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The Royal Institution of Naval Architects

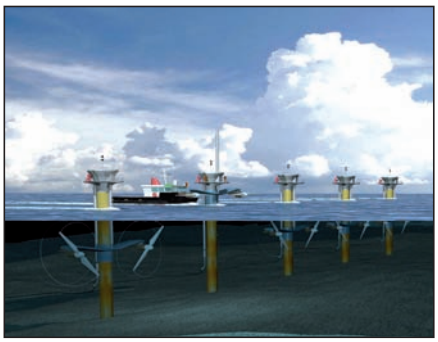
MARINE & OFFSHORE RENEWABLE ENERGY

26 - 27 September 2012, RINA HQ, London

First Notice & Call for Papers

Marine and offshore renewable energy sources have the potential to make a significant contribution to the increasing total global demand, as well as meeting targets for clean energy. However, the demanding environment in which they are found presents great technological challenges for those who wish to develop such sources.

Wave, tidal and offshore wind energy projects involve a wide range of disciplines and expertise. This conference will bring together the industry stakeholders to provide a forum for discussion and a means of professional development for those involved with using natural marine resources to generate energy.



The conference will cover a wide range of topics:

- Research, development and testing.
- Design and construction of renewable energy systems.
- Installation, maintenance and subsea operations.
- Transport / lift vessels and associated support infrastructure.
- Project management and integration.
- Economics and viability.
- Marine planning, environmental protection and sustainable development.
- Regulations, licensing and future directions for development.

www.rina.org.uk/renewable2012

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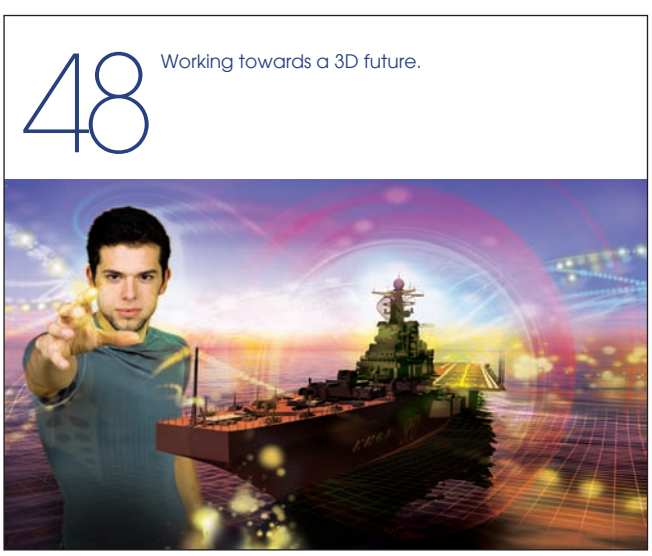
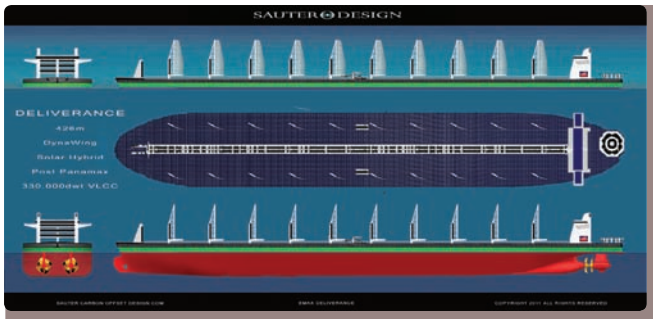
37 Could this vessel deliver us to a green future.



48 Working towards a 3D future.

On-line Edition

The Royal Institution of Naval Architects is proud to announce that as of January this year, *Shiprepair and Conversion Technology* 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/srct 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.



When the singing stops

Deliverance: could the technology used aboard this vessel be an answer to the green shipping conundrum?

A song and dance isn't normally associated with the hardcore maritime industry these days, discounting old style sea shanties and the jigs and reels of yester-year.

Having said that the noises being made by some in the maritime industry about the value of LNG as a fuel have been prolonged and the chorus is now reaching something of a crescendo. It is with this in mind that *The Naval Architect* decided to ask industry experts to offer their points of view.

First up is Tor Svensen, president of Norwegian class society DNV, who makes the case for LNG very well. Svensen considers the viable alternatives and dismisses them one by one as either not able to achieve the greenhouse gas (GHG) savings of LNG, not being as safe or a higher cost compared to LNG.

DNV does acknowledge that there are still obstacles to be overcome before LNG becomes established as an alternative fuel to heavy fuel oil (HFO) or marine diesel oil (MDO) but the class society is convinced that LNG is the fuel of the immediate future.

In some quarters the feeling that DNV is promoting LNG because Norway is awash with the gas has been mooted. What we have not seen from these detractors is the data to back their claim that LNG is not all that it's cracked up to be; in fact it is rare that any real data is made available by those singing from the pro-LNG hymn sheet either.

As a result we have asked a number of interested parties to share their views and to hopefully provide us with some hard data and statistics regarding LNG as a bunker fuel and these stories will be published in the coming months.

Starting the year by discussing the merits of LNG as a cleaner alternative to HFO and MDO is literally right on the money. Koji Sekimizu's election and formal appointment to the position of secretary general of the IMO will see the regulatory body push hard for agreement on new market-based measures that will include a fund that will help developing countries to operate cleaner ships.

Sekimizu intends to report what form the measures will take to the United Nations Framework Convention on Climate Change by 2015 and to implement the new measure by 2020.This is probably the single most important job that the new secretary general will undertake, along with solving the issues that cause piracy.

However, Sekimizu is right to point to the funding difficulties currently being experienced by the IMO-backed World Maritime University (WMU). Such institutions must be integral to the future of the industry.

Perhaps as part of the agreement on market-based measures, and the creation of a fund to help developing countries convert to cleaner technology, some small element of these funds can be diverted to the WMU for research projects that will aid the industry to improve its environmental record.

The challenge for the industry is not just the technology, however, in fact this may be the easier of the challenges confronting the industry, but rather the real challenge will be to bring all the diverse views together so that there is a harmonious resonance from all sides of the globe.

Beginning a new year with a resolution to improve is common, but for the shipping industry one senses that this year will be key in a number of ways. The fact that there is a new secretary general at the IMO will give new impetus for change. Many regulators outside of the IMO are apparently losing patience with the industry and this could spark intensified calls for unilateral action to reduce emissions from ships.

The industry itself has shifted critically and where there once was stubborn resistance to change there is seemingly a new, more synchronous, tune being sung by industry seniors. It is then, with some optimism that the industry begins the New Year and with the sounds of the Western world's celebrations only now dying the Chinese celebrations will be there at the end of the month to give us a lift.

Failing that we can all take heart from the Robbie Burns classic and in glorious harmony ring out the old and sing in the new: "We two have paddled in the stream, from morning sun till dine; But seas between us broad have roared since auld lang syne". *NA*

Litigation

China yard sues Wärtsilä

Wärtsilä has denied supplying a reconditioned land-based power generation plant to Rongsheng Xixiakou Shipyard Co in a two ship deal for Spliethoff Bevrachtingskanoor of The Netherlands.

Rolf Stiefel, director of sales and general manager ship power China for Wärtsilä, told *The Naval Architect*: "We are currently ordering equipment for the second ship, another multipurpose vessel of around 20,000dwt, but these ships do not have an owner." He went on to say that litigation in the original case is on-going in Shangdong province.

In an earlier discussion with *The Naval Architect* Stiefel had stressed that Wärtsilä's "aim is to settle any dispute with customers [out of court], but the yard has not been very responsive," however, Stiefel emphasised that the engine supplied was new, "we never supplied an old engine, he said.

Ship design

ABB unveils feeder design

In partnership with Danish naval architect Knud E. Hansen ABB Maritime Solutions has unveiled it design for a 2116TEU container feedership optimised for port calls in Bangkok, Thailand.

The new ship design has a smaller main engine, of 16MW from 23MW in a comparably sized conventional feeder vessel, but can maintain the same level of speed and with 15-25% increase in fuel efficiency claim the partners.

In addition the deckhouse has been moved forward to a more central position which will give the vessel greater design strength, will mean less violent movements in heavy weather and will reduce noise and vibration says ABB vice president of ABB's merchant vessel division Birger Myklebust.

He added: "ABB's vision is to be part of the whole ship planning process and we want to move into a new market segment. There are many large container vessels on order so there will be a need for feederships."

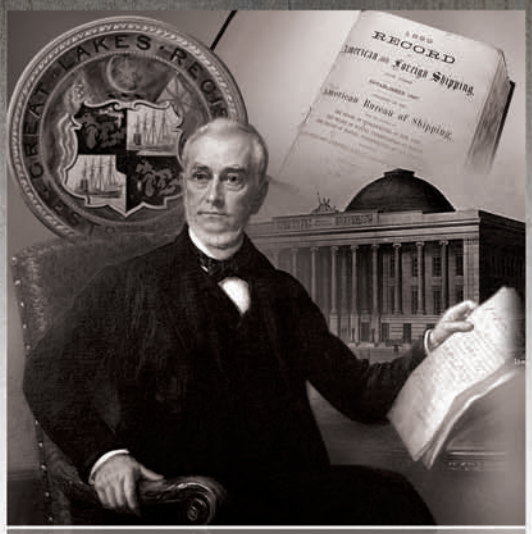
An electrically driven ABB Azipod unit will propel the vessel and with its capability of rotating 360degs the vessel will be highly manoeuvrable and will not need tug assistance in port. Attached to the Azipod is a main propeller, smaller than on a conventional ship with a smaller contra-rotating propeller in front offering greater efficiencies.

In addition to the main engine the vessel will have three auxiliary units that will provide up to 8MW of power, enough to run the vessel at a speed of 13knots if necessary and to power up to around 500TEU in reefer capacity, or more with some configurations. The main limitation on reefer boxes is access to the boxes, say the partners, rather than electrical power.

As the vessel is operated through an electrical system optimised through ABB's DC Grid the 172m, 18,000dwt ships will be capable of operating at any speeds between 2-21knots, though main engines will allow the vessels to operate at a maximum speed of 18knots so higher speeds will be achieved through using power from the auxiliary engines.

According to Myklebust the Azipod propulsion will improve fuel efficiency by 4%, optimised hull

Artists impression of ABB and Knud E. Hansen's Bangkok Max container feeder vessel showing the contra-rotating propellers and Azipod.



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design will offer 2% fuel savings, the DC Grid 1% and the smaller main engine 3% with the demand driven frequency converters offering a further 1.5% saving.

He says that a pilot project that includes the DC Grid system aboard a 93m platform supply vessel has seen fuel savings of up to 20%.

Engine Lubrication

Castrol and Total in lube dispute

Marine lube oil manufacturers Castrol and Total are in dispute over the effectiveness of universal lube oil, with the UK manufacturer warning ship operators that slow steaming and low sulphur fuels may adversely affect engine wear if a low base number (BN) lubricant is used.

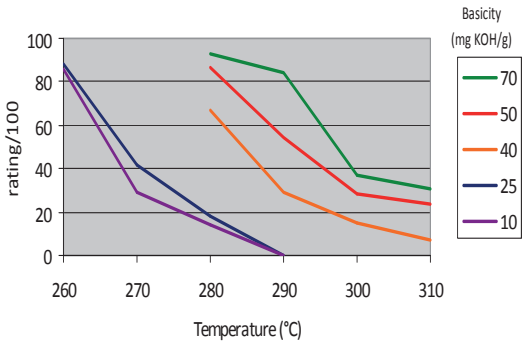
For its part Total refutes Castrol's view and claims to have evidence that shows its universal lubricant Talusia Universal has altered the marine lubrication landscape. But according to Total's Jean-Philippe Roman, technical director for the lubricants division, it is new regulation that is driving changes in lube oil development.

Roman says that in order to meet the requirements imposed by future constraints MCL [marine cylinder oil] must improve in four areas:

- better handling and control of deposits resulting from contamination and varying operating conditions;
- better control of lubricant degradation to avoid detrimental lack of performance during its lifetime on the liner surface;
- significantly higher resistance to wear to insure the reliability of the high rated engines;
- flexible basicity with high neutralisation efficiency to cover operations with the whole range of fuels available.

He added that: "The chemistry of current MCL is based on the mineral $CaCO_3$ [calcium carbonate], known for its anti-wear potential and obviously its basicity. However this chemistry is definitely not optimised for future requirements and is already known to have adverse effects. Although the decrease of additive content in actual formulations is the simplest way to adjust the basicity to the targeted level, the resulting MCL will have degraded properties. The figure (above right) illustrates the impact of a down-treatment from BN70 to BN10 on the thermal stability."

Castrol, on the other hand, has come up with evidence that gives a conflicting view on the lubrication of marine engines. Paul Harrold, Technology Manager Marine & Energy Lubricants says: "Until recently many shipping companies concentrated



Performance rating of thermal stability versus basicity level on coking bench test at different temperatures.

on trying to find the most efficient cylinder oil feed-rate taking into account the sulphur content of the heavy fuel oil in use. With the development of slow steaming practices a further variable now has to be considered, making it a more complex equation to calculate which cylinder lubricants offer the most efficient cylinder lubrication solution."

He goes on to say that new evidence shows that slow steaming and low sulphur requirements are significantly lowering the temperature in the cylinder, increasing wear and tear on pistons and piston rings as a result.

