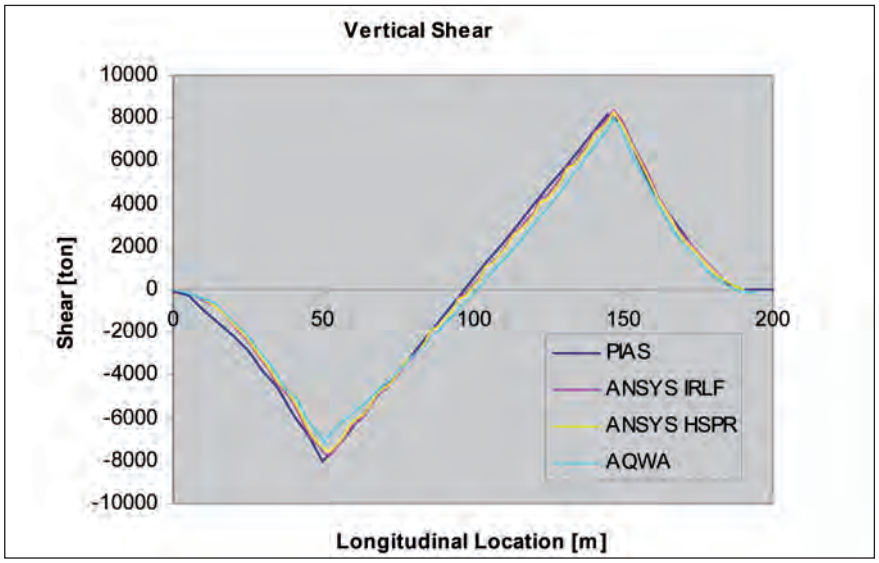
Modelling takes at least a month (depending on the complexity of the hull and the number of load effects sought). By this time, a preliminary loading conditions report is available, which serves as input for the hydrostatic load definition in both the FE and diffraction software.

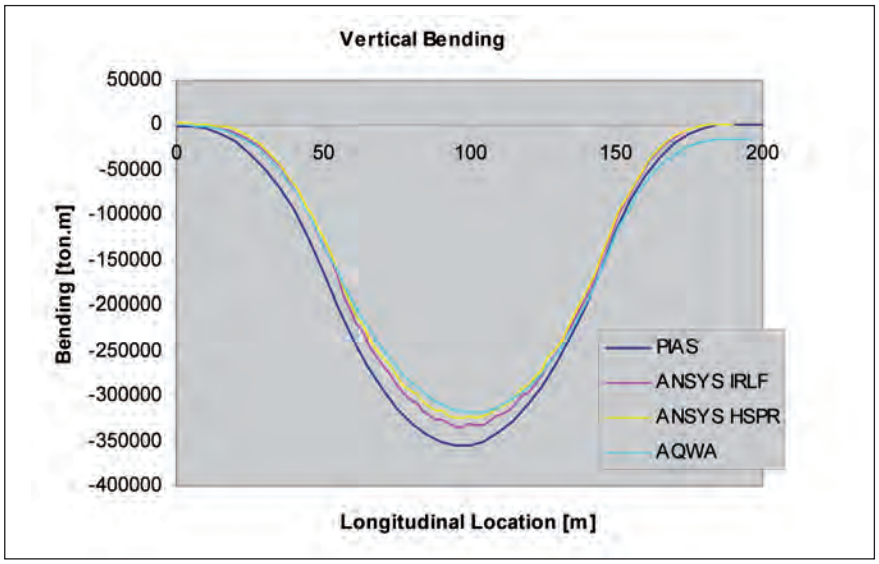
An FEA still water load case should always be based on a loading condition defined in a hydrostatic programme, in order to provide a clear reference. In theory, the hydrostatic loading condition can be reproduced in FEM with high accuracy, but this requires a lot of effort and is seldom necessary. Practically, the buoyancy in FEA is determined by the shape of the FE model which is inherently different from the shape of the hydrostatic model. Consequently, the LCB will always differ (where the total displacement can be tuned with a coefficient).

The reference weight distribution will have

*Vuyk Engineering Rotterdam designs ships and equipment from concept phase up to class approval mainly for the dredging, offshore and heavy transport industry. Also marine operations engineering and general consultancy is included in the scope.
www.vuykrotterdam.com

Figure 2 Typical comparison, vertical shear and bending.





to be rearranged for FE application. Several tuning options are available which, may as well be used to get the total LCG equal to the FEM determined LCB instead of to the reference LCG. This depends on the specific particulars of the project.

In case the weight and buoyancy in FEM are not exactly the same (which will often be the case for practical considerations) a balance has to be found in order to model the free floating situation correctly (i.e. no residual reaction forces). This can be done by either a hydrostatic correction using a mesh of soft springs or by correcting the weight distribution through a slightly modified gravity acceleration. The first option will be the most representative of reality.

Finally, the resemblance between FEM and hydrostatic hull girder loads should be 'reasonable'. A balance between accuracy and speed of analysis should be pursued on a project basis. The plots shown in figure 2 offer a typical comparison (vertical shear and bending), which meets Bureau Veritas requirements of deviations in a bending moment of less than 10%[1]. In the plots, 'PIAS' refers to the reference hydrostatic calculation, 'ANSYS' and 'AQWA' are the FE and diffraction tools used, respectively [2 and 3].

In assessing the still water load case, the shear force distribution should be leading, because it is the most direct representation of the load distribution (i.e. the first integral, without any compromising assumptions). The bending moment distribution is not only the second integration step but, is also prone to more errors due to uncertainties in the neutral line in the FEA and the effect of hydrostatic end loads on the bending (which can be substantial).

For large hopper dredgers, the effectiveness of the mid-ship cross section in overall vertical bending is an issue, due to the large opening of the hopper. Figure 3 shows the FEA results of the longitudinal stresses in the mid-ship

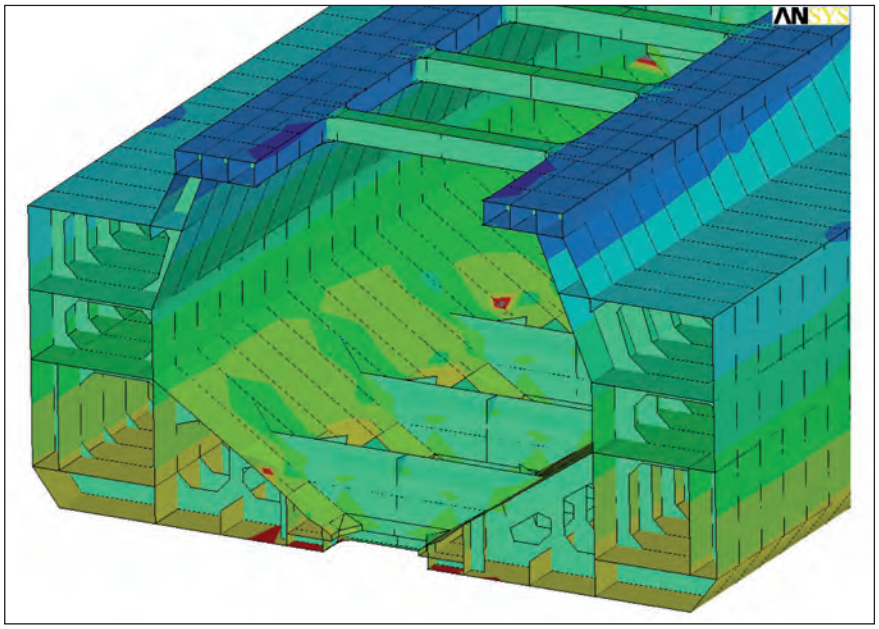


Figure 3 The FEA results of the longitudinal stresses in the mid-ship section (looking from aft to fore).

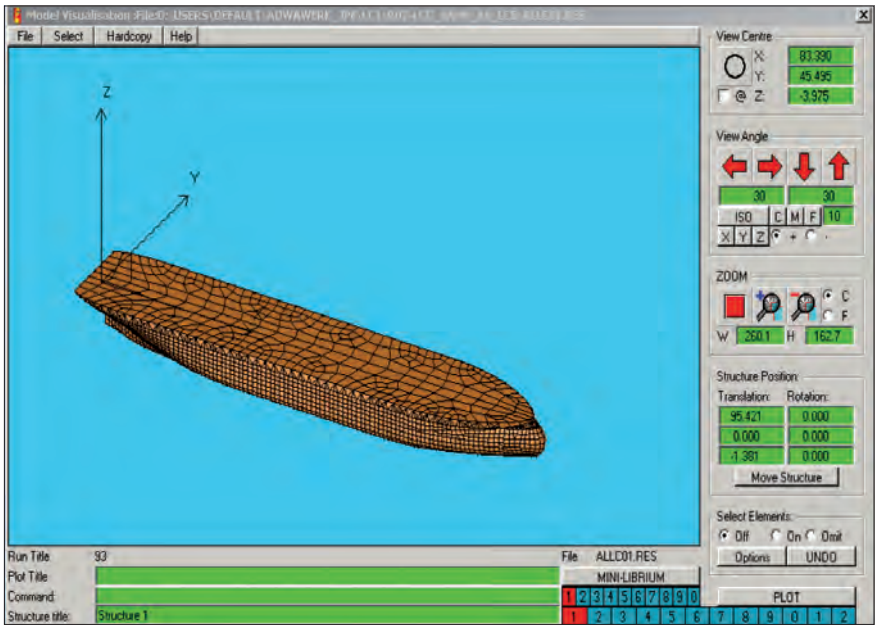


Figure 4 A typical diffraction mesh.

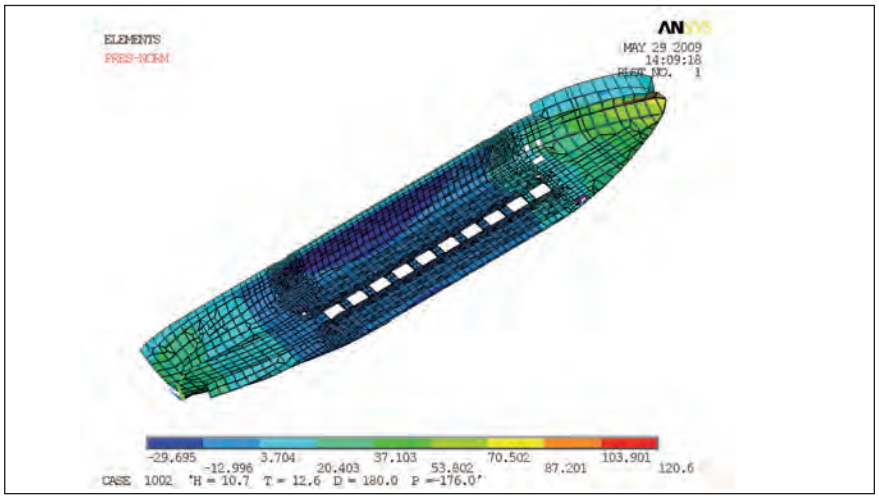


Figure 5 The hydrodynamic pressure distribution of the regular wave which reproduces the mid-ship vertical wave bending in sagging.

Loading Condition N.1 – Design Waves Summary						
Dominant load effect	Mv (sag)	Fv (aft)	Fv (fwd)	Mh D (rule)	Mh Max RAO	T (mid) D (aft)
Design value [kN] – [kN.m]	-1 438 210	-19 068	20 726	763 274		253 303
Design Waves						
RAO value [kN] – [kN.m]	268 750	4 438	5 765	295 670	407 770	66 398
D [deg]	180	180	180	120	90	75
W [rad/s]	0.5	0.5	0.55	0.6	0.6	0.6
T [s]	12.6	12.6	11.4	10.5	10.5	10.5
H [m]	10.7	8.6	7.2	5.2	3.7	7.6
P [deg]	-176	-171	154	-48	-83	-100
AQWA RAO's reproduced values						
Mv (sag) [kN.m]	1 437 844	1 150 690	861 515	-341 517	104 630	333 646
ratio [%]	-100	-80	-60	24	-7	-23
Fv (aft) [kN]	23 640	19 083	13 326	-4 710	1 809	4 625
ratio [%]	-124	-100	-70	25	-9	-24
Fv (fwd) [kN]	-27 180	-20 985	-20 755	11 358	-3 128	-14 828
ratio [%]	-131	-101	-100	55	-15	-72
Mh [kN.m]	-	-	-	769 786	755 981	1 462 426
ratio [%]				101	99	192
T (mid) [kN.m]	-	-	-	95 481	140 544	257 752
ratio [%]				38	55	100

Table 1: The design waves with the sectional loads for 190m long trailing suction hopper dredger.

section (looking from aft to fore).

Using class rules, an effectiveness of 90% in bending has to be assumed in this case. From the FE results, the mean outer fibre stresses can be extracted. In combination with the total bending moment (also an FE output), the effective bending moduli can be calculated. These values are compared to the geometrical section properties as defined in the FE model. The values appeared practically similar, indicating a 100% effectiveness of the section in bending. This finding is qualitatively supported by the stress gradients shown in the plot above. The plot also shows the cross beams which are probably responsible for the favorable bending response.

Wave loads

The ship rules of the classification societies provide reference values for design wave hull girder loads. These sectional loads are best reproduced in the FE model using an appropriate wave pressure distribution on the outer shell, e.g. generated by a 3D diffraction tool.

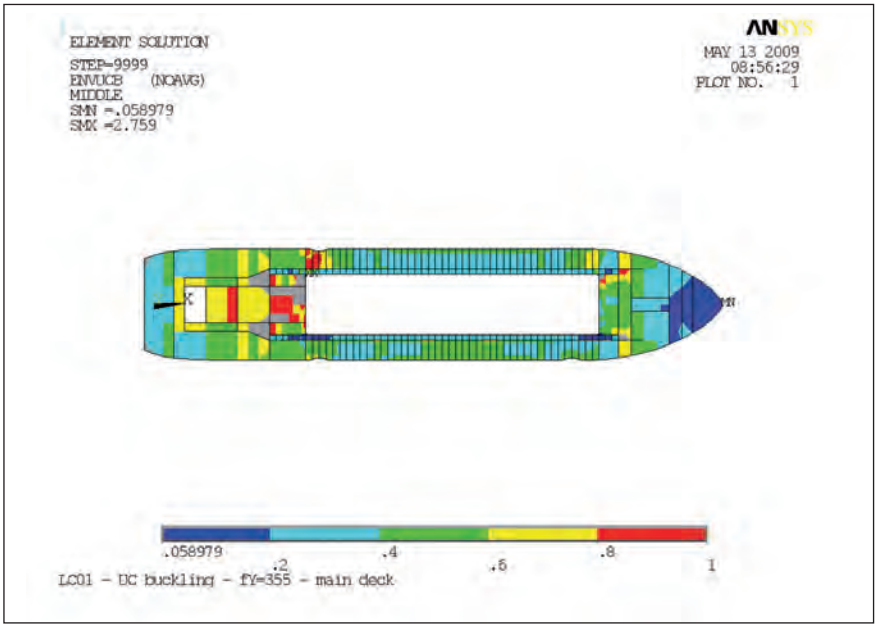
The FEA hull shape serves as the basis for the diffraction mesh, guaranteeing full compatibility between the FE and diffraction analyses. A typical diffraction mesh is shown in figure 4.

The results of the diffraction analysis are used to generate RAO data of all hull girder loads of interest. At the very least, the vertical mid-ship bending and the quarter length vertical shear should be included. Given the large opening introduced by the hopper in combination with the large length of the vessel (190m), horizontal bending and torsion are also evaluated.

From the RAO data the direction and period of the regular waves inducing maximum values for the sectional loads are determined. These waves are then scaled (by means of the wave height) in order to attain the reference value of the section load.

Figure 5 shows the hydrodynamic pressure distribution of the regular wave which reproduces the mid-ship vertical wave bending in sagging.

The wave has a height of 10.7m, a period of 12.6 seconds and approaches the vessel from the bow (180degs). A phase angle (-176degs)



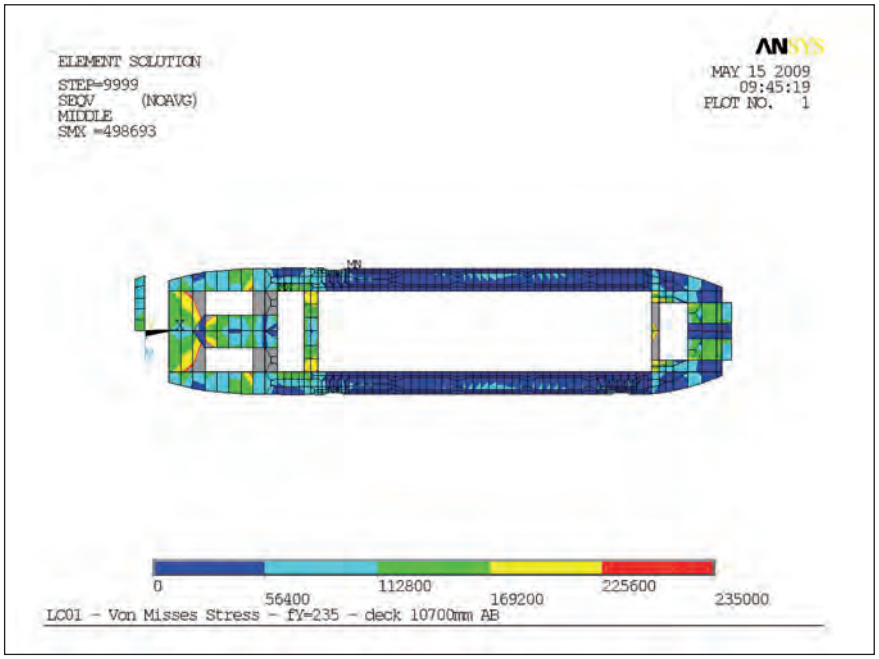


Figure 7 The load case, inducing maximum shear stresses in the 'tween deck aft of the hopper.

indicates the position of the wave crest with regard to the ship.

Sometimes a regular wave which generates the design value of one load effect severely over-estimates the value of another at the same time. This illustrates the large generality of the rule design values which apparently may lead to conflicting load effects in particular cases. On such an occasion, the highest load effect in the wave should be downscaled, based on common engineering sense. This downscaling is supported by the rules (1).

Table 1 presents the design waves with the sectional loads for this ship. The figures in bold indicate the dominant load effect of each wave, which equals the rule reference value. It can be seen that the wave reproducing the rule torsion simultaneously induces a horizontal bending of almost twice the rule value.

Strength analysis

Load cases are assembled combining the still water and wave load sets. In a post

Figure 6 UC on buckling envelope for the upper deck.

processing phase, plots are generated showing Unity Checks (UC) on yield and (plate) buckling, enveloping all load cases. Figure 6 shows a UC on buckling envelope for the upper deck.

Obviously, buckling problems can be expected aft of the hopper opening, giving rise to detailed examination of this region.

Also, for each element the governing load case number is retrieved. Based on this information, the governing case for particular areas can be identified and the stress response for that wave can be reviewed. figure 7 shows the load case, inducing maximum shear stresses in the 'tween deck aft of the hopper.

The high stresses aft of the hopper are due to shear leg effects related to the transition of the (open) cargo part to the closed aft ship part. This result was used to optimise the lay out of decks and bulkheads and fine tuning the plate thickness. This is a typical example where FEA can make a substantial contribution to the design of both safe and efficient hull structures.

Finally, all results are analysed and in cooperation with the design team one or more of the following actions are taken:

- Modify and / or refine geometry
- Refine mesh
- Change plate thickness.

Where necessary, sub-modelling is performed on parts of the model in order to retrieve accurate stress results in structural details, serving either a yield check or a fatigue analysis. After a final run over all load cases is made the basic construction plan is fine tuned and ready for class approval.

Outside the rules

Some ships of particular design fall outside the range of application of ship rules. A good example is *Pieter Schelte*, designed by Allseas Engineering, Delft, The Netherlands, and currently in the basic design phase. Vuyk Engineering is assisting Allseas with the overall hull girder analysis, using an FE model as shown in figure 8.

Due to the vessel's proposed exceptional shape, common rule design values cannot be used. Therefore, 3D diffraction analysis

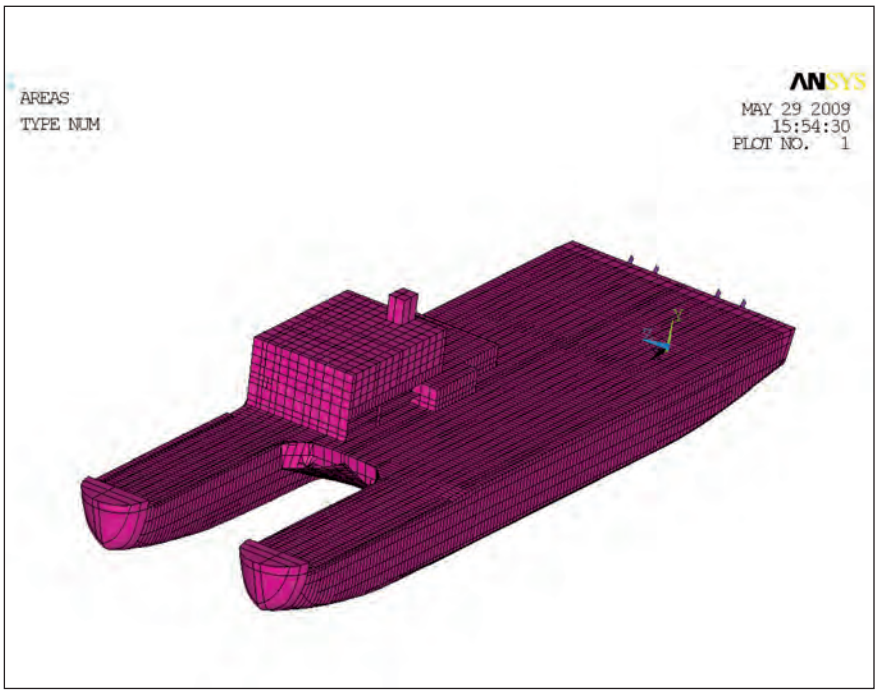


Figure 8 Vuyk Engineering is assisting Allseas with the overall hull girder analysis of *Pieter Schelte*, using an FE model.

generated RAO data that was entered in a long term extreme value analysis, using an appropriate wave scatter diagram. Design waves were identified, reproducing the long term extremes of the relevant section loads in waves. Due account was taken of non linear effects, which is essential for the large waves associated with extreme hull girder loading. *NA*

References

[1] Bureau Veritas
[2] ANSYS manual
[3] AQWA manual
[4] Vuyk report Long Term Extremes (not published)

NAPA adds mesh maturity

NAPA reckons to have improved its Finite Element Model (FEM) creation by upgrading meshing quality with a new unstructured meshing algorithm introduced into the meshing task.

FEM is a state-of-the-art FE pre-processor converting 3D ship product models into Finite Element Models. The main idea is to idealise an as-built product model by removing unnecessary details and simplify geometry suitable for the finite element analysis.

The idealisation process in NAPA is realised in several steps that are completely under the user's control. The NAPA FEM pre-processor allows users to produce various kinds of a good quality FE mesh for different needs by modifying the control parameters and options during the idealisation steps.

The control options are selected based on the final target of the FEM mesh. A final requirement for a FE model depends on things like:

- Ship type: bulk carrier, containership, passengership, tanker, navy
- Analysis type: rule requirement, stress analysis, vibration, fatigue ...
- Level of details: global model, three cargo hold model, Local model, Fine mesh model, hotspot analysis, etc.

The goal of the FEM creation process is to support design process by producing a good quality FEM mesh for a further Finite Element Analysis . As the idealisation control information is stored as part of the 3D product model, a new FE mesh can be updated whenever the structure model in NAPA Steel is changed or updated: a new mesh can be produced automatically within a few minutes with predefined parameters from the Steel model. The major part of users' work is done only once when these options and parameters are defined when the meshing is made for the first time.

Once the control data is defined for a ship project, these definitions can be used both for updating the current model, and also in the following similar ship projects, enabling very efficient design processes applying advanced structural analyses techniques.

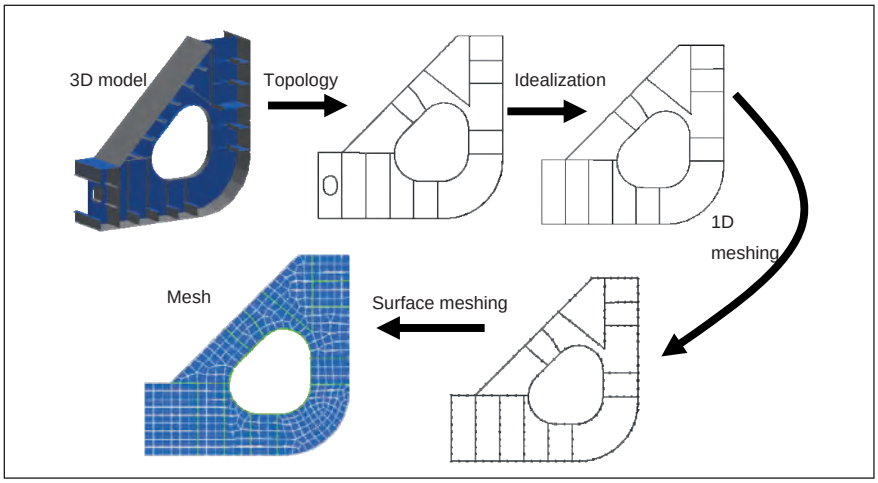


Figure 1 Mesh creation process in NAPA from as-build 3D model to FE mesh.

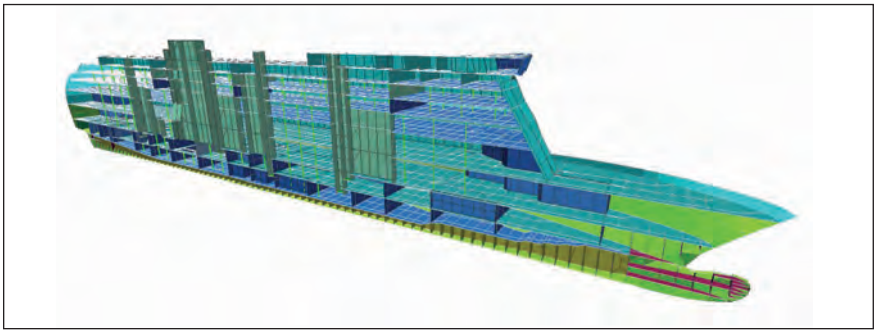


Figure 2 Example of a Global FE model of a Ropax Vessel.

Based on the same initial user input, NAPA continues automatically the FE model creation processes:

- The topological connection of a NAPA Steel model
- The idealisation of geometry
- 1D meshing
- Surface meshing

There are many reasons why the user may want to restrict the number of details in the FE model. NAPA says that NAPA Steel allows modelling the as-built steel structures to a very detailed and realistic level, but normally, the FE model for stress analysis is an approximation of the structures. Typical reasons for compromising the true structures are ship type related instructions from classification societies, the required result accuracy and limitations in FE solver resources.

One way for approximations to take place is just to prevent some structural items to be included in the FE model. A straightforward way is to use the coordinate limits when creating the FE model, but normally this is not an adequate method. The more advanced ways are possible through the NAPA Steel user interface allowing detailed structure and structure type dependent choice of structures.

The NAPA Steel user interface controls several parameters related to the idealisation and meshing of the model. They mainly affect the following items:

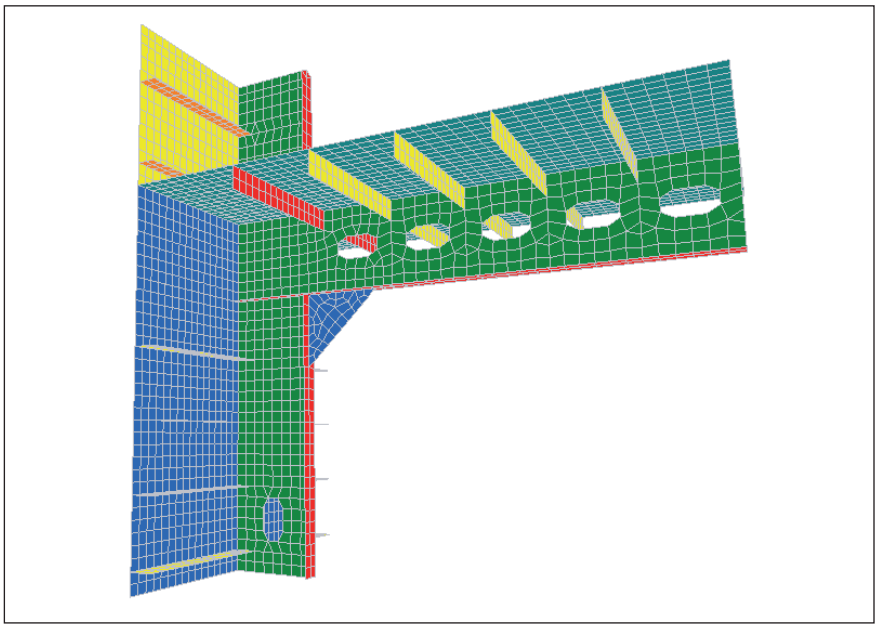


Figure 3 Example of a Local FE mesh.

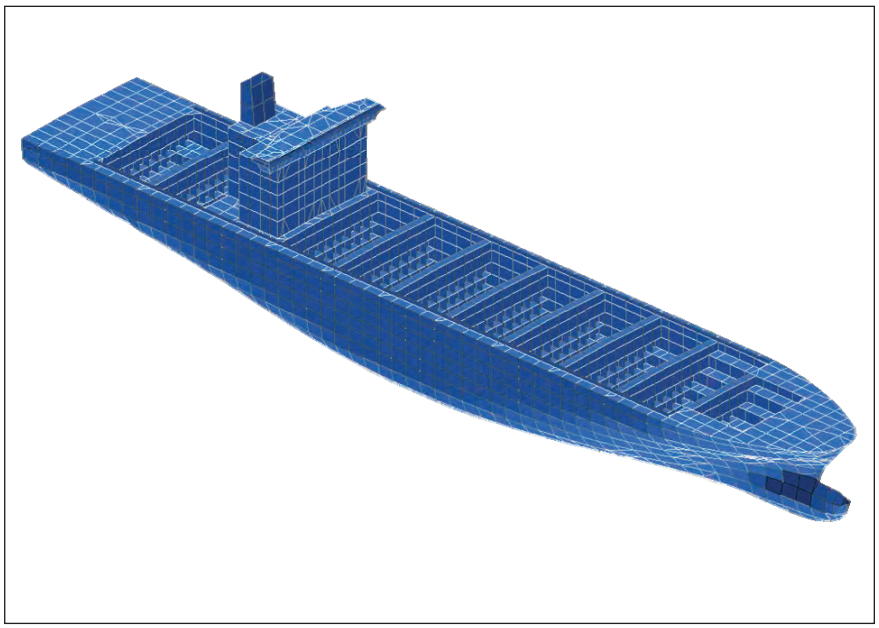


Figure 4 Global FE model of a Containership.

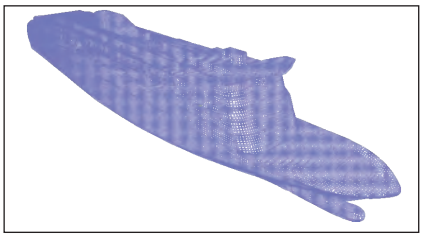


Figure 5 Global finite element model of a Ropax Vessel with over 177,000 shell elements and over 160,000 beam elements.

- Idealisation and connection of stiffeners
- Idealisation of openings
- Idealisation of curved segments
- Idealisation of adjacent nodes
- Mesh size parameters

FEM Output

The interface only handles the geometry and properties. Therefore, the FE model needs to be exported to a FEM system for further processing and solving. Available output formats in NAPA FEM are:

- Patran Neutral file (.out), e.g. for MSC Patran and Femap)
- Nastran bulk data format (.bdf)
- Ansys node and element data
- FEMGEN
- FINNGEN
- IGES,DXF
- With the versatile output functions and macro programming the users can define customised output. *NA*

3D reality check for CAS

Follow-up action on SENER's three year, EU-funded, Condition Assessment System project sees inspection measurements gathered on a working ship successfully plug into its original 3D block model.

As one of the follow-up actions to the EU-funded Condition Assessment System (CAS) project, CAD/CAM specialist SENER has exported the 3D model of a block for a four year old tanker for use in conjunction with inspection data gathered during its operation. The results, according to Bureau Veritas manager project department, Philippe Renard, who project-managed the three year CAS project, were "remarkable".

SENER exported the FORAN 3D model of a section of the double bottom of *Bahía Uno*, using the Hull Condition Model (HCM) standard file, to be used by BV to run the 3D model-based monitoring tools it developed as part of CAS, which ended in April 2008.