"This is particularly true when using higher sulphur fuels if a cylinder lubricant of insufficient BN is used," says Harrold.

Requirements for low sulphur fuels to be used in environment control areas (ECA) mean that ship operators are increasingly turning to universal lubricants rather than swapping between oils with varying BN numbers.

Harrold argues that: "Ideally shipping companies would prefer only to have to use one cylinder oil that would work with a variety of different sulphur fuels, but recent engine inspections suggest that the desire for simplicity may be compromising reliability and damaging to the engine, particularly under slow steaming conditions."

Castrol believes that those difficulties will be exacerbated with ship operators using HFO outside of the ECA and distillate fuels within the ECA regions complicating the mix of slow steaming, higher lube oil feed rates and variable sulphur levels.

Correction:

In the October Marine Power and Propulsion supplement we ran a story titled "HydroComp updates for the future", in which we incorrectly spelt the HydroComp name and the name of the VP and technical director Don MacPherson. *The Naval Architect* would like to apologise to HydroComp and to Mr MacPherson for any embarrassment caused.

Cause of giant ore carrier's cracked hull remains elusive

The origins of the hull cracks in iron ore carrier *Vale Beijing* should become clearer this month, *writes Julian McQueen*.

Classification society Det Norkse Veritas, which, along with the Korean Register, holds the ship's classification, told *The Naval Architect* that an investigation is "on-going and should be finalised during January".

The ship, a 400,000dwt very large ore carrier, forms part of the Brazilian mining company Vale's move into shipowning and was built at STX Offshore & Shipbuilding in Korea. But the appearance of cracks in the vessel's hull while it was docked at the Brazilian port of Sao Luis last month has raised questions over both the ship's seaworthiness and its commercial potential.

DNV is working with the ship's owner "to ensure that *Vale Beijing* can safely proceed to a discharge port". But at the time of going to press, it said that conclusions have yet to be been drawn "on what caused the incident".

The giant bulker forms part of Vale's VLOC fleet of which six, including *Vale Beijing*, of the ordered 35 ships are on the water.

The rationale behind that fleet is to lock in economies of scale on the booming iron ore trade between Brazil and China. In contrast to Australia, China's other major supplier of iron ore, the greater distance adds to the cost of transporting Brazilian cargoes. The VLOC fleet is designed to meet China's voracious appetite while, at the same time, keeping freight costs competitive.

One economic argument for outsized bulk carriers (the largest size being a capesize bulker) is that they can carry more cargo per trip. The other centres on fast loading. Less time in port loading cargo strengthens the economic case behind the big ships.

But the damage is thought to have been incurred during loading. Indeed, one line of enquiry will focus on the impact of fast-loading on ship structure.

In the case of *Vale Beijing*, the vessel's hull will have been designed and built to cope with all the expected forces that would arise from the loading process. It is understood that the ship also had DNV's CSA 2 notation. This notation allows the vessel to calculate fatigue and ultimate strength in the cargo area.

Vale officials have been quoted as saying that around 260,000 tonnes of cargo were onboard when the cracks appeared. The depth of the vessel in the water also lends support to the view that it was not fully loaded at the time when the damage emerged.

According to a report in shipping weekly Tradewinds, expert opinion has suggested that in that condition, the shear forces on the hull would be greatest on the empty number five hold. However, cracks have appeared on both sides of the ballast tanks surrounding the number seven hold.

One possible explanation has considered the position of that hold. The number seven hold is where the cargo hold connects to the engine room and longitudinal framing may change to transverse framing in the engine room. This could, it is argued, be a region of possible weakness.

Certainly, the rate at which dry bulk carriers have been loaded has been an issue in the industry for some time. As early as 1991, distinguished shipping commentator Michael Grey wrote of "the growing concern that concentrated loading of ore, in the absence of prudent operating practices, is exacting an untold cost in vessel damage".

Is there a design flow in new vale VLOC series? The 361m, 383,000dwt bulker which was delivered in September last year cracked on its maiden voyage.

In part response to such concerns, the industry has agreed to bring common structural rules on the construction of tankers and bulkers due to come into force from mid-2016.

Getting to the bottom of problem of *Vale Beijing* is vital to maintaining market confidence in the vessels which were already experiencing a frosty reception from some Chinese port authorities. However, it has been confirmed that the 388,000dwt *Berge Everest*, a VLOC operated for Vale by BW Group, has left the Chinese port of Dalian to refuel at Singapore prior to returning to Brazil. It is not thought that any of the other completed ships are scheduled to call at Chinese ports in the short term. *Vale Beijing* remains anchored off Brazil's Ponta da Madeira Port.

While the VLOC concept is very much a Vale project, there have been signs that the company might be re-thinking its initial strategy of owning around 19 of the 35 possible vessels. In late December, the company hinted that it would be willing to sell the ships in a leaseback deal. ***NA***

Ancillary equipment

New welding machine from WSS

Wilhelmsen Ships Service (WSS) has launched its latest welding machine that allows the operation of three separate welding processes within one unit.

The Unitor UWW-161 MP (Unitor Wire Welder- 161 Multi Process) allows users to carry out stick-electrode welding, wire welding (MIG/MAG) and TIG welding using a 230 volt single-phase 16 amp slow fuse. Weighing just 12kg, the machine is fully portable and has been manufactured in compliance with CE directives and standards of conformity, with a "touchable" Open Circuit Voltage of only 10V, making it extremely safe for shipboard use. Marine products director Danny Ingemann said: "Many maintenance engineers onboard vessels are faced with a huge variety of different base materials and often repairs have to take place under challenging conditions. The UNITOR UWW-161 MP is light, easy to transport and operate, making it an obvious choice for use across all areas of the ship."

Wilhelmsen launches latest welding machine.

UWW-161 MP offers users multiprocess MIG-MAG-MMA (Stick)-TIG and is fully portable, at 12kg net weight. Also, 1 phase 230V 16A for use anywhere onboard, Safe in use, voltage reduction function reduces touchable Open Circuit Voltage to10V and Individual, step-less adjustment of both wire speed and welding voltage through whole adjustment range provide optimal settings for any wire.

The user is able to select between softer or crisper arc on the front panel to optimise wire welding arc, with a 2-step or 4-step trigger function for wire welding operator comfort.

Other features are a 2-step TIG-torch control with Lift-arc start and adjustable gas post-flow and a polarity selection that allows for wire welding with all wires including self-shielding and automatic hot start and arc force control providing easy start and a stable arc in MMA modes. The welding machine also offers protection against both overload and high input voltage, with indicator light on the front panel to prevent machine damage from wrong primary voltage and overheating.
www.wilhelmsen.com/shipsservice

Lifesaving

Evacuation at the push of a button

Evacuating large numbers of passengers is now easier with the new Viking fully automatic liferaft and slide system. Viking Life-Saving Equipment has developed a 153-person, open reversible liferaft and mini slide system that is packed into a single aluminum stowage box. Named the VAS (VIKING Automatic Slide), and designed and certified for vessels on domestic voyages such as ferries sailing in protected waters, the liferaft and slide system enables crew to evacuate up to 153 people in one go.

While its size and evacuation capacity may be impressive, the real magic of the new system lies in its one-button, one-person release and operation.

The Viking Automatic Slide is designed for evacuation heights of 1.5 – 3.65m and requires no external power supply for deployment. Inflation of the system is automatically started by pushing a button on the stowage box or on the bridge. Another vital feature is automatic bowsing, which keeps the slide and raft close alongside the ship to assist passengers who are disembarking.

The system has been approved on sea trials with significant wave height of 1.5m. The liferaft is EC type-approved (EC Directive 96/98/EC with DNV as the notified body) for use in restricted areas, defined by the national administration. The system, the associated slide, the liferaft and all equipment complies with ISO 9001 requirements for quality assurance in design, development, manufacture, sales and maintenance.

The first two VAS systems have already been sold to Färjerederiet in Sweden with delivery during September 2011.
www.VIKING-life.com

Ancillary equipment

J D Neuhaus powers up

As part of an ongoing safety evaluation for all their products, J D Neuhaus has introduced an emergency lowering device for their EH range of air operated monorail

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Kawasaki http://www.khi.co.jp

JD Neuhaus focuses on safety with its latest product.

MacGregor electrically-driven stern quarter ramp on *Cattleya Ace* NB 3643; Shin-Kurushima Toyohashi shipyard.

hoists. With this feature JDN complies with the leading standards like NORSOK, specifying an emergency device for the safe lowering of loads in the event of a cut in the main power supply. The new device supplements an existing fail-safe disc brake, which is activated in the immediate event of a mains power failure, ensuring that suspended loads are held safely and securely at their above-floor level until mains power is again made available.

JDN monorail hoists with lift capacities from 25 to 60tonnes can now be equipped with the latest safety development. This comprises an additional separate pressurised air reservoir tank (maintained at a mains air pressure of normally 6bar), with a purpose built hand controller incorporating two additional push buttons. The controller provides positive two-handed lowering control, while eliminating the potential for unintended load movement. One button switches between normal and emergency lowering operations. The second button activates the integrated safety brake enabling the safe, controlled lowering of a deadweight load. The air reservoir, which is protected by a check valve, is topped-up during normal hoist operations, and contains sufficient air supply to complete a controlled lowering of suspended load in the event of a loss of mains air pressure.

www.jdn.de

Ancillary equipment

Cargotec gets onboard with MOL

MOL's latest generation of 'eco-friendly' efficient PCTC's will have MacGregor roro access outfits from Cargotec installed onboard, making them the world's first car carriers to have all of their roro equipment electrically-driven.

Cargotec's growing electric-drive roro reference portfolio now includes the first vessel to have all-electrically-driven roro access equipment entering service. The 4000 unit pure car truck carrier (PCTC), *Iris Ace*, is owned and operated by Japanese company, Mitsui O.S.K. Lines Ltd (MOL) and features an electrically-driven MacGregor stern quarter ramp/door, side ramps and two movable ramps from Cargotec.

Iris Ace was delivered from Japanese shipbuilder, Shin-Kurushima Toyohashi Shipbuilding Co Ltd earlier in 2011 and was followed into operation by a pair of 6400unit PCCs, *Cattleya Ace* and *Carnation Ace*, from the same builder. Each of these two ships features an electrically-driven MacGregor stern quarter ramp/door, a centre ramp/door and six movable ramps. All equipment is operated by electric winches and actuators, eliminating the use of hydraulic oil in the operating system.

Last year Cargotec and the Shin-Kurushima Dockyard group also signed further agreements for four pure car carriers (PCCs) to be fitted with fully electrically-driven roro access equipment

www.macgregor-group.com

Communications

Marlink Broadband bundles

Marlink is offering its customers better maritime broadband bundles which offer offshore, cruise and transportation customers' exceptional flexibility. By incorporating a wide range of satellite communications equipment and services, Marlink's maritime broadband bundles enable ship operators to choose hardware and airtime in accordance with their specific requirements for bandwidth, coverage, contract length and budget.

Customers of the new maritime broadband bundles are able to select a combination of VSAT and Mobile Satellite Services (MSS) equipment and airtime based on their communications needs. Services available include Marlink's well-established @SEAdirect Ku-band VSAT, Inmarsat FleetBroadband and Iridium OpenPort. They are also able to choose from the major antenna suppliers, dependent on their preference or already existing installations onboard, which have been certified for usage on the Marlink networks for both MSS and VSAT services. Airtime options range from the standard 256 Kbps VSAT airtime-only, to 1 Mbps VSAT plus MSS airtime and hardware back-up for heavy-duty business critical and crew applications.

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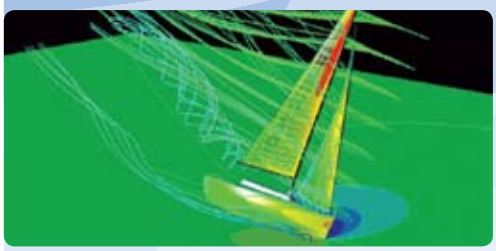
This fully refereed technical conference should be attended by everyone involved in the design and analysis of high performance yachts.



Abstracts can be viewed at www.hpyd.org.nz. Topics include:

- Performance prediction and measurement
- Wind tunnel and towing tank technology
- Regulations and rating rules
- Computational methods
- Materials and structural analysis
- Hull and Appendage Design

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"The most informative technical conference I've been to..." *Merfyn Owen, Owen Clarke Design, England*

"A terrific, well organised conference which attracts the world's leading names in the yacht research field." *Claudio Fassardi, Noble Consultants, USA*

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The Royal Institution of Naval Architects

Turning opportunities into solutions

Koji Sekimizu has formally taken control of the International Maritime Organization (IMO) following his formal appointment as secretary general this month. *The Naval Architect* asked him what his priorities will be during his tenure of the maritime industry's regulatory body.

First impressions can often be deceptive, but when one meets Koji Sekimizu his kindly and welcoming demeanour, akin to that of a father figure, should not be mistaken for weakness as beneath his warm welcome lies a solid foundation which is readily found even by the most superficial investigation.

Sekimizu's assured, discursive, approach does not see problems as difficulties, but as opportunities to find solutions to move the industry forward. Optimism laced with steel could well be a winning formula for the maritime industry's future. And he is under no illusions as to the tasks that lie ahead and describes each significant 'opportunity' with clarity.