Bahía Uno, built in 2004 at Astilleros de Murueta in Spain and classed by BV, is a double-hull tanker supply vessel with a length of 71.01m, a breadth of 15.6m, depth of 7.75m and draught of 5.6m.

Bahia Uno – the 2004-built tanker, a section of whose 3D model was used to check the EU-funded CAS project.

The remit of the CAS project was to improve the reliability of ship condition assessment by attaching all measurements taken on commercial ships while they are trading all over the world (steel plates and stiffeners thickness measurements, cracks position and coating condition) to the numerical virtual 3D model of the ship. A critical element of this aim was the development of electronic tools that would cut out the manual handling and interpretation of thickness measurements and simplify the handling of all thickness data, right from the measurement through to using the data in the most complex condition assessment tools, allowing definitive repair decisions to be made on the spot.

SENER's follow-up exercise looked to bring these aims to reality, cutting the time and costs involved in processing thickness studies of the structure of a ship in operation. The HCM directly relates the ship's structural elements with the measurements taken onboard, allowing 3D visualisation. By updating the HCM at each survey or repair, throughout the vessel's life, a continuous basis will be established for analysing the ship's condition and identifying trends and changes.

In detail, the The FORAN 3D model incorporates virtual reality techniques and can offer immediate worldwide access. Systematic comparison and consistency checks of measurement during inspection campaigns can include thickness measurements, visual assessments of coatings, and visual inspection for cracking, which will trigger electronic alerts. According to SENER, "repair decisions and residual lifetime of the structure can thus be calculated with modern methods of risk-based maintenance modelling, while the model can be updated after each measurement campaign".

"We were a little surprised," said BV's Mr Renard. "The model was perfectly readable in 3D and enabled us to incorporate it into the commercial tools we developed as part of CAS. We could see all the details of the stiffeners and cut-outs, etc, and add in the thickness measurements that had been carried out onboard, navigating our way around the block and using all the functionality of the tools, especially as they related to the thickness measurement of the block. The accuracy of the results were a bit of a surprise, because this was not a new ship."

"With this test, BV and SENER test the results of the CAS project in a real vessel," said SENER. "This project is expected to speed up the failure monitoring process and repair times with the aim of reducing marine disasters, specially caused by tankers and bulk carriers." ***NA***

Autodesk certifies ANSYS

ANSYS customers to benefit from new capability to import CAD models for simulation analysis.

Five products from ANSYS have been certified for 32-and 64-bit Inventor 2010 software from Autodesk. Such certification is reserved for partner solutions reviewed by Autodesk that have demonstrated that the integration is reliable and effective. ANSYS said that customers would thus be able to import CAD models for simulation analysis efficiently, saving time and money, "enhancing quality and fostering innovation in their product development processes".

"These certifications have been made possible because of the open architecture designed into the ANSYS Workbench environment and our continued commitment to develop and maintain state-of-the-art interoperability with leading design systems," said Dipankar Choudhury, ANSYS vice president of corporate product strategy and planning. "Tightly integrating ANSYS Workbench with Inventor enables our mutual customers to rapidly optomise products and processes, speeding design and development times and reducing costs. Such optomisation is a critical part of Simulation Driven Product Development, in which modelling and simulation are used to drive new solutions rather than to mearly verify existing ones."

The Autodesk Inventor 2010 product line is the foundation of the Autodesk solution for digital prototyping, which connects every phase of the design process through a single digital model. Autodesk Inventor produces a 3D model that enables users to validate the form, fit and function of a design before physically building it.

The ANSYS products certified for use with Autodesk Inventor 2010 now include DesignSpace, Mechanical, Multiphysics, CFX and DesignXplorer. ANSYS said the combination of these products with Autodesk Inventor would enable "upfront simulation, efficient evaluation of alternative designs and iterative modification of designs for products, such as heavy equipment, that require simulation and collaboration between different groups". *NA*

RINA – LLOYDS REGISTER EDUCATIONAL TRUST SHIP SAFETY AWARDS

Nominations are invited for the 2009 RINA - Lloyds Register Educational Trust Ship Safety Awards.
Entries close 31st December 2009

The RINA- Lloyds Register Educational Trust Ship Safety Awards
recognise recent innovations or developments which have led to an improvement of safety at sea, or which have the potential to do so.

Entries may be submitted directly by individuals or teams from universities and industry from any country, and may cover design, construction, research, equipment or operations. Entries are judged on originality, quality of design, feasibility of production and contribution to ship safety.

Members who are aware of recent work by a university, company or organisation which has or could lead to an improvement in safety at sea are invited to nominate them for one of the Awards, giving brief details of the achievement. The nominated university, company or organisation will then be invited to submit an entry.

There are separate categories for universities and industry. An Award of £1500 is made in each of the categories and will be presented at the 2010 RINA Annual Dinner.

Requests for further information and expressions of interest should be forwarded to:

Director of Professional Affairs
The Royal Institution of Naval Architects
10 Upper Belgrave Street, London SW1X 8BQ
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ShipConstructor licence to roam

ShipConstructor Software Inc. offers a new, simple software licence option, in the shape of the Universal Seat License.

The new Universal Seat License offering from Canada's ShipConstructor is being marketed as a cost effective alternative to its current modular licencing system, providing access to every module and function ShipConstructor has to offer in one single licence. Future modules of ShipConstructor, such as Electrical and WeldManagement, will be automatically provided free of charge under the subscription program.

The existing modular licencing system allows users to obtain the required number of disciplines from the following list: Hull, Structure, Pipe, HVAC, Equipment, Penetrations, ProductHierarchy, ManualNest, AutomaticNest, ProfileNest, Report, and NC-Pyros – with Electrical and WeldManagement to be released later this year. But, ShipConstructor acknowledges, predicting the correct number of disciplines is a very difficult (if not impossible) task for many customers. Using the Universal Seat License, customers can choose the number of seats instead of the disciplines, which provides unsurpassed flexibility and, for many, a cost advantage as well.

Small design shops with staff experienced in a variety of disciplines will benefit from the Universal Seat License as much as large shipyards and design offices, ShipConstructor says. In small design shops, a designer works on structure for a while, then moves to pipe, and after that to HVAC, nesting and NC code generation. Purchasing a seat of every available ShipConstructor module to cover all the required disciplines would cost over US$50,000. A single Universal Seat License is available for just US$19,950.

Large shipyards and design offices will also benefit from the flexibility the new licencing option offers, the supplier says. "When building a tanker, one needs more pipe seats, when building a bulk carrier, one needs more structural seats. Furthermore, throughout the production design of a single ship, the load on the various departments generally shifts from hull fairing and lofting to structural design, to pipe, HVAC, and outfit, and then to production oriented functions, such as profile, plate nesting, NC code generation and production reporting."

Clients currently owning any ShipConstructor modules can trade in the combined value of their modules to obtain Universal Seat Licenses. For a limited time only, the ShipConstructor Universal Seat License will be available at a reduced price of US$19,950 per seat including network license functionality. *NA*

Intergraph expands offshore

Intergraph has released the latest version of its 3D design solution with significantly expanded offshore capabilities.

The Huntsville, Alabama-based company says that SmartMarine 3D 2009 will provide all the capabilities needed to develop and build offshore devices or ships from the design to fabrication to operations and maintenance stages, in a single, integrated environment. Providing customer's with an environment for structural, hull, piping equipment, HVAC and electrical modeling with automated detailing and drawings for offshore and ship design. Adding to this is the embedded 2D drafting system, which eliminates the need for third party drafting applications.

It is a data-centric, rule-driven solution for streamlining design processes that Intergraph says will preserve existing data and make it more useable/re-useable over the operation, maintenance and modification life cycle of the device.

SmartMarine 3D 2009s design reuse wizards also allow companies to compile an inventory of their best-in-class design configurations, allowing them to respond quickly to requests for proposals and fast track project requests.

SmartMarine 3D 2009 will offer additional offshore-specific functionality: rule-based joints that govern joint behavior; built-up members that are defined and modified as a single member, but are actually composed of multiple plates that can be independently fabricated; and advanced plate systems that are parametric rule-driven plates that, in combination, define complex nodal connections. The advanced plate systems update automatically as the incoming members change.

Mr. Liang Guoming, deputy general manager, Technical Centre, Cosco Shipyards Group said: "At Cosco Shipyard Group, we have been using SmartMarine 3D in production on numerous offshore projects." He adds: "SmartMarine 3D is helping us achieve greater productivity and higher quality designs. The enhancements included in the newest version of SmartMarine 3D will assist us in gaining a further competitive edge during these challenging times within the marine industry." *NA*

THE INTERNATIONAL CONFERENCE ON COMPUTER APPLICATIONS IN SHIPBUILDING (ICCAS 2009)

The Royal Institution of Naval Architects

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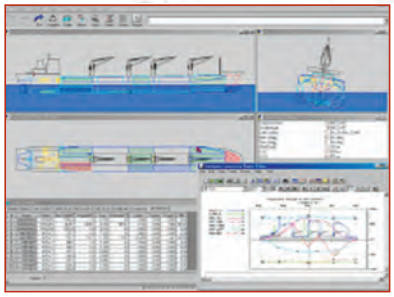

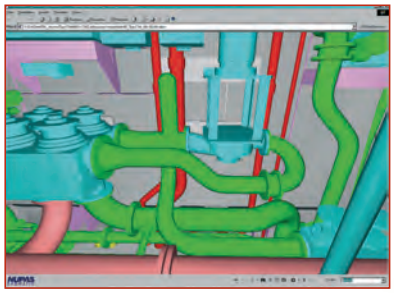

ICCAS 2009 will be the 14th International Conference on Computer Applications in Shipbuilding. The 2009 conference will be held in Shanghai, from 1-3 September 2009.

The conference will review operational experience from existing computer applications in the design and build of ships and offshore structures. It will also examine the advances in Information Technology which have contributed to increased productivity in both shipbuilding and maritime operations; including increasing co-operative working between shipyards, marine equipment and system manufacturers, engineering partners and shipping companies.

The conference will cover the full range of topics related to computer applications, including separate programs, integrated systems, knowledge management, simulation and virtual reality applications, for:

- Early design, including concept design, tendering, initial design, general arrangement, cost and work estimation, hull form, hydrodynamic analysis and basic structural design, risk based design
- Detailed and production design, including structure, machinery, hull and outfitting design
- Parts manufacturing and assembly, including prefabrication, shop automation, robotics, assembly and accuracy control
- Material management, including material control, supply chain management, logistics and e-solutions
- Management of shipbuilding projects, including planning, work-flow analysis, PDM and ERP applications
- Commissioning, inspection and maintenance, including life-cycle maintenance, life-cycle cost management, environmental cost management, parts and systems reliability, inspection standards and risk management
- Skills management, knowledge transfer and other human resource issues
- Innovation, innovation management and innovation impact assessment, including new materials and eco design

Papers are invited on the topics to be covered by the conference. Such papers should focus on advances made in information and communication technology with respect to methods, tools, standards and organisational adaptations in the different application sectors of the shipbuilding industry. Where appropriate, papers should also describe the potential impact of the innovation described to productivity improvements.

The conference will attract a large international audience and provide a forum and means of professional development for all parties interested in computer applications in shipbuilding.
Key dates and up to date information will be displayed on the website at:
www.rina.org.uk and www.iccas-conferences.com

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Grasshopper at your feet

The Rhino Development Team has launched the latest release of 'Grasshopper', the generative modelling tool for Rhino.

For designers exploring new shapes using generative algorithms, Grasshopper is a graphical algorithm editor integrated with Rhino's 3D modelling tools. Unlike RhinoScript or other programming tools, Grasshopper requires no knowledge of programming or scripting, but still allows designers to build both simple and complex form generators. Rhino says that Grasshopper extends the company's own modelling capacity "exponentially", by making it possible for the user to automate tasks and create their own scripting components.

Rhino said that Grasshopper was becoming more and more popular among designers willing to pass the limits of traditional 3D modelling.

David Rutten, Grasshopper's main developer, said: "Historically, programming has been an excellent tool for logical development, be it of software, art or buildings. However, most designers (and especially architects) do not have the luxury to learn programming. Over the years a number of software packages have been released which, combine the strictness of programming with the visualness of 3D design. These programmes are typically referred to as Parametric Modellers (PM). Grasshopper is not like a typical PM; instead, it aims to strip all the insulation which separates the designer from the source code, to the point where freeform drawing, logical modelling and textual programming can be used simultaneously on a single project."

Grasshopper, formerly known as Explicit History, is offered as a free download to all Rhino 4 users. *NA*

ACMA enhances with CFD

Alan C. McClure Associates (ACMA), of Texas, has expanded its analysis capabilities by acquiring a licence for STAR CCM+, the CFD (Computational Fluid Dynamics) package from CD Adapco. The purchase will allow ACMA to determine the effect of viscous flows and non-linear waves on vessel hulls and in internal tanks more accurately.

ACMA has also purchased a high-performance computing cluster, equivalent to 16 standard desktops to run the program and says it is to invest heavily in training and running test simulations of past projects.

ACMA will now be able to perform analyses with CFD that previously relied solely on models tested in a towing tank. Adding CFD capability enables ACMA to have its own "virtual towing tank", allowing analyses to be done quicker, at lower cost and earlier in the design cycle for maximum benefit to the client.

The design process will still include tank testing as part of the programme, but the inclusion of a detailed CFD package will allow testing to focus on confirmation of the analyses and will also provide the engineering team with a clearer picture of what they can expect to see in the model basin.

Aveva adds Sumitomo

Sumitomo Heavy Industries Marine & Engineering (SHI-ME) Co, Ltd has delivered its first ship to be designed using Aveva Marine engineering technology.

The Sumitomo Heavy Industries Ltd subsidiary started designing the 105,000dwt *Jasmin Joy* in April 2007, handing the oil tanker over to the owner in early April 2009.

Masao Takekawa, director, SHI-ME, said: "Quality and efficiency of our design have been improved with Aveva Marine. We at SHI-ME practice the 'Toyota Production System' concept, which will be enhanced with the aid of Aveva Marine. We believe these efficient solutions are key ingredients to success in today's competitive and very challenging shipbuilding world."

Peter Finch, president, Aveva Asia Pacific, said that, since the launch of Aveva Marine, over 30 customers in Asia Pacific had subscribed.

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It's in the RANS

New research delivers greater propulsive efficiency, writes Patrik Wheater.

In a paper to be presented at the International Symposium on Ship Design and Construction (ISSDC) this coming September, in Tokyo, Sing-Kwan Lee, principal engineer, ABS Corporate Research and Development, will provide naval architects and marine engineers with invaluable direction as to just what innovations are required to optimise a ship's propulsive efficiency.

In his paper – a synopsis of which *The Naval Architect* has seen – Mr Lee will argue that, despite the multitude of currently available technologies to reduce fuel consumption and emissions, the most cost effective way by far is to figure in energy efficiency at the basic design stage and, specifically, to optimise propeller design.

With the focus on efficiency never having been so acute, Mr Lee's paper reviews a real case study in which an integrated propeller design for an 8200TEU containership might be implemented to maximise its energy-saving potential. The classification society's investigation found that due to the restriction of propeller aperture, propeller diameter enlargement cannot be adopted while a reduced blade area ratio and skew are applicable to the optimal design for propeller efficiency.

The study, far-reaching in scope, went on to investigate the manufacturing process and, according to Mr Lee, it was found that in order to minimise propeller fabrication costs, the propeller blade should be as thin as possible to reduce the amount of expensive alloys used. While a series of propeller stress analyses should be performed to determine the minimum allowable thickness distribution on the blade, in order to achieve this design intention, Mr Lee says the resulting data would provide the necessary information to ensure that the propeller is fatigue-failure-safe for normal ahead operation and failure safe under emergency stop operation.

In an integrated design, propeller-induced vibration should also be considered. Mr Lee says that propeller cavitation cannot be avoided in a practical design. Due to the large ship size, the ship structure becomes more flexible and more prone to the vibration problem from the cavitating propeller excitation. Thus, to control the vibration, so that it will be within an acceptable level during operations, propeller induced hull vibration analysis would be performed before the necessary modifications can be made at the propeller design.

MARIN new pod set-up on a ship model.

Optimising propeller design has also been the basis of research carried out by Lloyd's Register. In a paper on ship hydrodynamic propulsion presented in London earlier this year, LR's John Carlton suggested that, where a vessel operates prolonged services and during different operational conditions, a propeller redesign could indeed optimise energy efficiency.

"By developing conventional propeller design techniques in which a redesigned slow-running propeller is permitted to have the same margins against cavitation as an existing higher speed design it is possible to optimise the benefits in terms of enhanced

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efficiency," Mr Carlton said. Ostensibly, this will allow for the blade area to be reduced and, consequently diminish blade section drag.

Cavitation prediction

However, higher propulsive efficiency may be at the expense of cavitation excitation and a number of research projects continue to take place on the subject. Recently, Lloyd's Register, together with its collaborative partners, developed an advanced boundary element method for the analysis and prediction of a propeller's cavitational characteristics, the results of which were verified using a number of techniques, including boroscope technologies.

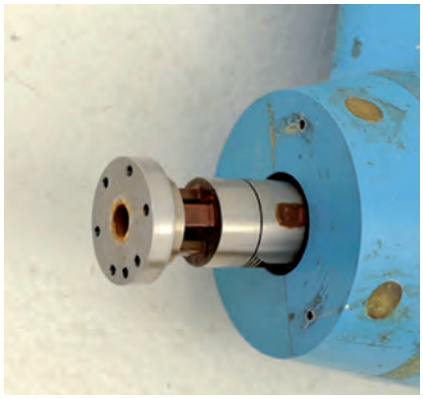
While sheet cavitation, which most commonly forms the subject of numerical prediction capabilities, is generally only problematic if instability is detected, other forms of cavitation, do not as yet readily lend themselves to computational analysis, said Mr Carlton. For instance, tip vortex and blade root cavitation still needs to be assessed in large cavitation tunnels or in depressurised towing tanks using an accurate simulation of the wake field – a critical factor since modelling the wake field using simple grid structures alone is insufficient and will lead to incorrect and misleading results.

Recent research under the EROCAV banner, of which LR was a member, also found that face cavitation - long the bane of propeller designers everywhere - tends not to be as erosive as once thought. The research found that by permitting greater flexibility in considering margins against this phenomenon would enhance the potential to deal with propeller blade back cavitation issues.

According to Mr Carlton: "The underlying physical basis for these considerations stems from the realisation that the blade surface pressure distribution giving rise to face cavitation is of a rather different character to that which develops into back cavitation and, furthermore, that face cavitation tends to have a more two-dimensional character than its back cavitation counterpart."

The findings, thought to provide designers with greater flexibility in controlling back cavitation, are important since they shed light on the relationship between back cavitation collapse and material erosion.

MARIN newly developed six component propeller shaft balance.



RANS Codes

Similar studies with the aim of coming up with an effective code capable of more accurate propeller and cavitation prediction have been carried out in Germany, by the Hamburg Ship Model Basin (HSVA). Indeed, HSVA, marked a milestone earlier this year with FreSCo, a new multi-purpose maritime RANS (Reynolds-averaged Navier–Stokes) Solver, which is now being applied to a number of ship research projects.

In a brief history of the development published in the most recent edition of Newswave, the HSVA in-house newsletter, the head of HSVA's CFD department, Jochen Marzi, explained how the project started out in 2005 as a collaborative venture with the Technical University Hamburg to develop a complete new RANS code. The project, however, was carried over into the VIRTUE (the Virtual Tank Utility in Europe) project, a European Commission framework programme for sustainable development, global change and ecosystems.

Mr Marzi stated in the article that FreSCo had now been applied to the prediction of manoeuvring coefficients for a large range of standard manoeuvres, which could be validated with experimental data obtained from model tests in HSVA's large towing tank.

Moreover, he claimed that the code has proved to be an accurate, fast and versatile means of predicting manoeuvring performance at the design stage of a new ship, of which wake analysis and propulsion optimisation are among the most crucial elements.

FreSCo, which underwent a series of validation exercises on standard cases such as the KVLCC2 tanker and other hulls before final release, can also be used within a complete design environment comprising CAD, RANS analysis and optimisation.

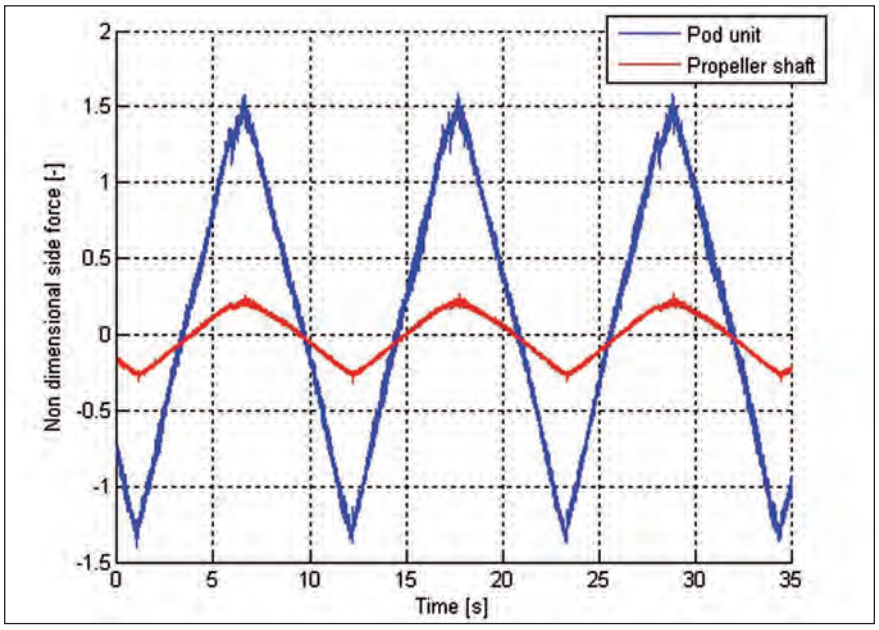
The flow around a highly-skewed propeller under steady (open water) and unsteady conditions has also been assessed using RANS calculations. In August last year, Sweden's SSPA reported, after a series of tests, that open water prediction by RANS methods delivers more or less the same level of accuracy as model tests. But there was also a tendency towards over-predicting thrust and torque coefficient at model scale, lending the SSPA to suggest that any improvement in prediction accuracy would require an integrated transition-turbulence model.

The conclusion to an 'unsteady' simulation of a propeller working in an inclined uniform wake was as expected and demonstrated the feasibility of a 'sliding mesh technique' for analysis of rotating propellers behind a given wake. Studies indicated that the discrepancy in thrust and torque coefficient by use of different turbulence models is greater than use of different grid sizes.

In Japan, the National Maritime Research Institute is researching the effects of bubbles in the water on the propeller. The findings could have significant implications for so-called air cushion hull form technologies. Yoshiaki Kodama, senior researcher, Centre for CFD Research, explained: "We put a bubble generator upstream of a working model propeller and measured the change in thrust and torque. In general, both propeller thrust and torque decreases with an inflow of air bubbles, but thrust decreases more so. Propeller efficiency also decreases. However, propeller efficiency does recover to some extent because the ship's drag decreases by air lubrication and the propeller load decreases at the same time. We have presented the results to the Japan Society of Naval Architecture and Ocean Engineering."

Loaded pods

An extensive series of CFD calculations and an innovative series of complex model tests



MARIN measurement signal SOLAS test.

have also been carried out at the MARIN basin in The Netherlands to measure the loads on the propellers and pod units of vessels operating in various conditions.

The study, which forms part of one of the Cooperative Research of Ships (CRS) working groups, has brought together a group of companies with a common interest in non-competitive research into hydrodynamics and related issues in terms of design and operation.

Loads on Pods is one of the CRS projects and the working group has been tasked with developing a mathematical model to enable its users, such as shipyards and classification societies, to determine the loads on pods for various operational conditions, at the design stage. For the development and validation of the model, an extensive series of CFD calculations and an innovative series of complex model tests were carried out to measure the loads on the propeller and the pod unit.

MARIN was asked by the working group to create a specifically-designed model test set-up; but to determine the loads on the pod slewing and propeller shaft bearings, it had to be capable of measuring six components (three forces and three moments) at the pod steering axis and at the propeller shaft. The system also had to be capable of measuring the average forces and moments, as well as the unsteady forces and moments up to the first blade frequency. In addition, precise azimuthing angles and negligible mechanical vibrations were needed.

New test set-up

Core elements of the set-up were the model-scale electric pod drive system developed some years ago and the well-proven technique of measuring pod unit forces and moments by a six-component balance. Just as at full scale, the propeller is directly driven by an electric pod motor, thus eliminating additional gearboxes, couplings and shaft lines.

Another advantage is that the position of the turning axis of the pod can be kept the same as at full scale, which means that the forces of the pod during steering conditions are correctly modelled. Cooling of the motor is provided by an aluminium housing which ensures good heat transfer to the water. For this particular test set-up, an even smaller motor was developed that delivers ample power to drive the propeller within the available pod geometry. The pod unit balance has been developed with a high natural frequency, providing a clear view on the hydrodynamic forces with minimum distortion by vibrations.

A new, zero backlash drive system was added to deliver precise azimuth steering during the test runs. The main innovation, however, is the application of a newly developed balance in the propeller shaft between the motor seal and the propeller hub. Now the full six components of the propeller loads can be measured with the same high accuracy as MARIN's standard thrust and torque sensors. Finally, a light weight aluminium propeller ensures minimum influence from the propeller mass on the measurement signals.

Model tests

With this newly developed test set-up the following test series were carried out:

- Open water tests for several steering angles, including those above 90 deg
- Pod-pod interaction tests at zero speed
- Zigzag, Crash-stop and SOLAS tests with a free sailing model.

The open water tests – with such large steering angles – provided unique information on the forces and bending moments on the propeller shaft and on the total pod unit. Particularly special, was the information derived for propellers operating in oblique flow conditions above the common limit of 35deg. Results that have been derived are being used for the validation of the mathematical model.

Pod-pod interaction tests were carried out to determine thrust breakdown of the propeller due to the wash of the other propeller. Apart from the thrust breakdown, it is known from full-scale experience that these situations can lead to undesirably high loadings of the bearings. These tests were the first ever to be carried out that did not only provide data on the propeller thrust but also on the side forces and bending moments of the propeller in these harsh conditions.

Tests with the free sailing model provided unique information on the unsteady propeller shaft forces. With this information insight has been gained on the loading distribution between the propeller and the pod housing and their contribution to the resulting side force of the pod unit while steering. With MARIN's new model test set-up, a unique data set was successfully obtained on the steady and unsteady loads on pods. The newly developed model test set-up elements have proven their merits and are more than ready to be applied to challenging projects in the future. *NA*

Driving out of recession

A desire to optimise propulsion efficiency is indicative in new propulsion systems unveiled during Nor-Shipping, writes Patrik Wheater

There is nothing quite like a recession to spur creative thinking and technological advancement in the marine industry, especially when the focus is placed firmly on delivering energy-efficient systems capable of reducing a shipowner's bottom line for little or no extra outlay.

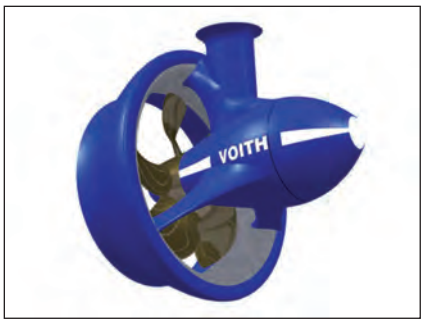
Indeed the drive to optimise propulsion efficiency was indicative in the number of new – and not so new – propulsion systems being unveiled during the recent Nor-Shipping exhibition.

Voith Turbo the German manufacturer famous for the 'Viennese whirl', aka the Voith Schneider Propeller, is about to relaunch a product it ceased to produce more than 30 years ago.

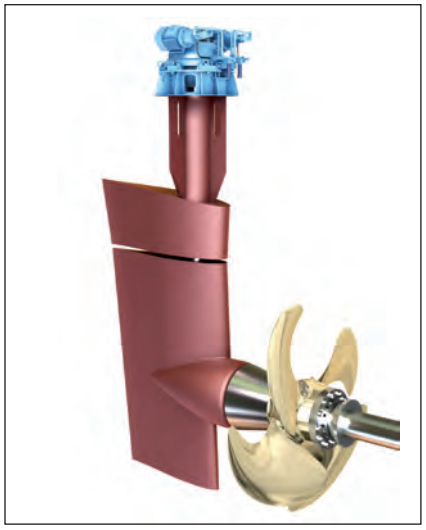
The Voith Radial Propeller (VRP) was a 360deg azimuthing thruster introduced in the 1970s, but, despite its potential success – there are several still in operation – unit production was stopped by the end of that decade. However, following the outcome of an extensive research project in to the hydrodynamics of steerable thrusters, Voith Turbo has been able to redesign an underwater mountable VRP for optimal dynamic positioning and hull-thruster interaction. The system is being marketed towards the offshore segment.

According to Voith Turbo, optimum thruster-hull interaction is of the utmost importance to the efficiency of propellers in offshore vessel application, specifically mobile drilling units and semi-submersible rigs. Indeed, some operators of these vessels have reported substantial energy losses – up to 50% thrust losses during offshore operations, in some instances. But while current technological practice to limit these losses dictates tilting the nozzle of the thruster downwards by four degrees, new research suggests greater reductions can be achieved by tilting the gear axis further to an angle of eight degrees. (Voith Turbo operates its own special gear machinery, so it is possible to tilt the propeller and nozzle axis in identical fashion.)

It was found that an axis tilt of zero degrees, losses could be as much as 45% of the generated thrust but by increasing the downward tilt, it was found that thrust losses reduced linearly up to a seven degree axis tilt. At an axis tilt of four degrees, losses equalled 28% but with an eight degree axis tilt thrust losses were significantly less at just 5% of generated thrust. Interestingly, greater tilt angles do not appear to lead to further improvements in efficiency.



Voith Radial Propeller.


Promas to the fore.

Based on the results of its research and the service experience of those 1970s-built units still in operation, Voith Turbo is confident the new VPR 42-55 will be better placed to stand the test of time. A 5.5MW prototype unit, with a bollard pull of 100tonnes at dynamic positioning, is already in production at the German manufacturer's Heidenheim works.

Based on an L-drive arrangement with a 4200mm diameter fixed pitch propeller, it incorporates a special98 deg gear that transfers the vertical input shaft to the propeller axes that tilted at eight degrees. It can be installed and removed underwater with the vessel afloat. Voith Turbo will deliver the first ship set of two VPR units for installation to a semi-submersible rig intended to be launched in 2011.

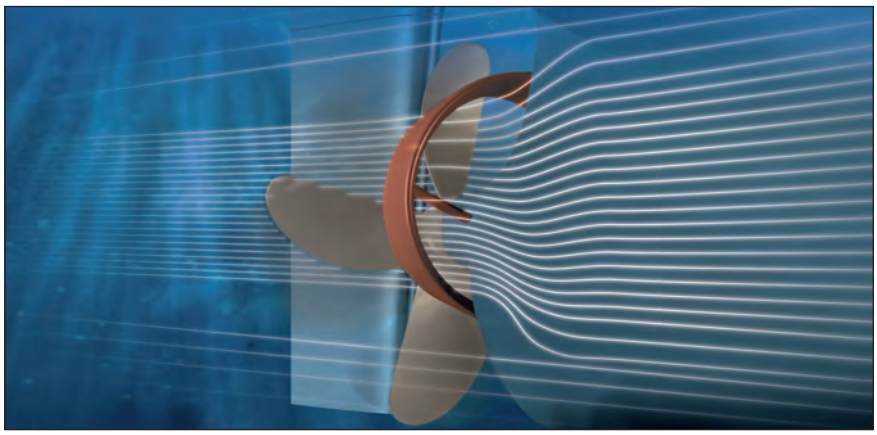
Like Voith Turbo engineers, competing counterparts at Rolls Royce have also been working to improve the energy efficiency of its propulsion systems. One is the use of hybrid propulsion, something the company has been promoting for many years and is now gaining full acceptance by ship operators; another is the development of individual products; but even mature products can be improved given the company's up to date research facilities and use of the latest computational methods.

For example, by redesigning the CP propeller hub Rolls Royce has been able to optimise hydrodynamic and mechanical efficiency. The results of this research is now manifest in the new S3 series of Kamewa waterjets, which can deliver increased thrust for the same power and less weight. Both are showing actual gains in service.