He identifies four major "opportunities"; Piracy, the debate over market based measures for controlling greenhouse gas emissions; the IMO member state audit scheme and finding a solution to the financial conundrum regarding the World Maritime University in Malmö, Sweden, was perhaps the surprise package in the group.

Two of the four opportunities Sekimizu identifies, piracy and the member state audit scheme, are more operational and, therefore, beyond the remit of this publication, though his views, particularly with the piracy issue, could be seen as indicative of the approach that Sekimizu will take throughout his tenure at the head of the IMO.

"Somalia is a failed country and there will be no recovery in a short space of time," declares Sekimizu, however, he believes that the "final solution to piracy rests within Somalia".

"The root causes of piracy must be dealt with," he says, and for this to happen "the future economic development of Somalia is key while Somalia must also establish a law enforcement capacity."

The IMO considers a solution to the piracy problem must be seen as part of the Somali peace process and the international community must play a role in that process. Succinct and to the point Sekimizu offers his views with a granite undertone that suggests he will not be easily diverted from his goal but his view is also inclusive of the whole community.

Koji Sekimizu is the new man at the IMO.

Easily the most important issue for Sekimizu and IMO will be the debate around market based measures (MBM) that will help to control greenhouse gas (GHG) emissions that he says will be introduced by 2020.

A tax levied on shipping companies is favoured by some industry experts though the discussions around a carbon trading scheme, which could also offer the industry an advantage have also been mooted with a third possibility of a combination of a carbon tax and trading scheme also put forward.

However, Sekimizu is clear that while the form of the MBM can be debated the new system should not change the fundamental basis on which the maritime industry operates.

"We must maintain the principle of a global standard," he says, adding that, "obviously the common but differentiated responsibilities (CBDR) is a basic and fundamental principle and it will affect the discussions regarding MBMs, that has been the case with EEDI (Energy Efficiency Design Index). Future regulations should reflect the needs of the maritime industry and should not distort fair competition within the shipping industry," says Sekimizu.

Debate over the form of the MBM has for the first time been given a date to conclude, following the Durban conference last month a carbon fund will be introduced though the US, backed by China, India, Australia, Korea and Brazil, were reluctant to allow aviation and Shipping to be specific contributors to this fund, preferring that nation states should be the sole contributors and not individual industries.

Nevertheless, Sekimizu is keen for the IMO to meet its 2015 deadline for agreeing to a MBM for the maritime industry and will implement the new regime by 2020, he says.

Success in creating and implementing a MBM that limits GHG emissions could also help the World Maritime University (WMU). Currently the WMU is financed through contributions from member states of the IMO. That funding has been traditionally provided by IMO member states, and industry donors. In recent years, and as a result of the current economic crisis, funding to WMU has been cut.

The institution is a research facility as well as a training ground for those that work in the maritime industry and is a crucial element to maintaining a competitive industry.

As with the WMU which creates opportunities for those entering the maritime industry and for engineers already in the industry to build on the current technologies for future generations, Sekimizu believes that there have been many years that have created "ample opportunities", the key now is to turn those years of opportunities into "years of solutions". *NA*

Koji Sekimizu's career - to date

Koji Sekimizu was born on 3 December 1952 in Yokohama, Japan.

He studied marine engineering and naval architecture, and in particular ship structure and vibration at Osaka University between April 1971 and March 1975 when he graduated with a Bachelor's degree in engineering.

He further studied ship vibration theories at the graduate level at Osaka University for two years and obtained a Master's degree in engineering with a thesis on "One method for vibration analysis of a uniform beam with vibrating sub-structures" in March 1977.

In April 1977, he joined the Ministry of Transport of Japan (MOT) and was immediately appointed as a Ship Inspector in the Nagasaki district branch of Kyushu District Maritime Bureau.

In April 1979, he moved to the headquarters of MOT. During the short interval before his next transfer in July 1980, he acted as the chief officer in charge of IMO regulations in the Safety Planning Section of the Ship Bureau and drafted various proposals to IMO's technical sub-committees, including the proposal to the DE Sub-Committee for manoeuvrability characteristics with Professor Kensaku Nomoto, who was later appointed as a Professor at the World Maritime University.

In July 1980, he was transferred, under a special arrangement, to the Shipbuilding Research Association of Japan to engage in his duties to attend committees and sub-committees of IMO.

In April 1982 he was promoted to Deputy Director of the Environment Division, MOT. One of the most notable achievements during his service in this Division was to introduce the bill for modifying relevant Japanese national laws in order to comply with the provisions of MARPOL 73/78 and to help it toward passage.

In April 1984, he temporarily moved to the Ministry of Foreign Affairs and was appointed Deputy Director, Second International Organizations Division, Economic Affairs Bureau, in charge of OECD related issues.

On his return to MOT in September1986, he was appointed Deputy Director, Safety Standards Division, Maritime Technology and Safety Bureau.
On 2 July 1989, he joined IMO and was appointed as Technical Officer in the Sub-Division for Technology, Maritime Safety Division of IMO, with an assignment as the Secretary for the Sub-Committee on Fire Protection. In 1992, when the Technology Section was established, he was appointed Head of the Technology Section. After this, he worked for the Maritime Safety Division until October 1997 when he moved to the Marine Environment Division.
In October 2001, he served as Executive Secretary of the Diplomatic Conference on the Control of Harmful Anti-fouling Systems for Ships. His outstanding leadership led the Conference to a successful conclusion and led the Convention to adoption.

In August 2002, he attended the World Summit on Sustainable Development held in Johannesburg, South Africa, representing IMO.

Since 5 January 2004, he has been appointed as Director of Maritime Safety Division, and the Secretary of the Maritime Safety Committee (MSC) to date.

He is a Member of the Japan Society of Naval Architects and Ocean Engineers, and is a Councillor of "*Kousi Zosen Kai*", the Alumni Society of Naval Architects of Osaka University.

Publications

- The Marine Electronic Highway in the Straits of Malacca and Singapore – An Innovative Project for the Management of Highly Congested and Confined Waters (Tropical Coasts, 2001)
- GESAMP and GMA – Constructing a New System for Evaluation of the Marine Environment (Ocean Policy Research Foundation, 2003)
- Marine Electronic Highway Project as a New Management System for Sea Areas (Nippon Foundation Library, 2004).

Japanese launch innovative vessel

Japan is keeping up with the LNG market following the launch of *Energy Horizon* a new vessel that incorporates the latest in energy efficient technology.

Energy Horizon was constructed at Kawasaki Heavy Industries (KHI), Japan, which is jointly owned by Tokyo LNG Tanker Co., Ltd and NYK and was delivered in September 2011.

The vessel is a moss-type LNG carrier with four spherical tanks, the largest of its type, and the "first Pacific max", has a capacity of 177,000m^3 giving it better transport efficiency due to its larger size. The 141,000gt LNG carrier is 300m in length overall and has a width of 52.00m and a depth of 28.00m, with a scantling deadweight of 97,931dwt. The vessel is powered by a KH URA-450 reheat steam turbine that has a power output of 29,890kW (SHP), giving it a service speed of about. 19.5knots at 90% MCR output with a 21% sea margin.

Energy Horizon utilises latest environmental technology.

TECHNICAL PARTICULARS

Energy Horizon

Length oa:	300.00m
Length bp:	286.50m
Breadth moulded:	52.00m
Depth moulded	
To main deck:	28.00m
To upper deck:	28.00m
To other decks:	23.25m
Draught	
Scantling:	12.50m
Design:	11.50m
Gross:	141,136gt
Deadweight	
Design:	85,372dwt
Scantling:	97,931dwt
Speed, service:	abt. 19.5knots @ 90% MCR output with 21% sea margin
Cargo capacity	
Refrigerated cargo:	177,440m^3
Main engines	
Design:	Kawasaki Heavy Industries, Ltd
Model:	URA-450 reheat steam turbine
Manufacturer:	Kawasaki Heavy Industries, Ltd
Number:	1
Output of each engine:	29,890kW (SHP)

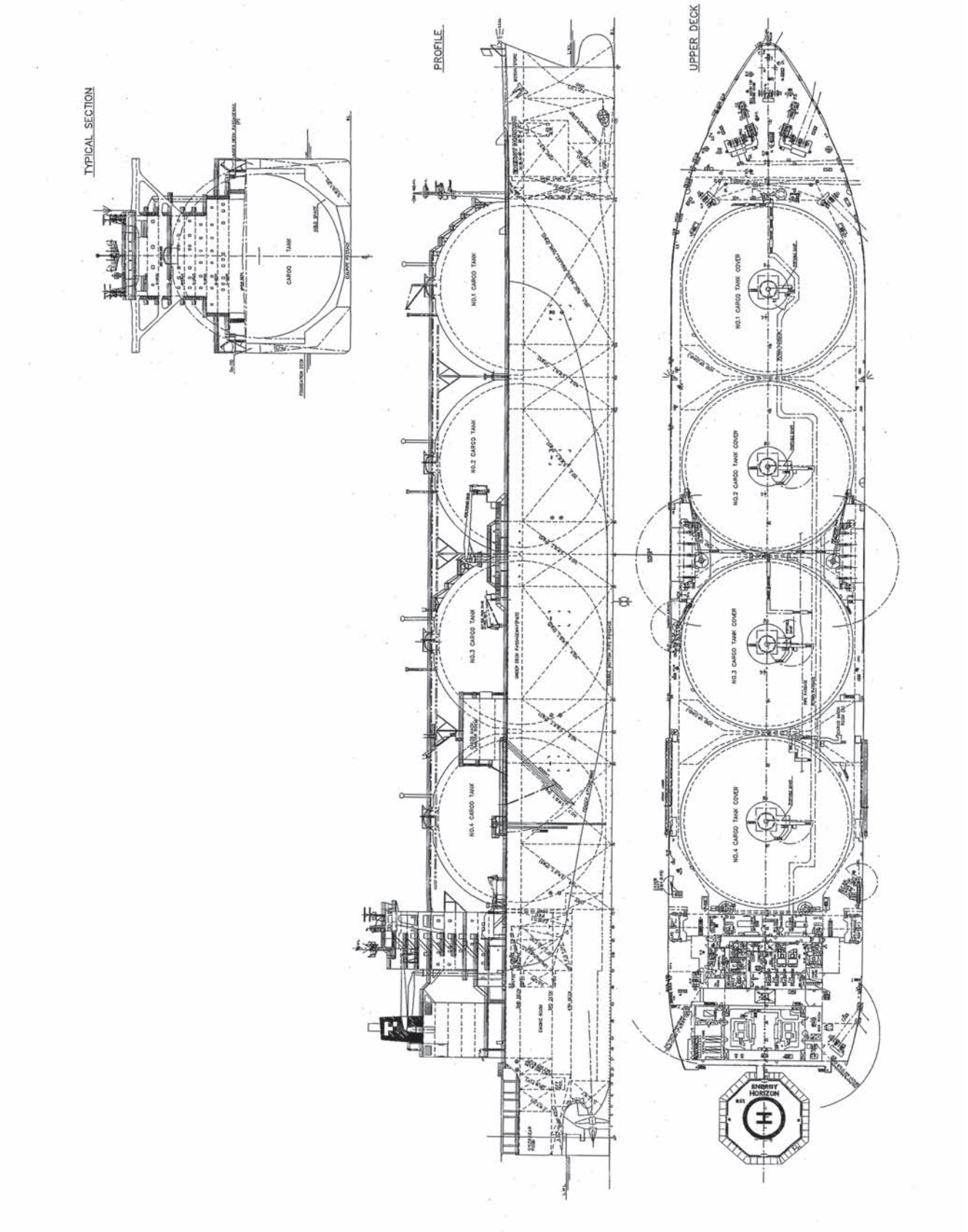
A reheat turbine plant is a highly efficient turbine plant that makes use of a reheat cycle that retains the reliability and maintainability of a conventional turbine plant. The reheat cycle transfers steam from the steam turbine back to the boiler and reheats it. The generated high-temperature steam is then sent back to the turbine. The turbine reduces fuel consumption by up to 15% over conventional steam turbine vessels.

Kazunari Aoki, technical manager, ship sales and engineering, Kawasaki Heavy Industries commented on the decision to install a reheat turbine: "The reheat turbine system was developed for LNG carriers based on our reheat turbine system for oil tankers in the 1970s.This system was selected by the owner because it can satisfy the demand of lower fuel consumption and higher environmental performance with all the advantages of conventional steam turbine kept, such as high reliability, flexibility of fuel selection, and less maintenance."

KHI is also looking in to other systems, such as Dual Fuel Diesel Electric (DFDE) and MAN ME-GI engines. KHI has opted for the MOSS containment system as they say that this system has a reliable tank structure, no filling level restriction and high insulation performance.

Aoki has highlighted that *Energy Horizon* differs from other LNG carriers because: "The transportation cost per unit cargo weight for *Energy Horizon* is the lowest for MOSS type LNG carriers in the world. This feature comes from its largest LNG tank capacity for MOSS type vessels, and low fuel consumption from the reheat turbine system. It is also very versatile with good compatibility with most LNG terminals in the world." *NA*

Energy Horizon GA Plan.



Hanjin Heavy plans for the future following yard dispute

Hanjin Heavy Industries and Construction (HHIC) looks to restructure its business following the settlement of a longstanding labour dispute.

Korean unions at HHIC's Yeoungdo yard were concerned that their jobs would be lost to foreign workers in the Philippines. A final settlement negotiated with the yard management and signed on 10 November focused on the re-employment of 94 workers within one year and financial aid for laid off workers in the meantime, and the withdrawal of charges against both parties.

Altogether a total of 94 staff, mainly welders, will be laid off and following the successful conclusion to those negotiations HHI can now move on with its plans to restructure and invest in the yard.

The Korean yard at Yeongdo will diversify into specialist, high-spec, vessels.

Repairs and improved facilities to the dock and quay wall will be made following the corporate restructuring through a labour-management consensus, it is hoped that the yard will emerge as a builder of high-value added vessels such as special purpose vessels (SPV) and offshore plant, says HHIC.

No sooner had consensus been reached than the Yeoungdo yard accelerated its realignment and upgrade to enhance its market competitiveness. HHIC has launched a modernisation project for its Yeongdo yard starting with a thorough inspection of the entire shipyard and related facilities. In addition, HHIC is reviewing the replacement of less efficient cranes with new ones.

Since its establishment as Korea's first steel shipbuilder in 1937, HHIC has played a pivotal role in building high-tech vessels (eg drilling rigs, membrane LNG carriers, cable ships, post-panamax container vessels, dive support vessels, ice breakers, etc.) and is now developing new markets.

The HHIC-Subic Shipyard plans to maintain its focus on ultra large & very large container carriers, tankers and bulk carriers for the time being. When technology and productivity levels are high enough, it may start to build more valuable vessels including Q-max LNG carriers, VLGC, offshore plant, drill ships and FPSOs.

HHIC's Subic yard will continue to build standard large vessels for the bulk, tanker and container markets.

Currently HHIC's Subic yard has orders for 44 vessels in total; 20 container ships, 20 bulkers and four tankers.

However, with the worldwide market in crisis since 2008 and the decline of the shipbuilding industry as a result of this banking crisis HHIC will focus its Korean operations on high-value vessels and special ships with a view to overcoming the decrease in shipbuilding activity.

The Yeongdo yard is now planning to increase its own market competitiveness through the overall realignment into more effective production system, including developments of new technologies and production methods, to revitalise construction processes.

In addition, the R&D centre in Jungang-dong, Busan will focus on developing new designs and technologies in the maritime sector and play a key role in shortening manufacturing lead times thereby enhancing competitiveness by applying those innovative engineering methods to the manufacturing and construction process.

In aiming to promote its mid and long-term vision, which includes business diversification, HHIC plans to make great strides into the future with the establishment of stable global manufacturing systems. *NA*

Technical feasibility makes LNG fuel the best solution

Excellent environmental performance and available technical solutions make LNG the most promising fuel of the future for shipping, says Tor Svensen, president of Det Norske Veritas (DNV).

We are undergoing a period of fundamental change as society at large takes its first major steps towards a low-carbon energy future. In the maritime sector we face unique challenges, as new technologies aimed at limiting the impact of climate change and air pollution must work safely and effectively on the high seas. Making major changes will indeed be a challenge but I am convinced that LNG will become an important clean fuel for shipping over the next 10 years at least. LNG is presently the only realistic fuel alternative that is technically mature enough to compete with conventional heavy fuel oil (HFO) or distillate fuels on a large scale.

Bergensfjord LNG powered ferry operating in Norway since 2007.

When considering air emissions from ships and possible abatement technologies, it is important to clearly distinguish between CO_2 which is a global issue and NOx, SOx and particles which are all related to local pollution and consequential environment and health problems.

Turning first to CO_2, it is a fact that shipping is by far the most efficient way of transporting large amounts of goods around the world. Shipping has probably been one of the most important enablers for global trade and manufacturing. It is also a fact that the world's fleet is responsible for over 1 billion tonnes of CO_2 per year, ranking the industry sixth on the global list of the largest producers of CO_2. Experts may have different views of increased CO_2 concentrations in the atmosphere, but early action to reduce these concentrations, as already advocated strongly by Sir Nicholas Stern, former World Bank chief economist, in his 2006 report to the UK government, *The Economics of Climate Change*, will clearly reduce the global costs of abatement.

Even with early action, by 2020, the extent of summer ice in the Arctic may be less than 10% of that which has been considered normal for thousands of years and climate scientists have concluded that this sort of climate change, resulting from increased atmospheric CO_2 and methane levels, will bring us significant and disturbing effects within the next 100 years.

Added to this is the health problems already known to be caused by SOx, NOx and particle emissions from ships. These pollutants could be causing around 60,000 deaths annually in coastal populations.

When the International Maritime Organization's (IMO) Marine Environmental Protection Committee met for its 62nd session (MEPC62) in July this year in London, we saw the adoption of a new Chapter 4 to MARPOL (International Convention for the Prevention of Pollution From Ships) Annex VI which calls for many new ships of 400 gross tonnes and above to have an International Energy Efficiency Certificate and an Energy Efficiency Design Index that does not exceed allowable limits. Improvement in energy efficiency is the single most important factor that can help the shipping industry achieve a real reduction in CO_2 emissions. The shipping industry, particularly IMO, should be proud of the fact that it is the first and only industry that has adopted global technical regulations for the reduction of CO_2 emissions.

MEPC62 also added to the growing regulation of air pollutants with the adoption of a new Emission Control Area (ECA) covering parts of the Caribbean. The requirement is for the use of 1.0% sulphur fuel oil from 1 August 2012 and this will reduce to 0.1% on 1 January 2015. Adding to this the existing ECAs of Northern Europe, the Baltic and Northern America, shipping is facing the even more urgent issue of finding practical solutions to achieve compliance in a cost efficient manner.

Ship owners and operators have three options to choose from when entering

the growing number of ECAs around the world. They can switch to low sulphur fuel, install scrubbers to remove the sulphur from the exhaust gas or switch to LNG as fuel.

At DNV, we believe that implementing LNG as bunker fuel represents an attractive and cost-effective solution for reducing air pollution and securing ECA compliance for new ships. An LNG fuelled ship reduces the emissions of NOx by 85-90% (depending on engine type) and SOx and particulates by close to 100% compared to the use of conventional fuel. In addition, LNG fuelled ships come with a 15-25% reduction in net greenhouse gas emissions. However, for existing vessels, this solution is less attractive due to both the complexity and costs associated with a conversion to run on LNG.

Marine Gas Oil and Marine Diesel Oil can be supplied with sulphur content below 0.1% and switching to such fuel only requires minor modifications to the fuel system on board ships. However, the availability of low sulphur fuel is already limited and rising demand is expected to increase its price uncertainty.

A scrubber can be installed to remove sulphur from the engine exhaust gas using chemicals or seawater. Scrubbers require significant alterations on board including additional tanks, pipes, pumps and a water treatment system. The sulphur rich sludge produced is categorised as special waste to be disposed of at dedicated facilities. But scrubbers also increase power consumption, thereby increasing CO_2 emissions.

Other hydrocarbon gases could be considered as bunker fuel but for example LPG (liquefied petroleum gas) is more expensive than LNG and supply is limited. It also carries safety concerns as it has different flammability and dispersion properties to LNG. Another alternative might be CNG (compressed natural gas). The existence of distribution grids is an advantage for CNG but twice the volume of CNG is required to achieve the same sailing distance as LNG.

Biofuel blends and alternative energy sources such as wind power, fuel cells and nuclear power still face significant technical and economic challenges and require implementation timetables longer than that of LNG. Biofuel, for example still has unresolved problems relating to sustainability, fuel instability, corrosion, susceptibility to microbial growth and poor cold flow properties.

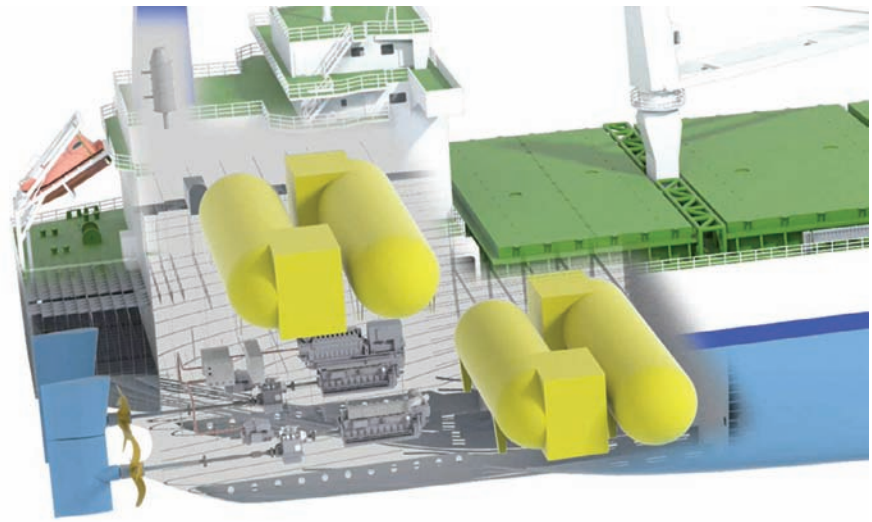
The main barriers to the adoption of nuclear energy for commercial shipping relate to societies' reservations, to the uncontrolled proliferation of nuclear material, to decommissioning and to the storage of radioactive waste. These challenges present significant investment costs and would need to gain greater acceptance from governments and the general public before nuclear energy would become viable.

In summing up the alternatives, LNG today offers the best economics to shipowners and the best environmental effect for society when considering ship newbuildings. Natural gas is the cleanest form of fossil fuels available, and when fuelling a ship with LNG, no additional abatement measures are required in order to meet ECA requirements. LNG is considerably cheaper on a per-energy-content basis than oil-based fuels and, taking a 20-year perspective, a conservative lifetime for a ship, it is estimated that the LNG alternative has the lowest net present value cost compared with the other alternatives outlined above.

The technical performance of LNG as a fuel for shipping is proven daily by more than 20 ships in operation in Norway. The first ship with LNG propulsion, the passenger ferry *Glutra*, was launched in 2001. Since then, more ferries and offshore supply vessels have been built, along with three patrol vessels for the Norwegian Coast Guard. Together, these ships demonstrate the application of a wide range of engine set-ups and manufacturers.

Moving from the ships already sailing on LNG to the current orderbook of around 20 ships, we see a greater variation again in ship types. The list contains ro-ro vessels, passenger ships, liquid bulk tankers, special cargo ships and high speed ferries. As these ships are being delivered over the next couple of years they will add to the experience base for LNG fuelled ships and lead to further design optimisation.

Gas fuelled engines are now available from several suppliers, e.g. Wärtsilä, Rolls-Royce, MAN Diesel and Mitsubishi Heavy Industries. There are two main engine concepts: dual fuel engines and LNG lean burn mono fuel engines. The dual fuel engine, which runs on both LNG and conventional fuel, is a flexible solution when the availability of LNG fuel is uncertain. In LNG mode, these engines only consume a minor fraction of conventional fuel. The lean burn mono fuel engine gives a simpler installation onboard when LNG availability is secure.



Cutaway showing the tank configuration for a diesel fuel bulker.

Tor Svensen says that the oceangoing fleet can benefit from LNG power.

The main maritime engine manufacturers are already introducing more new LNG fuelled engine models than bunker oil engines. Technically they are focusing on eliminating methane slip, where a small trace of gas fuel passes non-combusted through the engine and is emitted with the exhaust gas. This problem is expected to be solved in the near future.

An LNG-fuelled ship requires purpose-built or modified engines plus a sophisticated system of special fuel tanks, a vaporiser and double insulated piping. Available space for cylindrical LNG fuel tanks on board ships has been a key challenge, but new hull-integrated tanks are expected to simplify this issue. The engine and systems re-building combined with the tank requirements is the main reason why it is difficult to see a large number of conversions to LNG coming in the near future.

Another obstacle to the implementation of LNG as a fuel for shipping is the present lack of LNG bunkering infrastructure. This is currently being addressed by local governments as well as LNG suppliers and a significant increase in the number of bunkering terminals is expected by 2020, especially within ECAs. Large scale LNG plants are located throughout the world so potential supply bottlenecks can be overcome.

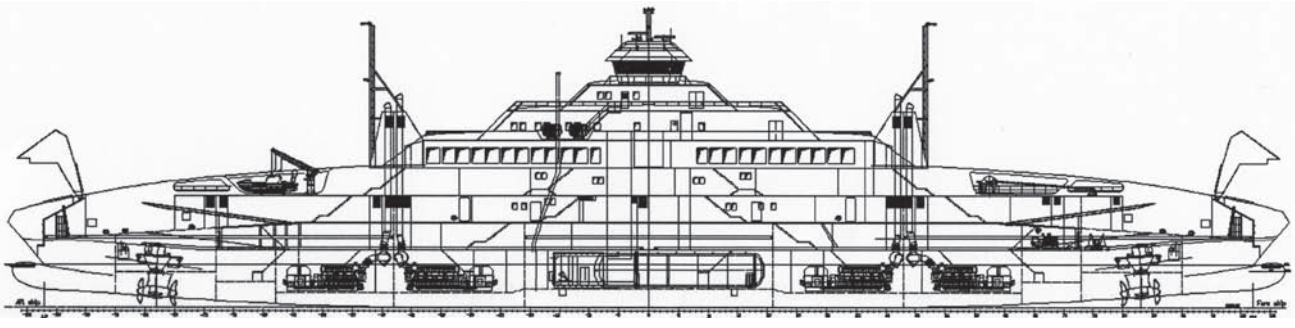
A prerequisite for the widespread use of LNG in shipping is a functional and effective bunkering infrastructure. This involves risk analysis, standardisation and the establishment of common practices and in January 2011 DNV proposed the launch of a working group within ISO to develop an internationally agreed guideline for LNG bunkering infrastructure. The interest has been overwhelming and a work group was established in June, headed by DNV, and involving more than 20 representatives from a total of 13 countries including China, Germany, Japan, the UK and the US.