Combining individual product improvements in optimised systems can be another route to saving fuel and reducing total emissions for a given amount of useful work done. Promas is a good illustration of this, applied to the stern of merchant vessels. In this Rolls-Royce system, Promas is an integration of the conventional propeller and rudder configuration of a typical single or twin screw vessel. A special hubcap is fitted to the propeller which smooths the flow on to a bulb that forms part of the rudder, while the spade rudder itself has a special shape with a twisted leading edge. The resulting improvement in efficiency is made up from several components. One is the reduced loss in the hub region of the propeller. The second is that the shape of the rudder converts some of the swirl energy in the propeller slipstream, which is normally lost, into additional forward thrust. The third component is that the shape of the rudder gives a much higher side force for a given rudder angle in the ±5 degree range normally used for course corrections.

The best results are achieved on blunt single screw vessels with a block coefficient greater

BAT for our side.



Mewis Duct system from Becker Marine Systems.

than 0.8 and a design speed in the 14 to 16knot range. Here efficiency gain can be as much as 6% to 9% compared with conventional solutions. Faster and slenderer single screw vessels such as car carriers can have an efficiency gain of 2% to 5%. In a well designed twin screw vessel there is less improvement to be had, but even so 1% to 3% can represent a substantial amount of money at today's fuel prices.

The first contract for Promas covers four shipsets, each with a 5.2m diameter CP propeller, to be installed in a series of 33,500dwt bulk carriers. The vessels are being built by Nantong Mingde shipyard in China for shipowner Kristian Jebsen.

Similar energy savings can be gained from Becker Marine Systems Mewis Duct system.

In March, ship model basins in Hamburg and Potsdam verified the fuel saving

potential of the system which Becker cited as delivering power savings of between three and eight per cent.

During their investigations, it was found that a 118,000dwt vessel operating at design speed of 14.6knots and with a fixed pitch propeller could attain a 0.27 speed increase with a 6.9% power reduction by using the Mewis Duct arrangement. A 12,000dwt vessel with a design speed of 15.2knots and operating a controllable pitch propeller could benefit from a 0.22 speed increase using 7.7% less power, and consequently fuel.

The system consists of two strong fixed elements mounted on the vessel: a duct positioned ahead of the propeller together with an integrated fin system within. The duct straightens and accelerates the hull wake into the propeller and also produces a net ahead thrust. The fin system provides a pre-swirl to the ship wake which reduces losses in propeller slipstream, resulting in an increase in propeller thrust at given propulsive power. Both effects contribute to each other.

The achievable power savings from the Mewis Duct are dependent on the propeller thrust loading, but virtually independent of ship draught and speed, says Becker.

Launched during last year's SMM exhibition, in Hamburg, the manufacturer has already taken orders for system. The first retrofit units were installed in July to the first of three 46,600dwt, Grieg Shipping-owned vessel; the second order came from Sweden's Laurin Maritime who will retrofit the 182m tanker *Tambourin* with a system during a scheduled docking this September. According to Becker, first calculations promise 7.5% of power reduction.

Sweden's Berg Propulsion has also been swift to take orders for a relatively new and untried thruster product. The company announced during Nor- Shipping that it has taken orders for the first two BAT 626 (Berg Azimuth Thruster) production units. These will be delivered in 2010 to Dubai Shipbuilding and Engineering for installation in an Offshore Supply Vessel.

Suitable for either electric or diesel drive up to 2500kW, BATs are designed for high performance and heavy duty operation and will be available in both the controllable pitch propeller and fixed pitch propeller versions. The first two production units are designed with controllable pitch propellers and will be diesel engine driven. Each unit is designed for 1839kW.

The order follows the June delivery of a full scale prototype for installation to a Swedish Survey Vessel in Sweden, operational data from which Berg will evaluate so as to optimise the design, manufacturing and installation process. But successful delivery of the first production units, to be built in Singapore at its newly built factory, is strategically important since the order marks the company's entry into the workboat, tugboat and specialised vessel sectors.

Compared with more established thrusters marketed towards these sectors, Berg believes its BAT units will offer a competitive technical edge. The development of the azimuth thrusters is based on Berg's controllable pitch hub (BCP), which has been on the market for eight years. The gearbox and lower part of the thruster is based on its tunnel thruster products. "So it is not a completely new design for us. We know the bits and pieces and we can put them all together to develop a reliable product. Customers will recognise our previous designs in the new product. We have focused on reliability without compromising performance," explained product manager Emil Cerdier. *NA*

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Size remains an issue

Trends in the design and construction of yachts over 100m are explored by Burness Corlett - Three Quays.*

The 100+m yacht market is a custom yachts market of one off designs initiated by yacht designers who develop the arrangement and profile to fit to the owner's requirements. Exemplary was a recent Burness Corlett Thee Quays (BCTQ) project 'Motor Yacht A', the exterior and interior concepts of which were designed by Phillipe Starck.

Consultant naval architects and marine engineers such as BCTQ are then brought in to refine the yacht designer's concept into a workable design.

Quite often the designer's vision does not start out as a feasible structural design, for instance glazing extending throughout the sheer strake, novel superstructure designs or large openings in the main deck for trays for low sill doors.

Working these design features into a feasible structural design requires understanding of what the designer is trying to achieve and a thorough understanding of the global structural issues involved.

Through BCTQ's work in this area of yacht design we have noted an increase in the number of yachts being constructed that are over 100m. We currently have two in build and one about to be signed.

The benefit of these larger yachts is that they offer the opportunity of fitting more owner and guest accommodation, along with more space for tenders and water toys, and by virtue of the greater distance from the noise and vibration sources, they also provide a quieter yacht. Additionally, the larger yacht provides a more impressive status symbol.

However, there are constraints placed upon design as yacht sizes increase. Owners, for example, will still want to be able to enter small, pleasant ports and marinas and will not want to be alongside in larger commercial ports. Draughts are, therefore, limited.

Motor Yacht A – Built by ThyssenKrupp Marine Systems at HDW in Kiel.

From a powering perspective it is clearly better to install the biggest propeller possible. However, as this is constrained by draught and the requirement to have reasonable clearance from the propeller to the hull, the logical conclusion is that highly loaded propellers should be installed. However, this increases pressure pulses and can increase noise and vibration.

Another factor is that, traditionally, the maximum number of guests for commercially operated yachts was 12. As yachts get bigger, there is a tendency to end up with space for more than 12 guests, and this means the yacht has to be certified as a passengership. This passenger certification has an impact on the damage stability, life saving apparatus, escapes and fire protection, and therefore has to be carefully considered and discussed at an early design stage between the yard, owner's team, class and flag, in order to ensure all implications are dealt with.

For many years the Maritime and Coastguard Agency's Large Yacht Code LY2 has been the definitive set of regulations for design and build of motor and sailing yachts. However, it has an upper limit of 3000gt. As such yachts of over approximately 85m loa have to apply the appropriate IMO regulations. In general, this results in a choice between applying SOLAS for a cargo ship or a passenger ship depending on the number of guests when the yacht is being used commercially.

The Cayman Island Shipping Registry is currently developing a new code for yachts with between 13 and 36 passengers. Until these regulations are issued a number of matters will still need to be clarified on a case by case basis for each individual design; these decisions effect the lifesaving provision, damage stability, structural fire protection, escapes and material selection and fire load calculations. These issues are discussed in detail in the paper "Super and Mega yachts - Regulatory Requirements" presented by BCTQ and Lloyds Register LR at the Design, Construction and Operation of Super Yacht and Mega Yachts Conference in April 2009.

SOLAS states that all cargo ships over 85m be fitted with lifeboats, whereas all passengerships 500gt and above including those on short international voyages are required to be fitted with lifeboats.

These regulations require lifeboats to be fitted for yachts over 3000gt whether they are cargo or passengerships. However Flag authorities have agreed to allow lifeboats to be replaced with davit launched liferafts on several 100m+ projects as long as a two compartment damage standard is applied. This is entirely discretionary and the exact

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requirements for Life Saving Appliances vary between Flag authorities. SOLAS 2009 probabilistic damage stability requirements will make this equivalence more difficult to apply as the two compartment standard no longer applies, and we await the clarification that will come about from the new Passenger Yacht Code.

A new trend on some recent BCTQ mega yacht projects has been to fit luxury lifeboat/tenders. The advantage is that the lifeboats provide a useful function for taking guests to shore etc.

These dual purpose custom tender/lifeboats have so far been designed specifically for each yacht. As such each new design is considered as a prototype by the LSA code and therefore needs to be tested as if it were a prototype. With care, the competing requirements of the luxury tender and lifeboat can be adequately balanced.

Recent regulatory changes

New damage stability regulations are included in SOLAS 2009. These regulations have been adopted in resolution MSC 194(80) in order to harmonise the damage stability requirements for cargo and passengership. These new requirements entered into force on 1 January 2009.

For yachts over 3000gt and for those yachts that are designed to carry more than 12 passengers, probabilistic damage stability calculations will need to be undertaken. BCTQ was involved in the working group at IMO to develop "Floodable Length Surfaces - The Ship subdivision design tool", which allows the naval architect to understand the implications of adding deleting and moving transverse and longitudinal bulkheads. Here, the naval architect can visualise local survivability along the ship length, optimise the arrangement and decide whether the overall subdivision performance is satisfactory.

Recent amendments to regulation 12A of MARPOL Annex 1 were adopted in March 2006. These regulations need to be complied with if the yacht has an aggregate fuel oil capacity of over 600m^3. Depending on the range and speed, yachts that are over 100m can easily carry greater than 600m^3. As such they need to either protectively locate the FO tanks or, as an alternative, demonstrate equivalence through the Outflow calculations.

Owner and guest comfort

In general, to achieve the low noise and vibrations levels in BCTQ specifications, a considerable amount of design and analysis effort has to be undertaken, by specialist noise and vibration consultants. This includes full finite element modelling for the vibration analysis. Additionally, a full noise model is generated for predicting noise levels throughout the yacht.

In order to attain the noise and vibration levels required on these yachts the following should be considered:

- Diesel electric propulsion
- Resiliently mounted generator sets
- Extensive use of floating floors
- As well as the usual fire, thermal and acoustic insulation.

At an early stage in the design process, before the mast and funnel design is finalised, either wind tunnel tests or Computational Fluid Dynamics analysis is used to predict the flow of exhausts in order to avoid exhausts being drawn down onto the open decks. This provides a tool to assess the merits of different mast and funnel designs.

Recent innovations

BCTQ has had extensive experience with specifying diesel electric propulsion in yachts. Recent BCTQ diesel electric yachts include *Octopus* and *Kogo*, whilst we currently have others in build and out to tender.

The main benefits of diesel electric propulsion for yachts are that the system provides:

- The ability to resiliently mount the diesel generators
- Greater redundancy with larger range of optimised efficiency
- Greater flexibility of machinery location
- Ideal for yachts with a large range in speeds, trial, cruising manoeuvring, and dynamic positioning.

However, the disadvantages are as follows:

- Potentially higher system losses, giving reduced efficiency at certain specific speeds
- Diesel electric propulsion systems require more equipment to be installed onboard with a corresponding increase in weight and a constraint on the space
- Likewise the capital costs are higher and require higher levels of skill and certification skill in the crew to run the systems.

On balance, based on our experience, it is considered that yachts of the 100+ range do benefit from diesel electric propulsion systems.

Podded propulsion has been utilised in cruiseships for a number of years, and

Motor Yacht *Octopus* - diesel electric propulsion.

in spite of a number of well publicised problems they have gained acceptance in that market.

Podded propulsion has been slower to gain acceptance in the yacht market, but this is changing as the benefits are becoming more widely appreciated by designers and owners.

The main advantage is that podded propulsors provide fully vectorable thrust and do not require a conventional shaft line, shaft brackets, rudders, steering gear and stern side thrusters with their associated drive and control gear.

A possible disadvantage may be that the space required for the unit's steering module may compromise available space in a beach club area at the stern of a yacht.

Podded propulsors are expensive but, when set against the saving from not fitting shafts and rudder etc, the difference is not so significant.

Although the reliability of pods has improved, they still have the disadvantage that, if problems do occur, the yacht has to be drydocked to carry out repairs to the pods.

Motor Yacht Kogo - diesel electric with podded propulsion.

Stabilisation

The design of stabilisers installed on yachts differs from those fitted to commercial ships in that they are generally:

- not retractable
- of larger area
- offset on the stabiliser shaft

These stabilisers are designed by manufacturers such as Quantum, Naiad, Ship Dynamics, etc. to operate with a range of GM values for the yacht at zero speed.

The disadvantage is that they have a large area and as such have a significant effect on speed.

A recent innovation that has been fitted to a number of BCTQ newbuilds is the 'Magnus Effect Stabilizer' from Quantum. These retractable rotating cylinders generate lift by rotating the cylinder in the flow. In order to generate flow whilst the yacht is at anchor, the cylinder is oscillated fore and aft.

Hull form refinement

Over the last few years there has been a change from the conventional yacht form incorporating an extreme raked and flared bow through the vertical bow to the reverse rake or ram bow type of hullform.

Naval architects will argue the merits of the different types in terms of seakeeping, ship motions and available waterline length in relation to overall length, although there is probably an element of fashion involved as well.

As yacht speeds have increased efforts have been made to reduce resistance and hence installed power. The naval architect will optimise the Cp of the hull for the design speed and probably incorporate a bulbous bow. The optimum arrangement of bulbous bow will require it to protrude above the waterline at rest. This is normally not acceptable from an aesthetic point of view and therefore the bulb will be arranged completely below the waterline with some compromise in performance. At higher speeds the hull may well trim by the stern giving increased drag. In this instance a stern wedge can be considered to reduce the trim and consequential drag.

It should also be remembered that the use of a podded propulsion system allows the elimination of the normal hull appendages including shaft lines, bossings, shaft brackets and rudders etc to give a significant overall reduction in resistance.

Environmental trends

Owners are now looking for green technologies on their new yachts and exhaust emissions have long been an area of concern. The modern diesels with common rail technology have reduced emissions and the focus is now on exhaust treatment. For smaller engines, catalytic converters have proved very effective. However, these become a problem for the larger diesels. The size of the catalytic converters for diesels over 3000kW becomes impractical and manufacturers are investigating alternatives to address the situation.

Diesel electric propulsion would also help emissions as the diesels are generally smaller than propulsion engines, making exhaust treatment possible. They can also be operated at a more efficient point on the power curve.

Sewage treatment plants have now been developed to meet stricter requirements, particularly in the USA, and this has led to the use of filters in the discharge from the plants. Although maintenance levels have been increased, the pollutants in the discharge are now extremely low and can easily comply with the latest regulations.

In short, it is clear that the large custom yacht market continue to provide interesting and varied challenges to all aspects of naval architecture, but specifically, stability, powering, structural design, and regulatory compliance. *NA*

Measuring beauty

Can an index be conceived that establishes a cosmetic, as well as a technical standard for the appearance of a mega yacht? R Kattan, of coatings specialist Safinah Ltd picks over the evidence.

One of the most important elements of a mega-yacht is its visual impact and a large part of this impact is attributable to the appearance of the final coating finish of the external hull.

For many years the assessment of the hull and superstructure coating has been based around terms such as "Super/Mega-yacht standard".

Coating work is generally focused on three separate activities:

- Newbuild application
- Crew maintenance and wash down
- Regular re-coating at designated repair/overhaul intervals.

Studies (1) have shown that typically faults in coating work can be broken down into a number of categories:

- Poor vessel design
- Poor product selection
- Poor product
- Poor management processes
- Poor preparation/application
- Poor maintenance
- Poor repair
- Poor climate/environment control
- Poor worker skill

Not all of these are in the control of one entity. In fact, the designer, the yard, the owner, the paint supplier, the contractor, the paint inspector, the crew and the maintenance facility all contribute in one way or another to either the success or poor performance of the coating resulting in a failure to reach Super-yacht standards.

Before discussing possible solutions for Super-yachts there is perhaps a need to discuss what makes a surface appear visually pleasing.

Quality of visual appearance is ultimately dictated by the uniformity of the surface that is being observed. The question though is: to what standard has that uniformity to be achieved?

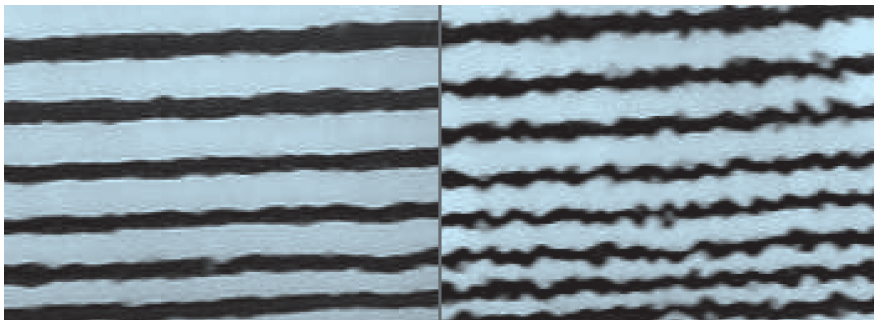

Figure 1 Focus on surface. Waviness (short and long waves).