Most of the attention and interest for LNG fuelled ships so far has focused on short sea shipping, but as both the economics and the environmental considerations are in favour of LNG there is no reason why the international oceangoing fleet cannot follow this lead. To this end, DNV has demonstrated the feasibility of LNG fuelled large ships through concept studies: Quantum, a 9000 TEU container ship, Triality, a VLCC sized oil tanker, a fishing vessel and two different sized bulk carriers.

We at DNV believe that hydrocarbons will dominate the future energy mix and I am convinced that with designs like Quantum and Triality pioneering the way, LNG can take a rapidly increasing share of the market as fuel for merchant ships. By 2020, a significant share of the newbuilding orders will be LNG fuelled ships. The drivers will be twofold: further tightening of the sulphur limits as already agreed by the IMO and the requirement for shipping to take its share in the global reduction of CO_2 emissions.

Remembering that achieving a low-carbon future is not just about technology, it is also about people and their organisations, and DNV continues to build the technical knowledge and industry partnerships required to support the next generation of ships and ship owners. *NA*

GA of the *Bergensfjord* LNG ferry.



Overall length: 130m Service speed: 21knots LNG storage: 2x125m^3 LNG

Ulstein's SX130 sisters start making waves

Ulstein dignitaries gathered in China for the delivery of the newly built SX130 sister ships *Neptune Despina* and *Neptune Larissa* sporting the distinctive X-Bow feature in the autumn of last year. The offshore support vessels (OSV) were designed by Ulstein Design AS and built by Sinopacific's Zhejiang Shipyard.

Delivery of the SX130 vessels to the operator, Neptune Offshore of Norway, is the result of co-operation between the Norwegian owners and designers and the privately owned Chinese yard. The Scandinavian's design team provided the design of the vessels as well as key equipment such as bridge and control room consoles, integrated alarm and surveillance systems, navigation and power management systems.

Sinopacific's Zhejiang yard built and delivered the ships and Sinopacific Shipbuilding Group Chairman and CEO Simon Liang said: "OSV is akin to the commercial ship in the field of offshore engineering. Its broad application means that all offshore oil and gas exploration projects need it. So I am confident about the future prospects of the OSV market. Although we are taking mostly international OSV orders at present, the local high-end OSV market demand is growing and possesses tremendous market potential."

He added: "Opportunity only favours those who are prepared. We will continue to be strategically-driven, leveraging on a business model of innovative and advanced technologies to maintain our lead in the niche shipbuilding markets."

"Both vessels are equipped with a moonpool and an integrated ROV-hangar and can perform subsea operations such as inspection, maintenance and repairs in deep water, up to 3000m. The vessels have the Clean Design (double hull), comfort class V3 and dynamic positioning (DPII) classifications," says Lars Ståle Skoge, sales and marketing manager at Ulstein Design & Solutions.

From right: Simon Liang Sinopacific Shipbuilding Group Chairman and CEO, Fenghua Party Secretary Rong Xuehai, Executive Chairman Neptune Offshore AS Jan Borø and Neptune CEO Bjørn Endresen and Neptune executive Jogeir Romestr at the vessels' naming ceremony.

Neptune Despina following its delivery.

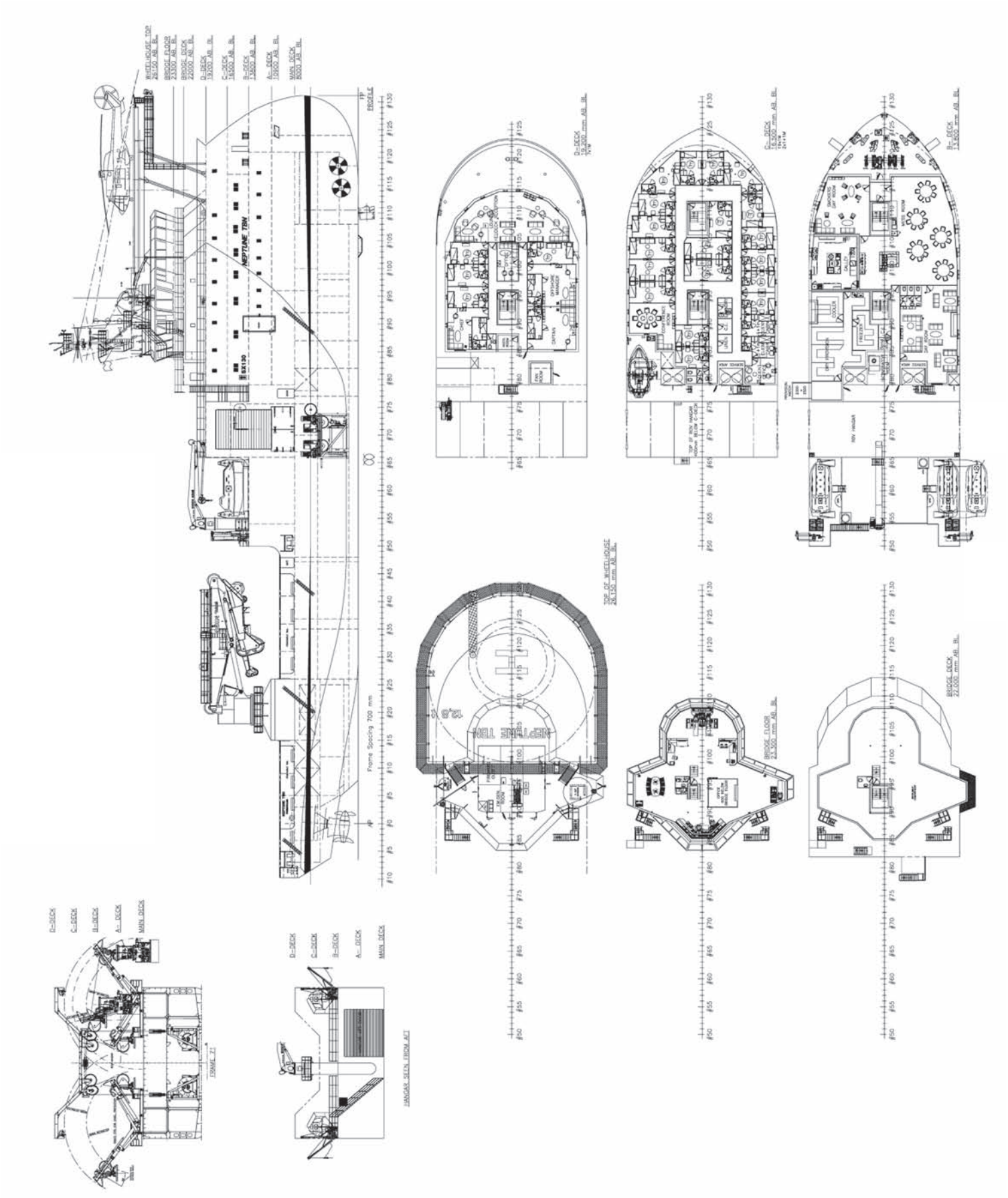
TECHNICAL PARTICULARS	
Ulstein SX130	
Length Overall:	98.6m
Moulded Breadth:	19m
Moulded Depth	8m
Scantling Draft:	6m
Total Power:	9125kW
Deadweight:	3800dwt
Service Speed:	15.3knots
Accommodation:	60 persons

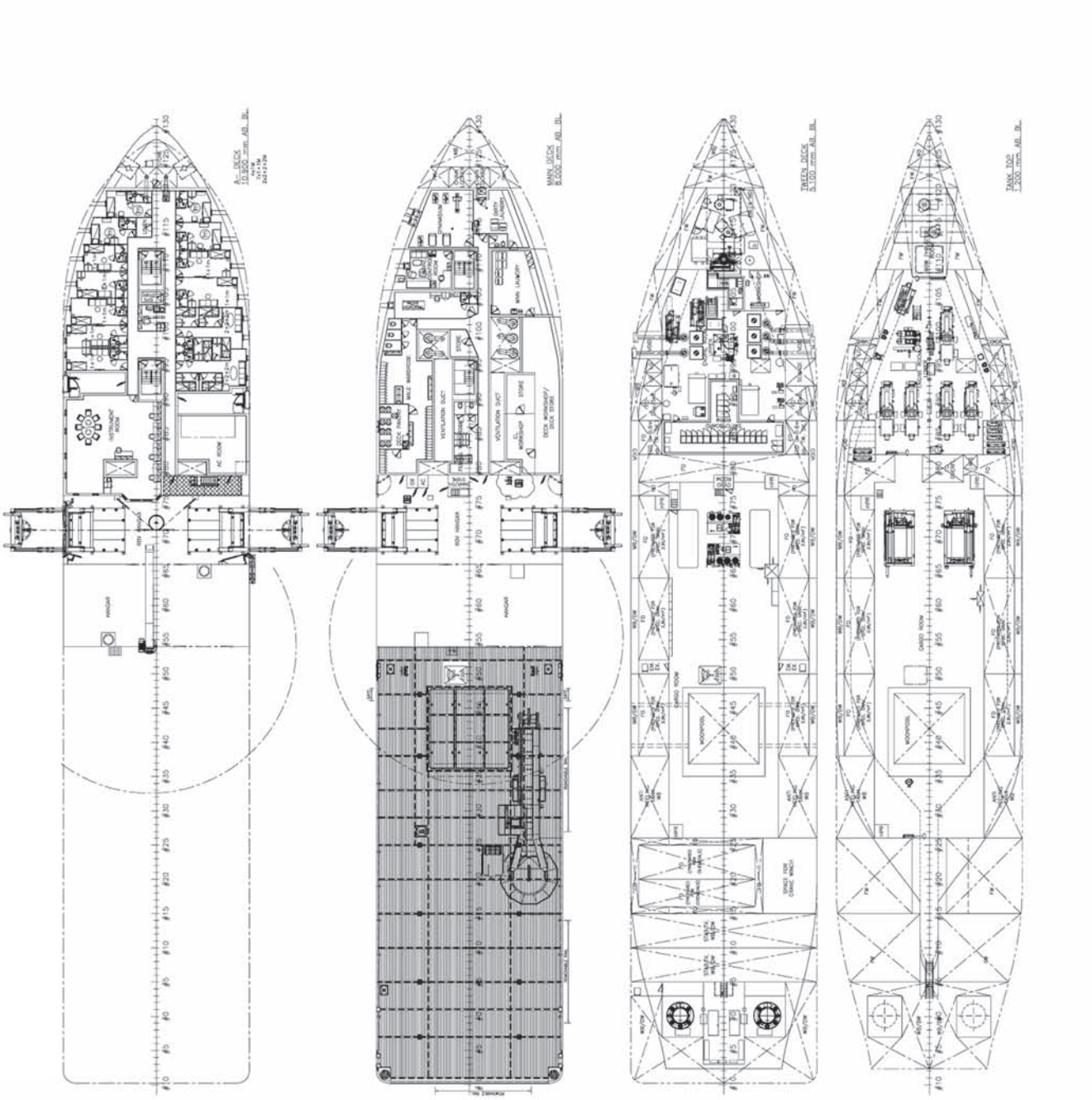
In designing the vessels with the exhaust outlets at the side of the ship, close to the waterline, crew have an unobstructed 360degs all round view and added space in the wheelhouse.

The X-Bow wave-piercing design also gives the SX130 a smoother ride in rough weather conditions said the owner and reduces the vessel's fuel consumption

Neptune Despina and *Neptune Larissa* were named in a joint ceremony at the end of October. *Neptune Despina* was delivered at that time while *Neptune Larissa* was handed over to the Norwegian company several weeks later. ***NA***

GA Plan for *Neptune Despina* and *Neptune Larissa*.





International Conference on Ship and Offshore Technology

"Developments in Ship Design & Construction"

Ambon, Indonesia, 7-8 November 2012

Organised by the
Royal Institution of Naval Architects
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CALL FOR PAPERS

Today, the international maritime industry faces new challenges as it emerges from the global financial crisis. It is therefore understandable that the industry's priority and attention is on consolidation and continued survival. However, at such a time it is all the more important for the industry to look ahead in order to respond to the continuing challenges it will face from the increasing demands of operators, regulators and society for greater efficiency, safety and the protection of the environment, as it emerges from the current crisis. This response will require innovative thinking from all sectors of the maritime industry, and particularly those involved in ship design and construction.

The International Conference on Ship & Offshore Technology – Indonesia 2012 will take "Developments in Ship Design & Construction" as its theme, and will bring together members of the international maritime industry to present and discuss the latest developments in the ship design and construction process which will provide the improvements in productivity and cost-competitiveness necessary to respond to the demand for lower cost of ownership and greater environmental sensitivity. Whilst covering developments in all ship types, it will look particularly at developments in those vessels which are essential to the economies of countries in the region, e.g. fishing vessels.