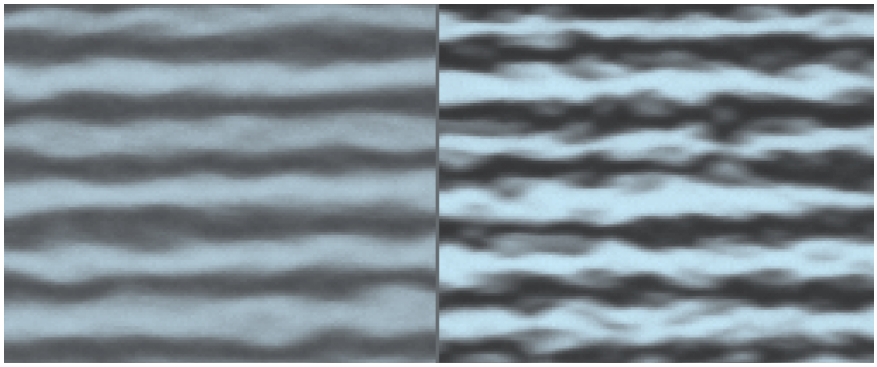

Figure 2 Focus on reflected image.

Thus, there is a surface focus caused by surface effects and the reflected image effects. Examples of some surface effects and reflected image effects and how they can interact are shown in Figures 1 and 2.

So a surface of uniform appearance is one where the values of the elements that make up appearance are consistent over the whole surface. This may be easy to achieve over small areas such as a car body panel but is not so easy on a yacht, which may be in excess of 60m in length with surfaces at a variety of angles from horizontal to vertical and when the surface may be viewed from close up or at a distance.

Therefore, the standard to which the surface is assessed should be defined. The factors that influence appearance are:

- First time coating or touch up
- Substrate type and quality
- Orientation of surface
- Concave or convex surface
- Application process stability
- Lighting and environment
- Human observer

Appearance is a function of waviness and definition of image (DOI) and colour. Waviness is defined by the orange peel effect, which is a surface effect and reflection, which is indicated by the DOI, and which is a reflected light effect. Waviness is itself dictated by the coating surface structure and size and can be long wave, short wave or a combination of both when areas are repaired.

Appearance can change with observer distance and lighting conditions or angle and, for a yacht, this is a real problem as the need is for both good long wave and short wave characteristics and the lighting conditions can vary considerably during a given 24 hour period, let alone

during the build time of the yacht.

The structure of the coating can influence the DOI. If the structure scatters light then this can reduce contrast, while smaller structures can cause distortion of the outlines of the image. Thus the profile of surface can be analysed and differences in appearance quantified.

If a surface can be judged by an owner or a yard as acceptable in appearance it can be subjected to some measurements that would enable a profile of it to be built up. It is not quite as simple as this, but the overview serves to illustrate the point, that profiling could offer a solution and it is one that is used in the motor industry.

In a continuous drive to be different and to innovate, both designers and owners are often looking for elements of uniqueness for their design/yacht. In terms of coatings, this can mean darker colours (blues and greys), even matt finishes as opposed to high gloss. However, increasingly owners are asking for metallic paint either in part or in total for the yacht.

These products work by changing the reflected light angle using a combination of:

- Absorption pigments
- Interference pigments
- Metallic pigments

The way in which these pigments are introduced into the paint formulation enables them to combine to give the desired effect.

The introduction of metallic paint would have an impact, of course, and add to the factors that influence appearance by the introduction of concepts such as graininess and sparkle.

For metallic paints, light conditions become even more critical and for some even the angle of viewing can be critical.

So what is an acceptable Super-yacht appearance standard for coating finishes?

At the present time, it can be argued that a super-yacht appearance standard is whatever the owner's representative is willing to accept or what the yard is able to sell, within the cost and time budgets of the project. Consequently, the standard can be open to subjective decision-making and opinion, with an ultimate compromise often based on attrition of one party or another.

There are a number of methods in the field through which owners/yards attempt to agree on the required super-yacht standard for a particular project. The following methods/techniques are predominantly in use:

- Subjective assessment by eye based on a 3rd party assessment
- Use of reference panels/mock ups
- Photographic referencing
- Basic measurements
- Use of measured reference vessels

The fact that a problem exists is reflected by a proposed ISO standard [3], which will apply to non-metallic coatings.

Each of these approaches has its strengths and weaknesses and all are in regular use. The best way to assess them would be to compare their needs to those as laid out in the proposed ISO standard. This will identify strengths and weaknesses in the current approach and the limitation of the ISO standard.

> "The high visibility areas are those where there can be no compromise on the finish and are visible to guests and passers by"

There are number of issues to consider in assessing coatings:

- Method of measurement and definition of acceptable measured values
- Cosmetic appearance
- Colour and type of coating (e.g. light vs. dark colours, metallic and non-metallic)
- Experience of assessor
- Expectations of owner
- Capability of yard/contractor

One noteworthy attempt to establish a benchmark has been made to try and define some standards [2]. One very important distinction has to be made between:

Technical Quality, the measurable attributes of the application,
As distinct to:

Cosmetic Quality (appearance) of the application.

Technical Quality is objective and can be properly assessed and measured. In simple terms Technical Quality can be answered by a positive response to the questions:

- Was the scheme applied in accordance to the manufacturers guidelines?
- Was the scheme specified using a functional paint specification approach?

These two elements together create a TQI (Technical Quality Index).

Technical Quality should be defined in the form of a Functional Paint specification. This is a specification that takes into account the build process, the tools and techniques available and the in service performance requirements. Regrettably, all too often a generic paint specification is developed that enables little assessment on the technical merit of the various options and often results in a decision based on price, rumour of past successes or failures, without a sound basis for performance.

The 'Cosmetic quality index', by contrast, would include questions such as:

- Does it look acceptable?
- Is it as good as the last yacht?
- Is the owner happy with it?

Many of these issues are subjective and difficult to measure and may boil down to the following visual aspects:

- Gloss
- Fairness
- Dustfall
- Surface Texture

The draft ISO standard entitled 'Large Yachts – Coatings – Measurement and analysis of the visual appearance' (Ref 3). identifies the following cosmetic issues:

- Gloss
- Colour difference
- Appearance
- Fairness
- Other superficial defects

- Gel coat defects
- Film thickness

In doing so it references other appropriate ISO standards and sets out some useful terms and definitions to ensure that everyone involved speaks the same language.

Immediately it can be seen that the list of factors that have an impact on appearance has increased and it is interesting that an item of technical quality has emerged on the list, namely in the form of film thickness. This would appear to confuse cosmetic quality issues with technical quality issues.

In reviewing the draft, then, the following observations can be made:

- Gloss to be measured using a gloss meter
- Colour difference to be measured using a spectrometer
- Appearance (orange peel) DOI, to be assessed using a wave scan.

Work is still ongoing to cover the other aspects of:

- Fairness
- Superficial defects
- Gel coat defects
- Film thickness

With the advent of laser scanning (4), the issue of fairness control could be developed in an objective format without the reliance of a subjective judgement based on observations on a show coat, or possibly the use of a metal baton.

Improved fairing should help improve the TQI and the CQI to enhance overall appearance and reduce filler consumption and make the process easier.

Thus, there are strides being made across many aspects of the cosmetic quality issues to remove the subjective element, with a view of making the processes more objective.

The reality, however, is that even if the Technical Quality Index is correct and the measurable elements of the Cosmetic Quality Index are correct and in accordance with measurements, the results may not look pleasing to the eye.

This would imply that more work needs to be done to better define the standards so that the objective values agreed at the start of a contract do align with the subjective requirements in terms of cosmetic quality.

Once that is done, then a profile of the acceptable values of TQI and CQI could be developed for any yacht project.

To date discussion has focused on one standard and that is the super-yacht standard. The implication to yards and owners is that, as long as the subjective element of this remains, there is no really clear point at which a decision could be made to say that the finish that is presented meets the standard or, if it fails, by how much it fails and for what reasons.

The danger is that "beauty is left to the eye of the beholder" and no two people may agree as to what the standard is.

It is clear that the important factors in assessing the cosmetic quality of a Super yacht finish include, but are not limited to:

- Gloss
- Colour measurement (initial and over time)
- Definition of Image
- Dust inclusions
- Fairness
- Gel coat defects
- Other surface defects

In addition these can be enhanced by factors such as:

- Tension (ratio of short to long wave light reflected)
- Hardness of surface (propensity to mark and scuff)
- Haze (cloudiness)

Of course the TQI requirements must also be met.

Finally, not withstanding how all the other factors are determined and measured, the visual appearance cannot be ignored, as it is the most critical, and it is ultimately subjective.

In theory, it is possible (but unlikely) that all other elements of TQI and CQI are not achieved but the vessel finish may be accepted based on the visual appearance.

The simplest method of establishing the standard required for a particular super-yacht, would be to take a prospective owner and show him a selection of yachts (this is how the car industry sets about establishing its acceptable cosmetic quality). The owner, having selected a suitable reference vessel, can then have the vessel analysed and a profile of the vessel can be built up and that would create a standard for that particular owner and that particular yacht, which may be different to another owner and another yacht.

If this assessment could be undertaken, then the various measurements could be combined on a scale that could represent a CQI profile:

The final visual assessment can still exert great influence, but there are opportunities to mitigate some of this influence, certainly one route would be to divide the visual impact into four broad categories:

- High visibility
- Medium visibility
- Low visibility
- No visibility

The high visibility areas are those where there can be no compromise on the finish and are visible to guests and passers by.

Medium visibility would take into account those areas that have limited visibility to passengers e.g. lockers.

Low visibility areas are those that are not on display at all (perhaps inside a motor housing).

Finally no visibility areas are those that will be covered by linings or decking or other materials.

Thus for the no visibility areas the TQI is paramount, while for the high visibility areas the CQI is the critical element.

In summary, a working standard for yacht finishes remains elusive, although previous proposals and the ISO draft text go a long way toward quantifying some key elements, there has not been a method proposed onto which the technical and cosmetic aspects of a finish for a super yacht can judged against in a consistent manner.

The proposal set out here, may offer a route for consideration and is under continuous development. It is slowly being applied to appropriate projects with an initial focus on the TQI elements and the use of increasingly complex instrumentation for the CQI elements.

Perhaps beauty will always remain in the eye of the beholder, but it may be possible to define that beauty on a project-by-project basis and give all parties an opportunity to work to an agreed standard. *NA*

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RINa takes mega share

Class body RINa invests in the yachts of the future.

Italian society RINa reckons to have classed 40% of the global orderbook for mega yachts, and reports a 200% growth in its yacht classification services over the last five years. Revenue from yacht services grew over 20% during 2008, reflecting both the increased orderbook and the widening of services to owners, the organisation said.

At the end of 2008 RINa had over 1000 yachts, totalling over 160,000gt on its register. Half of these were Italian flag, while a further 25% flew the Red Ensign. More importantly, over 400 yachts were on order to RINa class.

During 2008 yachts were building to RINa class in Italy, Turkey, China, UK, New Zealand, USA, Germany, Taiwan and The Netherlands. In the last case, RINa has been appointed for the first time by the Jongert shipyard to class a 40m aluminium motor yacht. 10 charter-class yachts between 30m and 60m loa were built in China to RINa class, along with 15 yachts for CE certification. A dedicated Yacht Centre was opened in Istanbul, with its own plan approval and expert yacht team.

Given its large market share, RINa has continued to develop new services specifically for yachts. In 2008, these included the Secure Yacht Certification, High Quality Boat Certification, Green Star Clean Energy – Clean Propulsion and Layout for Yacht Maintenance. The class body also launched a new Yacht Academy in 2008, providing courses tailored for yacht crews, masters and yacht building yards on technical matters. *NA*

Drive behind new design

A new concept 'Superyacht' has been envisioned by UK-based design company Drive for potential customers at the very highest end of the luxury market.

The 125m 7Cs from UK designer Drive concept is said to challenge the traditional proportions of a superyacht and "create a vessel that borrowed tried and tested ideas from the automotive industry". Drive said its designers had experimented with character of line, proportion, and graphical breakup to create a vessel with a "unique stance and balance above the water line". Drive has designed a number of sea-going vessels, ranging in size from small motor boats to large superyachts of 50m and above.

Drive said it believed that the vessel's primary use would be as "an overtly luxurious cruiser, with the accommodation space arranged purely to provide the levels of comfort and space that the owner would expect in his homes".

Drive envisages a hull featuring a reverse bow, which the designer says will minimise slamming, create a smaller wake, and afford a longer range. The 'wave motif' running from the bow down the side to the stern would allow the superstructure to be somewhat higher at the bow, protecting the deck. It would also allow for the break up of the profile of the yacht, lowering the visual line as it runs towards the stern, and an attendant colour break-up would lighten the visual bulk of the yacht, making it look a lot lower in the water than it would actually be.

Drive said cruising speed would be in the region of 20+ knots. The vessel's range at cruising speed (until the tank's dimensions have been defined, this cannot be defined precisely) would be about 5500 nautical miles.

Among the vessel's special features would be a sunken pool in the fore section with a retractable cover to provide shelter for swimming in poorer weather, also maximising deck space when not in use. Drive said it was looking at the possibility that a helicopter could be garaged to maximise deck space when in storage.

Concept for a new 125m long 'Superyacht' from Drive.

The 'wave motif' running from the bow down the side to the stern would allow the superstructure to be somewhat higher at the bow, protecting the deck.

The yacht would also feature a rear 'surrounded' jacuzzi providing shelter and privacy for the owner. Internally, Drive envisages an atrium space with a double curved staircase. An area envisaged for the stern had been inspired by contemporary glass structures and demonstrated a play on 'inside/outside' space. The superyacht would also offer the usual 'toys' that are found on other yachts, but Drive said it also had ideas for side garage doors where smaller craft could be driven in or out without the use of a winch system.

At this stage of the project, Drive said it had not progressed to looking at specific equipment for the vessel. However, Drive's designers had a list of specific features that they wanted to include, and these dictated some of the exterior proportions.

Since initially showing the concept at the Monaco Yacht show 2008, Drive said it had developed the design and, based on feedback received with input from suppliers, was currently finalising the interior accommodation space. Drive said its thinking here had been driven originally by the aspiration for the interior to be as spacious and open as possible. The interior would have provision for about 12 guests (possibly up to14), with double that for crew.

Drive said that, in the future, it would look to a partnership with a naval architect to take the project to production. *NA*

Eclipse comes into view

The biggest mega yacht of them all, so far, progresses towards delivery.

For some, owning the world's largest private airplane, two submarines and three mega yachts may be enough. However, when one has €340 million worth of loose change burning a hole in one's pocket, owning a fourth yacht – and naturally the largest in the world – becomes something of a necessity.

Eclipse, due delivery to Russian billionaire Roman Abramovich next year after certain unspecified finishing touches, emerged from under wraps at Hamburg's Blohm + Voss yard in early June. At 170m long, the Terence Disdale-designed yacht is 4.5m longer than *Dubai*, the mega yacht owned by Mohammed bin Rashid Al Maktoum, the Emir of Dubai.

Bringing a whole new meaning to the phrase 'maritime safety', *Eclipse* comes complete with bullet proof hull, armoured glass, its own missile defence alarm system and, reputedly, motion sensors sensitive to approaches from small craft.

The motor yacht *Eclipse*.

Given these attributes, it is no surprise that, following a design trend, *Eclipse* resembles a naval vessel externally. However, served by a crew of 70, guests in the 11 luxury cabins, or around the two swimming pools, at the aquarium, in the cinema, or in the discotheque, may take a different view. *Eclipse* also features two helicopter pads (with helicopters apparently thrown in), and a mini-submarine that will be able to submerge to depths of 50m.

With Mr Abramovich reported by Forbes as being down to his last US$8.5 billion, the owner of Chelsea Football Club will have to dig (though not very deep) to afford the estimated €30 million a year it will cost to run *Eclipse*. Reportedly, the 42-year-old intends to board his new ship next summer to travel to the Football World Cup in South Africa. ***NA***

BMT ponders rule changes

BMT Nigel Gee says it is researching the impact of future regulations on large yachts.

BMT Nigel Gee Ltd says it is to undertake a research and development project into the impact of future regulations on the design of large SOLAS certified yachts.

The company notes that, in recent years, the number of yachts in the upper segment of the industry that are outside of the (Maritime & Coastguard Agency Luxury Yacht) LY2 (over 24m in length) regulatory framework has increased.

The application of SOLAS passengership regulations to these yachts is now becoming increasingly common, the company says.

The SOLAS-based regulatory framework is undergoing a period of change, with the recent ratification of a number of new regulations. Together with near term future regulations, these will have an impact on the layout of SOLAS certified passengerships and therefore the yachts in the upper segment of the industry.

BMT said it would be undertaking research to investigate the implications of future regulations on the layout of large yachts and how current design practices will need to change.

According to James Roy, BMT Nigel Gee yacht design manager, one focus of the study is the way yacht design is changing to reflect the fact that mega yacht owners now want to have more than 12 passengers onboard, which means in regulatory terms that they will have to be defined as passengerships in the context of SOLAS (as defined in 1914, after the Titanic sinking). Additionally, Mr Roy said, BMT was concentrating on issues such as safe return to port, probabilistic damage, and new regulations that would affect yachties, such as MARPOL 12A. MARPOL 12A sets out the requirements concerning the location of oil fuel tanks in all ships with an aggregate oil fuel capacity of above 600m^3 delivered after 1 August 2010, or where orders were placed after 1 August 2007, or keels laid after 1 February 2008. In essence, the protection obliges fuel oil tanks to be located inside the double-hull.

"We are looking to see how the regulations can be interpreted and how we can position ourselves accordingly," said Mr Roy. "We have also talked quite a bit about goal-based standards and how they will affect yacht owners, although we don't know when they are going to come into force."

Mr Roy said that BMT would closely follow the study being undertaken by the Cayman Islands Flag regarding possible legislation for yachts that carry between 13 and 36 passengers, which may redefine the legislative framework for vessels operated by the super rich.

"We need to know how you act at the very early design stage when it comes to meeting these regulatory challenges," said Mr Roy. ***NA***

Palmer Johnson takes on the 'World'

The first 81.4m long 'PJ World' ice class 1B 'exploration' yacht is now being built in Norway.

Built to DNV class and for an unspecified client, the Palmer Johnson 'PJ World' yacht now under construction at the former Flekkefojord Slipp & Maskinfabrikk shipyard in Norway has been designed by Rolls Royce company NVC Designs, with interior and exterior superstructure design by the Italian company Nuvolari-Lenard.

The six deck yacht, with a beam of 14.6m, a draught of 4m, and speed of up to 16knots, with a range of 10,500nm (at 10knots), is being aimed at owners wanting to operate in rougher seas. Accordingly, while including all of the luxury interior features required by the discerning yacht owner (gym with spa, a cinema, a swimming pool, a heli aft-deck, etc), PJ World's hullform is actually derived from the Rolls-Royce UT Design platform of offshore support vessels.

The hull's attributes include avoiding loss of speed in head seas, a reduction in vibration and noise levels, and improved manoeuvrability and control.

With a newly developed Rolls-Royce DP1 dynamic positioning system, the 600dwt, 2800gt yacht will feature four stroke diesel electric propulsion, in the shape of the six cylinder Bergen C25 type engine, commanding 2000kW at 1000revs/min, as well as twin Azipull podded propulsors and one (type 1300) Rolls-Royce tunnel thruster.

The new 'PJ World' class of yacht, whose hull form is derived from the widely used UT Design of offshore support vessel.

The owner's apartment is situated on the fourth, fifth and sixth decks comprising of a bedroom suite, separate business and private lounges, an office and a Jacuzzi sundeck with 360deg viewing.

The design also demands lifts capable of spanning four deck levels. Therefore, the vessel will feature three marine lifts supplied by Lift Emotion BV.

It is understood that the first contract between Palmer Johnson and Rolls-Royce envisages the construction of a second yacht and includes options for two more vessels to the same design. *NA*

Simple strips to adjust pitch

Quickly applied, 'slot-in' solution could offer mega yacht operators the chance to adjust propeller pitch at low cost.

VEEM says it has patented the 'Interceptor' propeller concept, designed to attain the right engine revs and load without the need to change or modify the propellers it supplies.

The Interceptor changes the chord of the propeller without its removal from the vessel by using Interceptor 'strips' of different heights inserted in the propeller's trailing edges.

All VEEM custom propellers are five-axis CNC-machined on 100% of the propeller, with critical surfaces machined in a single set up. Propellers may still, however, have to be adjusted up or down by 100rpm.

Instead of bending the propeller to change its pitch, colour coded, polymer Interceptor strips of different heights are slotted into and locked into a machined recess in the trailing edge of the pressure face of each propeller blade. Once fitted, the strips cannot come out of their grooves unless they are pulled from the hub end using a hooking tool.

The strips protrude above the metal of the blade and create the 'Interceptor' effect, or surface discontinuity. Strips are manufactured with an included angle equal to or less than 90degs, causing a "wedge" of circulating fluid to be captured, which induced more lift. The higher the Interceptor, the higher the effect on the propeller pitch. No information was given, by VEEM however, regarding the potential vortex effects, nor was there guidance on the strips' effects on propeller efficiency.

If a correction in pitch was required, VEEM said the strip would simply be taken out and replaced by one of a different height, by a eliminating the need to either change to a new propeller or mechanically alter the existing propeller. Changing strips allowed alterations to propeller pitch at any time, so that changes in vessel weight or trim, windage caused by adding towers or clears, running tanks full to maximise range or even operating in different environments such as hot tropical regions, can all be easily accommodated.

VEEM Interceptor strips can be adjusted from a protrusion height of 3mm down, in 0.5mm increments. *NA*

Drillships offer a bit of comfort

As ship orders have stalled, more South Korean shipbuilders are chasing potential business in the offshore market, and specifically the drillship market. But how many shipbuilders can such a niche market support?

It is not necessary to look beyond the latest financial results posted by Hyundai Heavy Industries (HHI) to realise the impact global recession is having on ship ordering patterns. New orders placed in 2009 in the year to the end of April with the world's largest shipbuilder, HHI, added up to zero, compared to US$6.7 billion in the equivalent period of 2008.

While it is important not to get things out of proportion (HHI still has a shipbuilding backlog of orders worth US$26.7 billion, after all, with the majority of deliveries due after 2010), it is worth observing that expectations from affiliate company Hyundai Mipo Dockyard that it will secure orders worth US$3.5 billion in 2009, compared to the US$4.6 billion it achieved in 2008, and from Hyundai Samho Heavy Industries that it will win US$3.5 billion worth of orders in 2009, compared to US$4.3 billion in 2008, may prove optimistic.

HHI said what it termed the "oversupply problem" would be "settled down by the cancellation of speculative orders and by restructuring of the uncompetitive shipyards. About three years of backlog will work as a buffer, enabling HHI to survive through the adjustment period despite tough market conditions expected in the near term."

West Polaris, built by Samsung Heavy Industries for Seadrill.

In the meantime, though, some South Korean shipbuilders are looking to follow the lead taken by Samsung Heavy Industries in pursuing opportunities in the relatively resilient offshore sector. So far, SHI, for example, has built 10 drillships, and it has a further 25 on order.

Daewoo Shipbuilding & Marine Engineering (DSME) delivered its first ultra deepwater drillship to Transocean in 2006. *Discoverer Clear Leader* is 254m long, 38m across the beam and 127m high.

TECHNICAL PARTICULARS

Comparison between our HuisDrill 10,000 ordered through STX Shipbuilding and a traditional drillship*

	HuisDrill 10000	Conventional drillship
Max. water depth (MDR)	10,000ft (3000m)	10,000ft (3000m)
Max drilling depth	40,000ft (12km)	35,000ft (10.5km)
Variable deck load	20,000tonnes	20,000tonnes
Deck area	4,000m^2	3,200m^2
Length	619ft (189m)	748ft (228m)
Width	104ft (32m)	137ft (42m)
Displacement	54,000tonnes	96,000tonnes
Installed thruster power	6 x 3.5MW	6 x 5.5MW
Cost	< $ 600 million	>$ 1 billion

Source: Huisman

Samsung Heavy Industries has built 10 drillships so far, and has another 25 on order. Among them is a series of ships for Stena.

More recently, a DSME contract last year, with a pair of drillships ordered by Odebrecht for US$700 million, which will be leased to Petrobras after delivery in the second-half of 2011. Aker Solutions has been awarded the US$260 million contracts to deliver drilling equipment packages. For Aker, the scope of work includes engineering, equipment deliveries and commissioning services.

HHI, meanwhile won its first firm drillship orders in 2008, with one secured from Transocean and two more secured from Metrostar. These 229.4m long by 36m wide by 18.15m deep ships have been designed by Gusto MSC, with the first ship due for delivery in October 2010.

Joining the party in 2009 has been STX Shipbuilding, which secured its first drillship order from Huisman, and it is the comments of this shipbuilder that suggest that four of the big five Korean shipbuilders at least are likely to be vying for forthcoming drillship orders expected from Petrobras and Shell with considerable zeal.

STX, of course, is very different from other Korean shipbuilders, after it took over the former Aker Yards to establish STX Europe, entering the cruiseship market in one fell swoop.

Overall, 2009 will be a big year for deliveries for STX, but 2010 will be even bigger. As additional building capacity came on stream at the Changwon yard this year, output has risen dramatically. Compared to the 56 ships delivered in 2008 (1227cgt), 2009 will see 88 delivered (1896cgt), and 2010 will see delivery of 99 ships (2500cgt).

STX was particularly successful in securing bulk carrier orders, as that market boomed, with 24 ships of this type to be delivered in 2009, rising to 57 bulk carriers in 2010, with orders split across the range of Supramax, Kamsarmax, Mini-Cape and Capesize vessels. This compares to no bulk carrier deliveries at all in 2008. The expanded bulk carrier production should be set against the tailing off of tanker output (23 tankers slated for 2010 delivery, against 55 such ships in 2009). The overall production level should also be seen in the context of low output of containerships (2008, eight ships, 2009 seven ships, 2010 four ships).

STX's presence in the gas carrier market will be sustained in 2010 with the delivery of nine ships, against six in 2008, but none at all in 2009.

S J Her, STX Corp manager, marketing planning team, shipbuilding marketing division, said: "STX considers LNG-related offshore facilities as future growth engines," said Mr Her. "We have developed a generic design of LNG FSRU and LNG FPSO, and now we are working on marketing them to LNG-oriented shipowners."

Mr Her said STX also believed the market for drillships and semi submersibles would become larger. "So we are planning to do marketing aggressively with our unique-design drillship, which is different from a conventional drillship," said Mr Her. "We have received from a renowned American drilling company two drillships called STX-Huisman GT-10000 Design, having 10,000ft water depth and 40,000ft drilling depth with 189m length x 32.2m beam x 18.9m depth at 11knots service speed."

As noted earlier, Mr Her was referring to a pair of HuisDrill 10000 ships, which will be delivered by the STX satellite yard in Dalian, China, some time in 2011.

The HuisDrill 10000 is designed to offer a low cost and flexible alternative for drilling in ultra deep waters. This design envisages a compact box type drilling tower instead of a conventional derrick and the omission of a substructure allows for a significantly smaller sized vessel compared to other deepwater drillships of similar capacity, according to Huisman. The vessel measures 198m by 32.2m, at only 54,000dwt. In addition, the design is claimed to offer improved operational efficiency as a result of the different equipment layout, lower building costs and lower operational costs. The drilling equipment is based on the drilling mast and pipe storage in carousels as currently under construction for the "Bully" rigs, on order by Frontier Drilling / Shell.

The drillship is said to represent a major step change in the industry, in being designed to offer a low cost and flexible alternative for drilling in ultra deep waters. The selection of Huisman's compact box type drilling tower instead of a conventional derrick allows for a significantly smaller sized vessel compared to other deepwater drillships

of similar capacity. In addition, it is said to offer improved operational efficiency as a result of the different equipment layout.

Furthermore, the vessel design does not follow the traditional concepts for drillships. For instance, the engineroom of the vessel is placed forward, underneath the accommodation. This arrangement is common for most other types of offshore construction vessels, but not for drillships. It leaves the entire 4200m^2 aft deck area free for drilling equipment or tubular storage.

The drilling capabilities, however, match those of the new generation large drill ships. The vessel will have DP-3 classification and be suitable for unrestricted worldwide service. Special attention has been given to sea keeping characteristics. Modest vessel motions and a low drill floor result in very low accelerations at the drill floor, according to Huisman the low drillfloor is the result of absence of a substructure below the drilling mast. The drill floor is at a level of no more than 5m above the main deck of the vessel. This not only reduces sideways motions at the drill floor but also lowers the centre of gravity of the drilling equipment considerably. This is made possible by lowering the BOP through a large hatch aft of the drill mast before skidding it to the well centre, forward of the mast. The top section of the mast can be removed to allow passage through the Panama and Suez Canals as well as below the Bosporus bridge.

Nor is STX alone in believing that drillships offer the potential for new business. Hyundai Mipo Dockyard Co Ltd which is focused on ships of up to Panamax class, has been gradually developing a wider portfolio of ships. The shipbuilder currently has an order backlog for 246 ships (9.84 million dwt, or 7.67 million gt).

In 2008, when 70 ships were delivered, the yard turned out just three ship types, in the shape of 47 product carriers, 21 containerships and two LPG carriers, reflecting the then high demand for these mainstay ships.

This year, with 71 ships due completion, product carrier production remains strong, and 50 ships of this type will be delivered. However, only three containerships will be delivered, alongside four pure car and truck carriers, 10 LPG carriers, two general cargo vessels and two bulk carriers.

Huisman 10000 design represents the first drillship order for STX Shipbuilding.

Looking forward to next year, HMD said the delivery pattern would be even more diverse. True, 44 product carriers are due delivery, but the builder will also deliver six more PCTCs, five ro-ro ships, three con-ro vessels, three more LPG carriers, two general cargo ships and six bulk carriers.

To date, however, the steps towards diversification taken by HMD have reflected changes in ordering patterns within the commercial fleet. Now, HMD too is turning its mind to the more resilient offshore sector.

According to a company spokesman: "At the moment, there are no offshore vessels in our order book as, over recent years, we strategically concentrated only on commercial vessels such as product tankers and container vessels etc in line with their high markets. However, we have plenty of building and delivery performance of the offshore vessels in the past such as drillships, cable layers, pipe layers, etc.

"As the market has changed, now we are focusing on high value-added offshore projects as our important strategic sectors and currently we are developing the various related designs."

But, before the bandwagon is even rolling, it is pertinent to note that Samsung Heavy now sees greater opportunities elsewhere in the offshore market. According to Hweui-Sik Cho, SHI senior manager, ship and offshore sales and marketing division: "The current market situation for drillships is not so good in comparison with last year, but SHI expects to get a few drillship orders this year."

Rather, Mr Cho said: "Fortunately LNG FPSO projects are on the rise, mainly the Shell FLNG and Petrobras projects, so we are focusing on getting new orders for LNG FPSOs by offering different types of design, including membrane, SPB and combination (mb + spb) [storage options]."

The Shell LNG FPSO Mr Cho was expressing an interest in, for which a tender was issued last year, is to be 450m long by 75m, with a 3.5 million tonne per annum LNG capacity, plus associated LPG and condensate production; taking total liquid production potential to over 5 million tonnes per annum. Doubtless HHI, STX, DSME and, perhaps even Hanjin Heavy are just as interested. *NA*

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More gas for Russian shipbuilders

Some 23 LNG carrier orders could be on the cards, with Russian yards to be the prime beneficiaries. Crisis, what crisis?

A heavy duty delegation from Gazprom toured St Petersburg shipbuilding facilities in late June to explore opportunities for future ships demanded by the ambitious giant. The delegation was led by Alexander Ananenkov, Gazprom deputy head of the management committee for production.