Papers are invited on the following topics for all ship types:

- Hydrodynamics and structures
- Design and construction of all ship types
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- Material developments; steels, alloys, composites, etc.
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Patent pending for Norse BWTS

Ulmatec Pyro and its partners, including a major Norwegian offshore shipping company, are collaborating on a new ballast water treatment system (BWTS) that costs little to run or install. A patent for the system has been lodged and now it is up for class approval.

According to Ulmatec managing director Jan Petter Urcke the company has designed a new system of heat exchangers that are grouped in pleated plates rather than as a lot of individual plates making the new ballast water treatment system (BWTS) easier to clean and very cheap to install.

Urcke is cautious and will not reveal the identity of either of Ulmatec's partners but the new system is in the process of being patented and the second partner will allow a 250m^3 BWTS to be installed on one of its vessels for testing purposes this year.

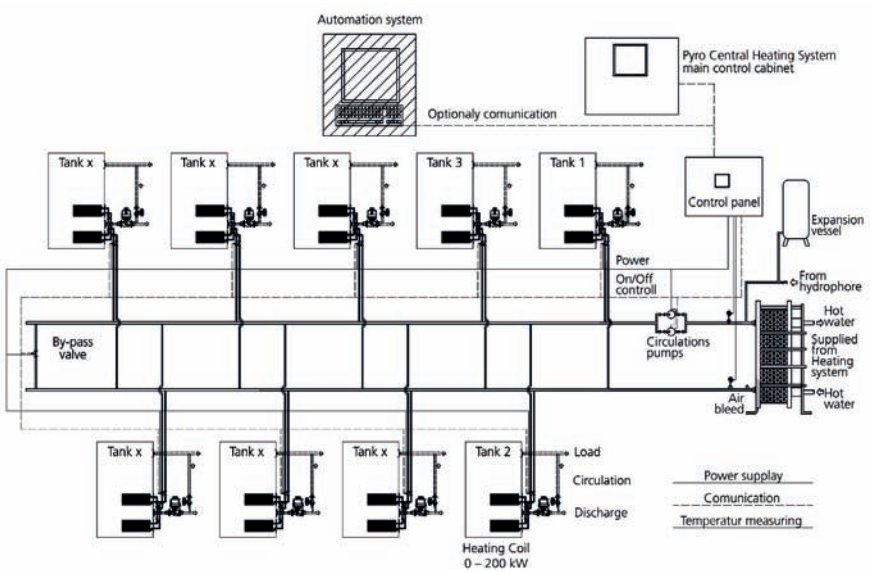
Even so Urcke says: "The approval process will take one to two years".

Ulmatec's cautious approach could stem from the belief that its BWTS will blow the competition out of the ballast water treatment business. Essentially the Ulmatec BWTS works by heating the ballast water to temperatures in excess of 65°C, up to 100°C using waste heat from the engine exhaust and cooling systems.

Filtration will be required, but the Ulmatec BWTS does not require any chemicals or UV lights and is so simple to use that crew will not need training. Furthermore, the waste heat used to heat the ballast water can be recovered through cooling the water and used again.

"At 100°C we will kill everything in the ballast water system," says Urcke, but he concedes that it is too early to say exactly what the installation and operational costs will be, although he says, "it will be much less than a conventional BWTS".

By using the waste heat for the central heating system and BWTS Ulmatec says that ship operators can make substantial savings as the waste heat has no extra cost to produce once the engine has burnt the fuel to run the vessel.



The Pyro tank closed heating system operates at 2bar and uses heat exchanges to capture waste heat energy from the engine.

Ulmatec Pyro MD Jan Petter Urcke beleives his BWTS has a very real edge.

"As we all know, 60-70% of the machinery energy consumption is waste heat at different temperature levels and just a small piece of this is normally utilised for general purposes onboard a ship. Because of this, we have started a programme for developing more equipment which can utilise this 'zero cost' and 'no emission' energy. We have earlier this year successfully launched our Pyro Central Heating System with waste heat recovery management. We have sold five of these systems this year," says Urcke.

System Components.

- Existing ballast water system w/ pump, valves and filters etc.
- Heat Generators (Electric heaters, fuel fired heaters or waste heat recovery units/system)
- Pyro Waste Water Treatment module. (configuration of heat exchangers, valves, slow flow unit, equipment f/ automatic cleaning etc.)
- Pyro WWT Control System, w/ Manual control, Automatic control, log and report functionality, interface to IAS. *NA*

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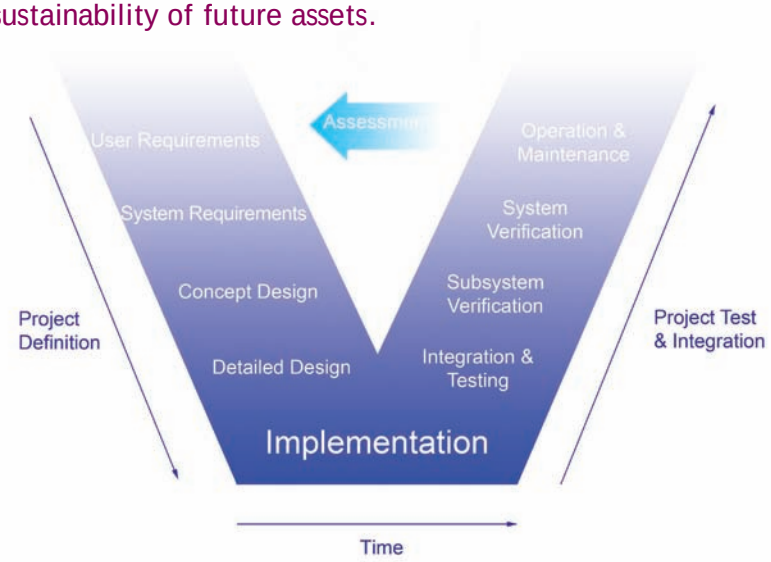

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Sovcomflot sets it sights on the future

Recent developments in Arctic exploration has lead Russian ship owner Sovcomflot to develop its fleet further.

Constructing vessels that meet demands for working in extreme ice conditions is not new to Sovcomflot, but taking the skills that they have in this area and pushing them further is now high on the company's agenda for the future.

In 2009 the 70,000dwt Arctic shuttle tanker *Timofey Guzhenko* was constructed, the last in a series of three special Arctic tankers that had been built for the Varandey project from Samsung Heavy Industries, South Korea. "The series had been designed to maintain operations from Lukoil's Varandey terminal in the Pechora Sea throughout the year, in conditions where the ice covering can be as much as 1.7m thick and the air temperature as low as -45°C.", commented Sergey Popravko, senior executive vice president of OAO, Sovcomflot.

The new breed of diesel-electric Arctic shuttle tanker incorporates a cutaway, icebreaking bow and a hull form specially devised to allow navigation astern in heavy ice. Hull strengthening complies with the new ARC6 notation of the Russian Maritime Register (RS), the follow-on to the former LU6 standard.

The vessels were designed in conjunction with Aker Arctic Technology, Samsung Heavy Industries and the Russian Central Scientific Marine Research and Design Institution in St. Petersburg, and are dual-classed by Russian Maritime Register of Shipping and ABS. The ABS recognition of the ships' ice-going standard is implicit in the ice-class 1AA notation, and the Society's Safe Hull and Safe Hull Construction Monitoring criteria have also been brought to bear on the project.

Central to the technical design has been the nomination of twin 10MW Azipod propulsion, powered from a diesel-electric plant based on three main generators of total 26,700kW output. The tanker can make 2.8knots in heavy ice of 1.5m thick, with a snow cover of 0.2m, and offers a service speed of some 15.7knots in open water conditions.

Sergey Popravko, senior executive vice president of OAO, Sovcomflot comments on ice class activity.

Steam heating coils are fitted throughout the cargo tanks, slop tanks and ballast spaces, and also in the fuel oil, lube oil and potable water tanks, to cope with sea water temperatures of -2°C and extremely low ambient temperatures. Each ship incorporates a two sea chest arrangement using iceboxes.

Winterisation of the deck equipment is extensive and includes using special steel grades for the hose-handling crane, davits, anchors and chains, and high-pressure, electro-hydraulic windlass and mooring winches, plus de-icing lines, hawsepipe steam blowing, hydraulic oil heating and electric heat tracing. The problem of firefighting in extreme low temperatures is addressed by employing special Arctic foam.

The cargo, slop and ballast pumps have been engineered to suit Arctic operating conditions, utilising features such as: stronger intermediate supports on the pipe stack; an increased number of drive shaft bearings; increased strength of the motor stool and dome material, so as to withstand an ambient temperature of -40°C; stronger motor bearings and greater wall thicknesses for the drive shaft pipes; plus heaters for electric motors. Heat tracing has been provided for the radar scanners, anemometer and whistles, and antennae are housed in a coiled, heated dome.

Combustion air for the engines driving the main generators is preheated and led to each engine by a dedicated duct, so as to prevent overloading under very low ambient temperatures. The machinery spaces are thermally insulated and fitted with steam radiators. The ventilation air intake louvres incorporate anti-icing and anti-clogging heating provisions.

The emergency generator, located in an insulated and heated room, is designed to be operable with an outside temperature of -40°C. It provides a power supply for the boiler, so that the heating of essential systems and equipment in the engine room will not be interrupted in the event of a blackout. The 1000kW harbour generator, moreover, can be manually started and brought to bear on engine room revival, in the aftermath of a major power failure or blackout.

The navigation outfit has been augmented by special provisions to suit the demands of Arctic service, including ice radar, with its scanner mounted on the foremast, night vision infrared camera and associated laser scanner, also fitted on the foremast, and three remote-controlled xenon ice projectors. The vessel also has the requisite receiving and playback facilities for ice navigation and weather charts.

Shtokman and Yamal

In the past year developments of the Shtokman and Yamal fields have been at the forefront of Sovcomflot's development. On 18 June 2010, during

the XIV St. Petersburg International Economic Forum, the Chairman of the Gazprom Management Committee Alexey Miller and the Sovcomflot President and CEO Sergey Frank signed a co-operation agreement covering the seaborne transportation of liquefied natural gas (LNG) from the Shtokman gas field.

The Shtokman gas field is situated in the central part of Russia's offshore sector in the Barents Sea. The field's C1 reserves make up 3.9 trillion m^3 of gas and 56 million tonnes of gas condensate, with 3.8 trillion m^3 of gas and 53.3 million tonnes of gas condensate located within Gazprom's licensed area. It is the world's largest proven offshore gas field.

On the 17 June 2011, Gazprom Global LNG and SCF signed a long-term time charter for two ice-class LNG-carriers. The ship design will be an 'Atlanticmax' type carrier (capacity 170,000m^3 and tri-fuel diesel-electric propulsion), with RS Ice 2 class and winterisation enhancements, and a reinforced membrane cargo containment system. The vessels are to be constructed with dual RS and Lloyds Register (LR) class by STX and USC. The project will be multi-functioning: the ships will be able to operate between almost all existing LNG terminals, in particular, offering year-round exports from Russia's first LNG project (Sakhalin 2) and from the Shtokman LNG project terminal.

Yamal LNG is a Novatek corporate project for the construction of the gas liquefaction plant in Yamal. The total amount of investments in the development of the Yamal gas fields was assessed by the Government experts in 2010 as US$220 – 260 billion over 25 years. About 20% of Russia's LNG is accumulated in the Yamal peninsula, washed by the Kara Sea. The potential resource base in the area for LNG production is about 10 trillion m^3, including Yamal LNG – 1.3 trillion m^3.

Designing and building vessels to meet the needs of these fields has also been a priority.

"The company looked at different types of vessels and came to the conclusion that the gas carrier of a membrane type would be best suited to both projects. There are several reasons for this. 1) Vessels of a membrane type are of the optimal metacentric height so that the centre of gravity is situated relatively low. The lower the metacentric height of a vessel, the less the risk there is of rollover, in a situation where ice and snow becomes attached to the top of the carrier. 2) Membrane gas carriers provide the maximum forward visability, which is essential when navigating across ice and in ice-bound bays. 3) The construction price is relatively low in comparison with other types of gas carriers [SPB). 4] This type of vessel can be adapted by Russian shipbuilders in the short-term", Popravko said.

"Since a final investment decision has not yet been reached on either project, there are no current orders for the vessels", he added.

Special design requirements of the fields had led Sovcomflot to look at vessels that have a significant Arctic strength. "The Shtokman gas carrier is a conventional gas carrier with slight ice enhancement, 1C, but with significant winterisation features, including additional heating and insulation to enable the vessel to carry out work under low temperatures.

"The Yamal vessel will require a very high ice class: Arc 7 class (Super Super 1 A). In addition, it is likely that the vessel will be equipped with two propulsion units of an Azipod type and a central propulsion shaft connected to a screw propeller. The vessel might also have an icebreaking stern. The hull will either follow a model similar to our existing vessels *Mikhail Ulyanov* or *Vasiliy Dinkov*, or it will have a conventional bulbous bow with ice-class. The decision will depend on whether the vessel will be used to cover relatively short distances or to carry gas to Europe," Popravko said.

NSR

The development of the Northern Sea Route (NSR) is also becoming more prominent with vessels now running trials over the route.

Popravko comments on the type of vessels navigating it: "The expansion of the NSR and the accompanying rise in cargo traffic requires the construction of a modern arctic transportation fleet. Such vessels should have ice enhancement of Arc4 and Arc5 class, and higher, depending on the time of the voyage and the particular route. The vessel propulsion systems should have a high capacity to be able to adjust to a wide range of velocity and power requirements. The vessels should match the requirements of the administration of the NSR, not least the need for the voyage to be self-sufficient. The vessels should be equipped with communication systems to cover the Inmarsat satellite system, where coverage is not available. The vessels should be of large enough tonnage to be economically viable."

"SCF has successfully tested the Northern Sea Route during 2010 and 2011, with plans to conduct even more technically challenging tests in the coming years. To expand further the knowledge and understanding of the commercial case for the Northern Sea Route requires a long-term perspective to be taken, and a significant investment of time and resources. With developments in naval architecture, perhaps using lighter yet stronger materials in ship construction to increase cargo capacity and, subject to the prevailing ice conditions, larger vessels of up to 250,000 tonnes deadweight and perhaps more may be able to trade regularly on this route. However, careful risk assessment of the environmental impact of such traffic is vital before regular voyages can be contemplated.

"Icebreaker escorts and assistance remain necessary throughout all transits, even for ice-class vessels and whatever the ice conditions. Another important challenge faced is the absence of ship repair and supply services within this region. Despite all this, in our view the Northern Sea Route remains an exciting opportunity for world trade and, in particular, serving the energy requirements of major Asian markets", Popravko added, regarding Sovcomflot's own developments. ***NA***

Polar Code causes concern

Development of the Polar Code to cover ships operating in the Arctic and Antarctic has raised a number of issues, not least as far as the design of vessels is concerned, writes Sandra Speares.

Issues relating to the Code are due to be debated at the International Maritime Organization (IMO) in February 2012, when the Design and Equipment Sub-Committee meets to review progress on the particular challenges posed by the increasing use of Polar waters for maritime transportation.

As operations in Polar waters seems to offer increasing potential, not least in terms of reduced voyage times, attention has turned to demands that will be placed on crews, ship design and operations in a hostile climate, with floating ice and the need for icebreakers.

The *Explorer* cruise casualty in 2007, when over 150 passengers and crew had to take to the lifeboats after the ship hit ice in the Antarctic, is just one example of the dangers of operating in ice-infested waters.

Speaking at the International Chamber of Shipping conference in September, Daniel Hosseus, of the German Shipowners' Association noted a shortage of places of refuge, not to mention poor communications and limited search and rescue and pollution response capabilities.

The issues are due to be debated at the IMO's design and equipment subcommittee in February 2012. Issues under discussion include the demands on various ships types and challenges posed by different ship categories operating in areas with varying ice cover, including what additional structural requirements and compliance mechanisms will be needed.

Demands on shipbuilders and designers to meet the challenges of new regulation alongside the demands of a hostile environment, may have serious effects on crews' operational capabilities that need to be considered.

The many points raised were outlined in a report prepared by Norwegian classification society Det Norske Veritas for the IMO which was released last month.

The hazard identification (Hazid) report touches not only on issues concerning ship design, but also on emissions control, safety measures in Arctic and Antarctic waters, search and rescue, high level navigational hazards and equipment requirements.

David Tongue, director of regulatory affairs at the International Chamber of Shipping.

While the Polar Code is intended to cover both the Arctic and the Antarctic, it has been recognised that there are a number of differences between the two, one example being the need to consider human populations in Arctic regions – less of an issue in the Antarctic.

If some of the high level hazards ships face are no different from those they face elsewhere in the world – ship to ship collisions, groundings, fires and explosions for example – the consequences of such hazards occurring in Polar waters may be very different. Other issues to be considered include the effects of high latitudes on ships' electronic equipment, the need for equipment that will be able to function effectively in extremely cold conditions, restricted bunker fuel types that are fit for purpose, to name but a few issues.

As far as the report is concerned, some of the issues to be considered relating to the design of ships include:

- Taking the environment into account when designing ship systems, for example installing more efficient combustion systems and low emission burners
- Using fuels with lower carbon content, for example LNG or LPG
- Greater energy efficiency as outlined in MARPOL Annex 6
- Limited size of fuel oil tanks, or greater sub division of tanks
- Damage stability and other survivability requirements
- Larger waste carrying capacity (so waste can be offloaded in safer locations)
- Use of water instead of oil based hydraulic fluids
- Ensuring appropriate hull residual strength for the conditions
- Improved propeller design to reduce propeller noise
- Sufficient engine power to operate in ice
- Equipment designed to be easy to use in cold environments for example when wearing heavy
- Load monitoring systems to detect stresses on ship
- Improved ship manoeuvrability and crash stop capability.

According to David Tongue, director of regulatory affairs at the International Chamber of Shipping, some of the general implications for shipbuilders of the development of the Polar Code may include the need for more icebreakers and ice class vessels, possible changes to performance and text standards for equipment used on ships operating in polar waters, and the potential for increased complexity of "interaction between IMO, flag and class requirements for individual ships depending on the intended service".

"If Northern sea routes become more available in general, then in addition to standard ships being able to transit areas of clear water, there are likely to be increased opportunities for transit of areas that are not ice free but where the ice cover has reduced enough to allow voyages such that increases in fuel consumption due to transit through the ice are still outweighed by the advantages of reduced voyage distances and times, thereby leading to an increase in the demand for ice-class ships.

"Although reduced ice cover might superficially imply a reduced requirement for ice-breakers and tugs, if traffic volumes increase, then there may be an increased demand for ice-breakers on routes which were not previously commercially viable and also to cater for increases in traffic on routes where there is a desire to extend the seasonal availability of those routes."

As far as machinery issues were considered, he highlighted at the recent Tripartite meeting, increased redundancy and or robustness of main and auxiliary machinery, increase in power demand for systems such as trace heating of external piping, provision of deck steam lines, heating of accommodation & work areas and a potential increased in power for 'Polar Class' notations.

"The need to guarantee performance in low temperature may lead to changes in a wide range of equipment, not just for obvious considerations such as the need to avoid low temperature brittleness in steel structure and pipework, but also, for example, potential requirements relating to the viscosity and effectiveness of lubrication and hydraulic fluids along with consideration of the need for equipment controls, valves and various mechanical devices to be operable by seafarers wearing heavy clothing.

"There may be a consequent general impact on new ships if increased availability of high latitude routes encourages owners to make some basic provision for potential use on Polar routes at some point during the commercial life of the ship."

Mr Tongue added that the treatment of redundancy for machinery is still a matter of concern in relation to IMO discussions on the Energy Efficiency Design Index . "It is likely that if a vessel is designed with the intention of polar operation, then even with no formal ice-class solutions, such as twin shaft / heavier shaft / redundancy of prime mover could be reasonable considerations and would need careful assessment. Similarly systems which have no, or very little, power demand on ships intended for general service may need to draw power for effective operation in low temperatures".

"More specific consideration of the bridge and navigational equipment provided to ships may be necessary. For example, particular consideration could be necessary for the provision of suitable equipment to guarantee the availability of effective operational and emergency communications at high latitudes, Tongue says.

"For ships regularly operating in ice-covered waters consideration might be given to additional/ more powerful radar systems and/or consideration of the provision of SONAR, thereby leading to additional increases in the need for electrical power.

In addition to more obvious considerations such as the operability of equipment in low temperature environments, the effectiveness at low temperature of the various fire-fighting media may need to be assessed. There may be related issues such as for example the need to ensure that fire-fighting water can be either adequately cleared from open decks for example as it is deployed or that any resulting icing is manageable." *NA*

GL prepares for the Arctic

Moves to exploit resources within the Arctic Circle, and the fact that ice cover is melting has led to the opening up of the Northern Sea route, and in consequence an increase in the number of ice class vessels required to operate in demanding conditions, writes Sandra Speares.

According to class society Germanischer Lloyd's business manager for polar shipping Justus Dennin, the "tanker market especially, has seen the number of vessels with some kind of ice class balloon over the last five years. Other sectors, be they fishing, even expeditionary tourism, will also be developed, but the main focus for ice class at present is in vessels associated with oil exploration, extraction and transport."

As Dennin explains: "Preparing a vessel to operate in ice-covered waters requires a great deal of attention, many if not all of the features of the vessel will have to be changed in some way. The hull structure must be designed to resist the global and local ice loads characteristic of its ice class.

"The extent and magnitude of local ice loads for the different hull areas and appendages depend on the various ice interaction scenarios upon which the design of the ship is based. The uncertainty associated with ice loads is relatively high compared to sea loads and so the design of the ship structure has to incorporate some strength reserve to limit damage from accidental overloads. Higher material grades suitable for low temperatures have to be used and special abrasion-and corrosion-resistant coatings are required."

Key machinery needs to be designed for operation in ice, he says, with particular emphasis placed on the ice loads on propellers and the entire propulsion line. Not only do engine output requirements need to be established for independent or escorted operations, but deck and auxiliary machinery systems also have to be designed taking snow, ice and the expected low temperatures into account.

Other pieces of equipment including deck machinery and steering gear have to operate in low ambient temperatures, he explains. Ballast tanks above the waterline need to be heated and vent pipes, sea chests, intake and discharge pipes and associated systems have to be designed so that blockage or damage due to freezing or ice and snow accumulation is avoided. Even electrical installations and safety systems require special attention.

GL takes a closer look at ice classification.

When operating in hostile climatic conditions, loss of essential services or control systems could be catastrophic. Emergency batteries have to be protected from low temperatures and the danger of explosion when gas ventilation is restricted by the accumulation of ice or snow, Dennin says. The basic arrangement of an ice class ship has to take into account special subdivision and stability requirements due to icing, damage and/or ramming, as well as accommodation and escape measures, and anchoring and towing arrangements.

Given the expense of providing salvage and towage services in such inhospitable conditions, ensuring maximum redundancy for any ship operating in Arctic or Antarctic waters is vital, and whether or not salvage companies will decide to provide services in these conditions will depend on whether the demand is there.

Operation of ships in polar waters has been extensively discussed at the International Maritime Organization (IMO) design and equipment subcommittee this year, and further discussion is expected at the next DE meeting in February 2012.

The International Association of Classification Societies (IACS) will be putting in a paper to the next meeting, which Paul Sadler of IACS says will be considering the format of the new Polar Code including its goals and prescriptive requirements.

IACS has already submitted a number of papers to the IMO on issues like powering requirements for ice class vessels operating in polar waters, ice certificates and descriptions of polar classes, which Mr Sadler says have been taken forward in working group meetings. Polar classes, for example take into account whether the ship is operating

all year round in Arctic conditions or whether seasonal variations apply. The quality of the ice in which the vessel is operating is also taken into account in establishing the polar class.

One issue he raises is that of the need for a common understanding on air temperatures. Extreme cold will obviously impact ships' functionality. While it is still relatively early days in the development of the Polar Code, IACS is supporting the process and wants to make sure that technical issues are tackled and requirements clarified on structural aspects. A "global and consistent understanding" of what is required is necessary, Sadler says.

IACS already has unified rules covering the issues, including hull and machinery requirements and hopes that these will be taken into account as the code develops. Sadler says the current requirements do not need to be changed at present unless further action is necessary as a result of IMO developments.

Germanischer Lloyd was one of the bodies who worked on many of the development groups for the regulations, from the outside working group which developed the draft Code of Polar Navigation. GL's involvement in the continuing development of these uniform guideline continues with the IACS Project Team PT49, which is considering the scope of the existing requirements of the IACS unified requirements for Polar Class hull structures. Alongside these efforts, GL says it is also involved in the continuing development of the IMO Polar Code on behalf of the German Ministry for Transportation.

Legal aspects of operation in Arctic areas are also being considered, territorial aspects are one consideration. New guidelines on Arctic Shipping will include issues like heating of ballast and ice radar, crew protection and machinery requirements.

GL says its rules are in the final stages of preparation and will soon be published. Compliance with the requirements of chapter 13 of the OCIMF (Oil Companies International Marine Forum) SIRE (Ship Inspection Report Programme) 2011 will soon be certifiable.

More than 3000 vessels in GL's fleet in service now have some kind of ice class and, over the last 10 years, some 1700 vessels have been built with ice class according to GL's rules. "Operating in some of the most sensitive ecosystems on earth, ice class vessels in development will also have to be designed with a mind to the newly introduced EEDI [energy efficiency design index]. Ice classed vessels that will be subject to the requirements of the regulations, will have their EEDI assessed and a correction applied to the calculation to account for the specific design elements of the vessel."

GL Maritime Software and GL's FutureShip units offer modelling systems that utilise computational fluid dynamic techniques and massively parallel processing to calculate hull optimisation for both free water sailing and heavy ice conditions. Various factors, such as strength, capacity or energy efficiency, for example, can be prioritised in the generation of thousands of hull forms, as a simulation of the effect of different operating conditions on each shape, allowing the designer to select a vessel tailor made for the desired operational model.

Other companies like the Finland based Steerprop are offering innovative solutions to the problems of operating in Arctic conditions, with azimuth propulsion systems that can not only be applied to harbour tugs operating in ice bound environments, but also offshore supply vessels, tankers and cargo ships operating in Arctic conditions.