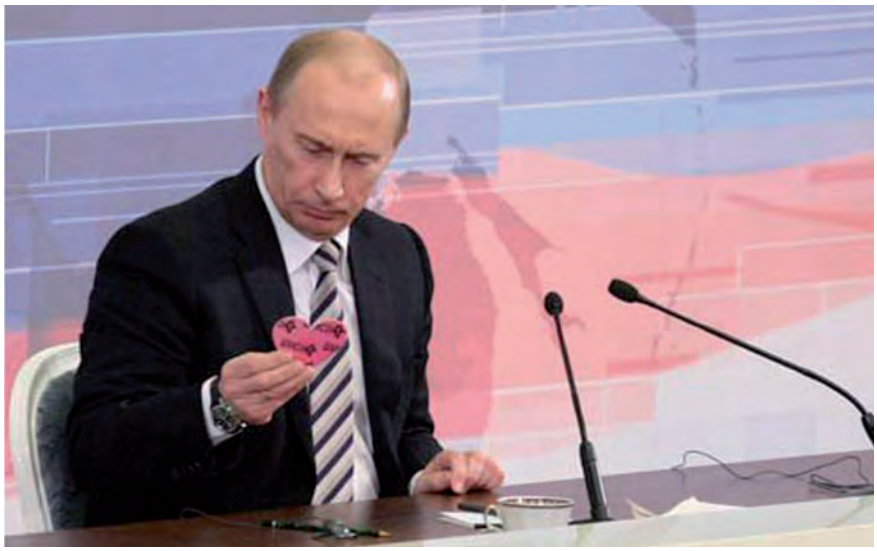
The meeting focused on the prospects for expanding production and engineering capacities of Russian shipbuilders to fulfil Gazprom's orders. Taking part were top managers from Russian leading shipbuilding companies, including United Shipbuilding Corporation, Admiralty Shipyards, Amur Shipbuilding Plant, Baltiysky Zavod, Vyborg Shipbuilding Plant, Zvezdochka Shiprepair Centre, Severnoye Machine-Building Enterprise (Sevmash), Severnaya Verf, and the Krylov Shipbuilding Research Institute

Gazprom emphasised its desire to develop the 5 million km^2 Russian continental shelf, as well as the prospects for LNG production and sea-borne transportation. The company said it was striving to maximise the engagement of domestic production capacity. There was an obvious lack of both production and engineering capacities to construct modern marine equipment for offshore operations, including drilling rigs and new-generation production platforms, Gazprom said.

Field development offshore Russia up to 2020 will demand over 10 drilling and production platforms, over 50 vessels and marine equipment of various types, as well as at least 23 LNG carriers, according to Gazprom, which said it would look to place the bulk of orders with domestic builders. "In order to deliver this objective, the producers should comprehensively upgrade shipbuilding companies to satisfy the demands of Gazprom as a large customer in terms of quality and quantity," Mr Ananenkov said.

Special emphasis was put on the need to replace high-tech foreign spare parts with domestic alternatives.

"It is necessary to adopt a state import substitution programme that would embrace not only the shipbuilding, but the engine, machine, oil and gas equipment sectors as well. This programme should encourage Russian producers to be active in equipment upgrade, certification, adoption and development of advanced technologies," said Mr Ananenkov.



Of course I love shipbuilding.

The initial aggregate hydrocarbon resources of Russia's continental shelf average 100 billion tonnes of fuel equivalent, of which 80% is gas. The bulk of the hydrocarbon resources (around 70%) is concentrated in the Barents, Pechora and Kara Seas, with gas and condensate prevailing in the Barents and Kara, and oil in the Pechora Sea.

Gazprom considers the Barents, Kara, Pechora and Caspian Sea shelves, the Ob and Taz Bays offshore areas, the Okhotsk Sea shelf, including the Sakhalin Island and West Kamchatka offshore to be most promising.

In Severodvinsk, Sevmash Production Association is currently constructing the Prirazlomnaya offshore ice-resistant stationary platform, Zvezdochka Shiprepair Centre the Arkticheskaya jack-up floating drilling rig, the Vyborg Shipbuilding Plant

Floating nuclear option

Baltiysky Zavod, a part of United Industrial Corporation (OPK), is in the process of building the first of eight floating nuclear power units for FNPP.

The contract, signed by OPK and Concern Energoatom PLC on 27 February 2009, includes construction, launching, rebuilding and testing. Ultimately, the project envisages exploitation of a head floating power-generating unit, with two KLT-40C type reactors. According to the contract, the construction of the floating power-generating unit will be completed by the second quarter of 2012, with tests due to be complete so that the unit can enter operations in the fourth quarter of 2012.

The floating power-generating plant is a non-self-propelled barge of 144m in length and 30m in width, of 21,500dwt. Regulation capacity of each reactor will be 35MW, while thermal power is given as 14Gcal.

Three tankers for Krasnoye

Krasnoye Sormovo Shipyard has signed a contract with Kazmortransflof for the construction of three tankers.
The US$66.5 million contract envisages construction of three 13,000dwt vessels, with the delivery date of the first tanker due in September, 2009, the second in May 2010, and the third in August 2010.

The tankers will be the largest to operate in the Caspian Sea, and will be capable of entering any port without port terminal equipment. The design of the tanker was worked out by the engineering bureau of the MNP Group (at present the Volgo-Caspian Design Bureau) to transport crude oil and oil products with a flash point of less than 60°C . The double side and double bottom of the hull (fitted with ballast compartments) prevent oil spillage, in the event of an accident.

the Severnoye Siyanie (Northern Lights) and the Polyarnaya Zvezda (Polar Star) semi-submersible drilling rigs.

The Krylov Shipbuilding Research Institute has also developed draught concepts for Gazprom of an offshore ice-resistant drilling rig, engineering designs for 11 vessels to ensure offshore fields pre-development, the engineering design for a mobile floating drilling rig is underway.

In a related development, in April United Industrial Corporation (OPK) and Japanese shipbuilding and shipping companies Mitsubishi Heavy Industries, Ltd., Mitsui & Co, Ltd. and Nippon Yusen Kabushiki Kaisha, signed a memorandum of understanding for a new business cooperation.

OPK said it planned to modernise its shipbuilding capacities on Severanya Shipyard and Baltiysky Zavod in order to ensure construction of LNG carriers.

The Japanese partners will participate in working-out OPK's shipbuilding capacity modernisation plan needs, as well as providing consulting support directly in LNG carriers' construction.

The parties to the memorandum said they would participate in Gazprom's coming tenders to have LNG carriers constructed for Shtokman LNG project, as well as to participate in programmes of other companies developing the Arctic shelf. *NA*

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RS breaks cover on ice

The Russian Maritime Register of Shipping (RS) continues to push forward to operate in ice-covered waters.

In completing the development of new rules for the classification, construction and equipment for floating offshore oil and gas production units RS has emphasised its forward looking role in the field.

Significantly, the new Rules include requirements for the design, construction and operation of floating offshore units for drilling, production, treatment, storage, refining and offloading hydrocarbons. These requirements are based both upon the international experience of construction and operation of the units and upon the experience of RS in the classification and construction of ships, mobile offshore drilling units and fixed offshore platforms.

The Rules include requirements for low temperature resistance in the materials used during construction and structural strengthening for ice loads. The choice of the material (steel) for ice strengthening is crucial. So, RS has conducted a range of research on steel performance during long-term operation at very low temperatures, including brittle fracture resistance assessment in welded structures to be used on the Arctic shelf, thermo-mechanical steel strengthening technologies, and complex assessment of the efficiency of new low temperature-resistant steel grades intended for Arctic structures.

The prospective development of hydrocarbon fields in areas with permanent ice coverage will require technologies able to perform underwater (under-ice), including systems for processing and offloading hydrocarbons extracted with the help of such technologies. RS is conducting research in to safety standards for underwater production facilities and offloading systems during design and operation.

Unsurprisingly RS focuses on ice operations, as over 90% of ships under construction to RS class are ice strengthened. Protecting the safety of life in harsh conditions, RS has also developed additional winterisation requirements. The requirements consider protection from icing and optimisation of ship's structure, equipment and systems for long-term operations at low temperatures.

Ships complying with the ice protection requirements may be assigned additional anti-ice notations.

RS gave special consideration to ships with the distinguishing mark WINTERIZATION and the certification of materials used for manufacturing elements of equipment, fittings and other products installed on the open deck and providing safety of navigation, environmental protection and other specific purposes. *NA*

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Crew reductions herald disaster

Dear Sir,

May I comment, as a former deck officer in car ferries, on the article in the April *The Naval Architect* regarding the *Herald of Free Enterprise* disaster?

Whilst the 30 factors quoted are all more or less relevant to the cause of the ship's capsize, the two most important ones in my view are the fact that the bow doors were not closed, and the absence of any form of longitudinal bulkhead on the car deck.

In my time on ferries on Irish Sea routes, which ended six months before the incident, it was the practice to carry three deck officers, one of whom was responsible for closing the ramp and bow doors on leaving port and reporting to the bridge that this had been done, by VHF radio.

It is my understanding that the third deck officer was dispensed with on the ferries of which *Herald of Free Enterprise* was one, some months prior to the disaster. This would have removed the positive reporting procedure, as the Bosun's Mate who was given the responsibility did not have a radio.

The ferries on which I served had at least a partial longitudinal division of the car deck forming the access stairs to the accommodation decks. This would have greatly reduced the free surface effect of loss of stability, caused by even moderate amounts of flooding of the car deck.

I was interested in the under-estimate of car weights. In the 1980s we too used one tonne per car, which was probably about right up to then, but car weights have been increasing due to safety features and the arrival of 4x4's, and it is probably nearer 1.5tonnes or even 1.75tonnes now.

Of course, nothing excuses 'sloppy seamanship', but this is greatly contributed to by reducing the number of deck officers and the consequent fatigue problems which inevitably ensue. Commercial pressure to keep a ferry's schedule is an ever-present fact of life.

Yours sincerely,
Desmond Fforde

Falling foul of Hempel

Dear Sir,

I have one comment to your article on page 66 (June 2009, *The Naval Architect*). It is completely wrong to write that "X3 uses the same hydrogel silicone technology intrinsic to Nippon Paint's LF Sea". There is absolutely no relationship between the two technologies' brands, or companies. This is taken completely out of the blue by the author of the article.

Torben Rasmussen
Group Product Manager
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Fax +44 20 7245 6959
E-mail conference@rina.org.uk

September 1-3, 2009
ICCAS: International Conference on Computer Applications in Shipbuilding, international conference, Shanghai, China.
Contact Conference Department, RINA, 10 Upper Belgrave Street, London, SW1X 8BQ, UK.
Tel +44 20 7235 4622
Fax +44 20 7245 6959
E-mail conference@rina.org.uk

September 7-8, 2009
International Conference on Light Weight Marine Structures, international conference, Glasgow, UK.
Contact ASRA Net, A1 St James Road, Glasgow, GA 0LT, UK.
Tel +44 141 548 5709
Fax +44 141 552 3886
E-mail asranet@live.co.uk

September 8-11, 2009
Offshore Europe, international conference, Aberdeen, UK.
Contact Gateway House 28, The Quadrant, Richmond, Surrey, TW9 1DN, UK.
Tel +44 20 8439 8890
Fax +44 20 8439 8897
E-mail oeteam@reedexpo.co.uk
www.offshore-europe.co.uk

September 8-11, 2009
DSEi, international conference, London, UK.
Contact Clarion Events, Earls Court Exhibition Centre, Warwick Road, London, SW5 9TA,UK.
Tel +44 20 7370 8551
Fax +44 20 7370 8815
E-mail enquiries@dsei.co.uk
www.dsei.co.uk

September 15-17, 2009
Seatrade Europe, international conference, Hamburg, Germany.
Contact Seatrade, Seatrade House, 42 North Station road, Colchester, CO1 1RB,UK.
Tel +44 1206 545121
Fax +44 1206 545190
E-mail sales@seatrade-global.com
www.seatrade-europe.com

September 22-25, 2009
NEVA 2009, international conference, St Petersburg, Russia.
Contact 103 Bolshoy pr., VO, St. Petersburg, Russia 199106.
Tel +7 812 321 2676
Fax +7 812 321 2677
E-mail transtec-neva@setcorp.ru

September 23-24, 2009
4th Fast Ferry Information Conference, conference, London.
Contact 4th Fast ferry Information Conference,14 Marston Gate, Winchester SO23 7DS, UK.
Tel +44 1962 869842
Fax +44 1962 843863
E-mail fastferry@fastferryinfo.com
www.fastferryinfo.com

September 24-26, 2009
INMEX, international conference, Mumbai, India.
Contact IIR Exhibitions Limited, 29 Bressenden Place, 5th floor, London, UK.
Tel +44 20 7017 7108
Fax +44 20 7344 3890

September 28-29, 2009
ICSOT: Ice Class Ships, Busan, Korea.
Contact Conference Department, RINA, 10 Upper Belgrave Street, London, SW1X 8BQ, UK.
Tel +44 20 7235 4622
Fax +44 20 7245 6959
E-mail conference@rina.org.uk

October 5-7, 2009
Middle East Workboat, international conference, Abu Dhabi, UAE.
Contact Seatrade Communications Ltd, Seatrade House, 42 North Station Road, Colchester, CO1 1RB, UK.
Tel +44 1206 545121
Fax +44 1206 545190
www.middleeastworkboats.com

October 11-15, 2009
ICHD 2010, international conference, Shanghai, China.
Contact ICHD 2010 Secretariat, 185 Gao Xiong Road, Shanghai 200011, China.
Tel +86 21 63150072
Fax +86 21 63150072
E-mail zhou_ld@ichd2010.org.cn
www.ichd2010.org.cn

October 14-16, 2009
Fundamentals of Contract & Change Management for Ship Construction, Repair and Design, conference, London, UK.
Contact Conference Department, RINA, 10 Upper Belgrave Street, London, SW1X 8BQ, UK.
Tel +44 20 7235 4622
Fax +44 20 7245 6959
E-mail conference@rina.org.uk

October 14-17, 2009
Interferry 2009, international conference, Instanbul, Turkey.
Contact Interferry, #8 - 735 Moss Street, Victoria, BC, V8V 4N9, Canada.
Tel +1 250 592 9612
Fax +1 250 592 9613
www.interferry.com

October 21-24, 2009
Kormarine 2009, international conference, Busan, South Korea.
Contact Bexco (Busan Exhibition & Convention Center), #1291 Wu 2-dong, Haundae-gu, Busan 612-827, South Korea.
Tel +82 051 740 7300
Fax +82 051 740 7320
www.kormarine.net

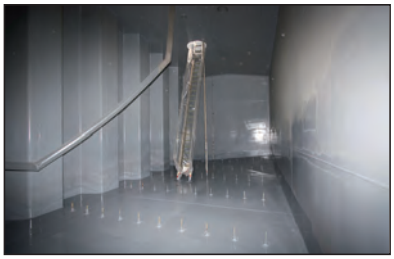
October 26-27, 2009
Design and Operation of Bulk Carriers, international conference, Athens, Greece.
Contact Conference Department, RINA, 10 Upper Belgrave Street, London, SW1X 8BQ, UK.
Tel +44 20 7235 4622
Fax +44 20 7245 6959
E-mail conference@rina.org.uk

The Royal Institution of Naval Architects

Marine Coatings

17 - 18 February 2010, London

First Notice & Call for Papers



The marine environment has always been a harsh and unforgiving environment for both anti-fouling and corrosion control coatings systems. In the current economic climate the industry faces an even greater need to improve the performance and cost effectiveness of coatings systems. The industry is now being affected by more and more legislation on safety and environmental protection issues.

The ballast tank Performance Standards for Protective Coatings (PSPC) is now incorporated in SOLAS and standards for oil tank coatings are being finalized. These regulations also require the shipowners to maintain a Coating Technical Files (CTF) to record details of the coating system and its maintenance. This file will be subject to regular audit by Class.

Both from a financial and environmental point of view the need for a clean hull, reduced resistance and hence reduced fuel consumption have never been more important. Many operators including the offshore energy sector are seeking coating systems with greater surface tolerant and extended life to 15, 20 or even 40 years.

This conference will provide a forum for materials manufactures, shipbuilders, repair yards, contractor's operators and owners, coating manufacturers, and classification societies. Papers are invited on all related topics including the following:

- Performance standards for protective coatings
- Search for alternative "equivalent" coating systems
- Harmonization of coating system certification
- Maintenance and repair of coating systems
- Vessel lay up procedures and issues for coatings
- Coating system development & challenges
- Environmental issues: anti-fouling, solvent emissions, etc.
- Coating data measurements and recording
- Anti-fouling performance monitoring and analysis
- Future regulation

www.rina.org.uk/marinecoatings2010

☐ I would like to offer a paper and attach a synopsis of no more than 250 words by 18 September 2009

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

☐ I would like to receive a full programme brochure and registration form

Name: Position:

Company:

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Postcode:

Telephone: Fax:

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