As the OCIMF questionnaire on winter navigation and training is incorporated in the vetting inspections on tankers sailing in ice-covered waters, crew development is all the more important for vessels operating in ice covered waters.

According to GL, "as the demand for vessels increases, so too will the demand for crew and crew inexperience has been identified as a significant cause of ice damage to vessels". GL Academy, as part of the Icetrain consortium, offers a course which fulfils the requirements of for training in IMO resolution 1024(26), Guidelines for Ships Operating in Polar Waters, and of the STCW (Standards of Training, Certification and Watchkeeping for Seafarers) 2012, Annex 2.

The course provides practical instructions and the information needed to operate safely in harsh winter conditions, especially in the Baltic Sea, through a combination of theoretical presentations and special training on the bridge simulator. The course focuses on: ship ice interaction, ship design for ice operation, icebreaker operation, management and legislative issues, ship handling and manoeuvring in ice, cargo handling and ballast water operation, ice information services, working and occupational health in cold winter conditions. *NA*

GL is working closely with the IMO in the development of the Polar Code.

Backward shipping must shape up

Former car designer Richard Sauter believes that the maritime industry is trailing far behind its counterparts in the auto and aircraft industries and that it needs to shape up. So he designed his own tanker.

In general those involved within the design and innovation side of the shipping industry tend to scratch their collective heads which they shake with a sharp intake of breath when a reduction of greenhouse gases (GHG) of 50% or more over the 1990 levels are considered.

According to shipping sages a 30% reduction is achievable with today's technology and more than that will come with the development of new technologies in the future. Fuel cell engines, lighter materials and more efficient hull designs along with ground breaking technologies such as air lubrication and the like will all contribute to decrease GHG emissions from ships in the next 40 years.

It is then with some surprise that I learnt that ships can be built, today, that will reduce emissions by 75%, according to American-born Richard Sauter, who now lives and works in Bali, Indonesia. When compared to the automobile and aircraft industries, shipbuilding is very "backward", he says.

Semi-retired now Sauter spent some time looking at the developments in the maritime sector and he believes that: "It is easy to make large savings in CO_2 emissions from ships because the vessels of today are so polluting that the designer starts from a very high base [when compared to car and aircraft designers]".

Richard Sauter has taken a leaf out of the automobile design book.

In designing the 330,000dwt *Emax Deliverance* solar hybrid post-panamax tanker Sauter has combined the excellence of a Mitsubishi Heavy Industries (MHI) designed vessel, with a Wärtsilä designed dual fuel engine and added some energy saving devices.

Deliverance includes the MHI-designed air lubrication system, the DynaWing hybrid Wingmast and mainsail system and Solbian marine solar panels which have the highest rated efficiency and a 25 year warranty.

With a range of possible power sources, including wind, solar power, liquefied natural gas (LNG) and, if all else is unavailable, diesel, *Deliverance* can sail at around 15knots on around 20MW of power.

With a full array of sails with Wingsail emulated efficiency, to a gradual reduction of all sails culminating in Wingmast reefing to sustainable and renewable sun power sources, DynaWing sails can deliver between 4 and 8MW of power while the Solbian Solar Panels can offer up to 4MW output. The energy harnessed from the sun is stored in 5MW Lithium ion UPS (uninterruptible power supply) batteries that allow for zero carbon docking and power for all hotel services. As a major Certified Carbon Offset Project, the carbon offset or reduction in GHG emissions achieved by *Deliverance* is 110,000tonnes of CO_2 annually or around three million tonnes of CO_2 over the supertanker's 25 year service life.

"The Solbian marine solar panels are a real break through. The DynaWing Masts are covered in transparent or even light concentrating film to magnify the light that

The Richard Sauter designed tanker uses a standard MHI-designed tanker with renewable and clean energy additions.

hits the Solbian Marine Solar Panels. The furled Mainsail sheets are translucent and may also incorporate Fresnel film. This light concentrating sail option raises the efficiency of the solar cell from 22% to perhaps 35%," explained Sauter.

Solar and wind power are only half the story with the Wärtsilä LLC Duel Fuel Hybrid Power equal to 10MW output providing the top up power to the clean energy systems. According to Sauter key benefits of Wärtsilä's DF engines and LLC (Low Loss Concept) are that they offer high efficiency, low exhaust gas emissions, flexibility of fuel use and fuel economy over the entire engine operating range.

Capital costs for *Deliverance* run at around 10-15% higher than a conventional vessel which operates with a 30MW output, however, MHI's Bubble Hull design improves efficiency, significantly reducing the amount of power needed. Podded propulsion allows the layout of the engine room to be flexible with the absence of a drive shaft connecting the propellers.

"The ship [design] is conventional in every way," said Sauter, adding, "When I looked at the new Panama Canal locks the scale conformed to a far better hydro-dynamic shape, longer, thinner, stretched and not so deep, it allowed for better efficiency, the configuration of the locks lend themselves to a more advanced design," he said.

At 330,000dwt *Deliverance* is a cost effective workhorse sized vessel which would normally cost around US$180 million, the power saving appliances on *Deliverance* mean, however, that the initial cost is pushed up to around US$200 million, but with savings of up to 75% in fuel consumption and pollution costs the lifetime expenditure for the vessel is significantly reduced.

"Maritime engineering is very backward, so it is very easy to make 75% savings in emissions, it is not so easy in the car and aircraft markets," said Sauter. He went on to say that other closed ships, such as car carriers, bulk carriers and ro-ro vessels could also make significant emissions reductions through fuel savings. *NA*

Yards cling to niches in financial crisis

Speculative shipbuilding in South East Asia has ground to a halt as yards and banks rein in their exposure to the maritime industry.

Many European owners used to visit SE Asia looking for vessels nearing completion that they could buy up at reasonable rates. That was before financial calamity hit the global economic system.

Following the financial firestorms of 2008 and again this year speculative building has all but ended, explains Francis Tang, Wärtsilä's general manager ship sales and project development in Singapore.

Yards have retreated into the niche markets that they can rely on for business and in SE Asia, as in many other regions, that means the offshore business. Wärtsilä has continued to design and supply newbuildings for the regional market, including the company's biggest current project, an 85m multi-purpose supply vessel. The 4000dwt ship is being built in Nanchong, China, for a Malaysian owner and is due for delivery in the first quarter 2013.

Wärtsilä has provided the design, engine gensets, thrusters and propulsion system for the vessel, "so it is optimised very well," said Tang, adding that, "The engines will meet Tier II regulatory requirements from the international Maritime Organization [IMO]".

Typical of the types of vessel now being built for the SE Asian market, Tang says that speculative shipbuilding in the region has come to an end for the next five to 10 years.

"In a general sense the economy has affected business [in the SE Asian region] in the good days, pre-2008, there was a lot of speculative shipbuilding, designers and yards would talk to brokers and try and anticipate which ships would be in demand in one or two years time – then they would build a series of six or eight ships and when they were close to delivery owners would come and buy the vessels," said Tang.

Curbs on funding from banks to both the yards and some owners have forced the industry to contract. "Banks want to see that owners have a charterer in hand before they release funding," said Tang.

He went on to say that as the financial crisis has engulfed Europe fewer European owners have been seen in SE Asia looking for vessels. "I heard of one case where a European owner was ready to contract a yard for a vessel, but the owner's bank did not recognise the yard's bank". Effectively the owner's bank did not believe that the yard's financial backer was capable of meeting the refund guarantees and so the deal collapsed.

According to Tang there is a possibility that some of the smaller regional yards may not survive as the banks tighten their lending criteria stifling the business, causing a natural re-alignment of the market, he said.

In some ways the economics of shipbuilding have hit Wärtsilä's Vietnam operations too, though the cocktail of problems in this market are more than mere financial scarcity. As the company's general manager for sales and support, Jeffry Especkerman points out the Vietnamese economy is going through some difficulties with the currency, the dong, trading high and interest rates and inflation also high. "We have to keep things ticking over until shipbuilding comes back," he explains.

However, Mr Especkerman does not expect much to change in Vietnam before 2015 when the "WTO [World Trade Organization] rules kick in". Subsidies to industry and import duties and other economic mechanisms that protect the local market from competition will be scrapped within five to seven years of Vietnam's 2007 accession to the WTO.

Wärtsilä is managing to maintain its presence in Vietnam with a series of small projects designed for the domestic offshore market, including an anchor handler design, a recent tugboat delivery.

Shipyards are still building vessels, but it is at a much slower pace than the pre-crisis days of 2008. "Eventually the shipbuilding business will turn around," added Especkerman. *NA*

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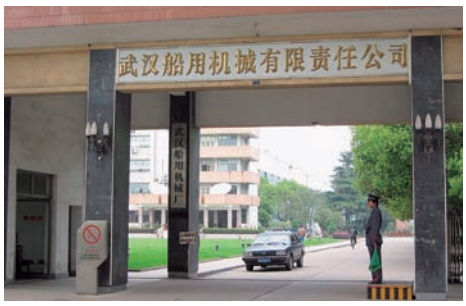

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Debt puts Vietnam shipbuilding on hold

Vinashin's crippling debts have put shipbuilding development progress back, possibly by more than four years, reports Sam Chambers.

At least Vinashin could organise a party in a brewery. As the full scale of its debt demise emerged last year its myriad non-core investments included a golf course and a brewery.

Vietnam Shipbuilding Industry Corp (Vinashin) has been the darling of state-owned enterprises for much of the past decade. Its dramatic decline, saddled with US$4.5 billion in debts, last year caused acute embarrassment to Hanoi and now experts argue the financial debacle has set shipbuilding development back by at least four years.

"It won't be until at least 2015 until confidence returns in any deals relating to Vinashin," comments one classification society surveyor in Ho Chi Minh City. "For the time being," he adds, "it'll be local, often state run, shipping lines who'll be ordering at Vinashin. They'll be the guinea pigs in any new designs."

New designs, however, are unlikely, says one Hong Kong-based shipbuilding consultant: "Vinashin is unlikely to branch out into anything new for a long time to come. First, they have to get back on a sound financial footing. Secondly, they have to up their quality and delivery schedules."

Financial woes continue. Indeed, in November a Dutch creditor took Vinashin to court in London over its failure to pay any of its debts back.

Vinashin is arguably the most high profile of a host of state run enterprises that have hit hard times in the past 18 months. Despite much talk of revamping these state institutions analysts think these promised reforms will not fully materialise.

Johanna Chua, an economist at Citigroup in Hong Kong, noted in a recent report, "Despite escalating talk of divestment [of state-owned enterprises] and restructuring, we think strong vested interests and a weak global market backdrop next year will likely slow reforms."

Jonathan Pincus, Harvard University's head of economics teaching programme

Vinashin may have to wait until 2015 when new World Trade Organization rules are enforced to kick-start its shipbuilding industry.

Foreign yards

While state-run Vinashin wallows in the mire there are a number of foreign yards that are progressing in the South East Asian nation. Established in 1996, Hyundai-Vinashin Shipyard (HVS) was a joint venture between Korea's Hyundai Heavy Industries and Vinashin. It was originally a yard created to shift repair work from Hyundai Mipo but has since progressed into newbuilds.

Last year Hyundai-Vinashin repaired 28 ships and delivered four 56,000dwt bulk carriers for ER Schiffajrt and one 37,000dwt bulk carrier. In area space it is one of the biggest shipyards in the region.

Following its takeover of Europe's Aker Yards three and a half years sprawling STX Group, also of Korea, gained a foothold in Vietnam. Based in the south in Vung Tau the small yard is focused on offshore support vessels and has two 3000dwt anchor handling tug supply (AHTS) vessels on its books plus a pair of 2500gt platform supply vessels.

Adding to the foreign mix this year Japan-based Oshima Group announced it is planning to build a new shipyard costing some VND3800 billion (US$184.6 million) in Cam Ranh City. Oshima has secured a 304 hectare site and construction of the yard will commence in 2013 with a view to an opening in 2017. Oshima says the yard will focus on bulkers in the 37,000 to 56,000dwt range, not dissimilar to its highly acclaimed vessel types on offer in southern Japan at present.

in Ho Chi Minh City, wrote recently: "Vietnam is replicating the South East Asian model of inward-looking conglomerates profiting from speculation and government favours like Thailand and Indonesia in the 1980s."

Officially Vinashin declined to comment for this article. However, a source within the organisation in Haiphong told *The Naval Architect*: "At the moment we are keeping our heads down. There has been a very big upheaval and we expect there to be more. We will try to focus on our own jobs, but it is difficult when there is such constant negative publicity."

Since its fall Vinashin has had two big reorganisations of management and this past November prosecutors said nine officials, including Pham Thanh Binh, former board chairman of the corporation, were charged with "deliberately acting against state regulations on economic management."

There are still a slew of foreign owners who had lined up in Vietnam predominantly for bulkers – mainly 56,000dwt and the Diamond 53,000dwt design. These orders from the likes of Geden, ER Schiffahrt, Norden, Ofer and Unibulk are all set for delivery in 2012.

Vinashin has only received one order from overseas this year; the onus is very much on local lines to help fill the drydocks that are going to become vacant from mid-2012.

In July Vinashin inked a contract to build a pair of car carriers for Norway's Blystad Group. Vinashin's Nam Trieu Shipbuilding Industry Corp is to build two 6900 capacity car carriers. The vessels are due to be delivered in October 2013 and April 2014.

Many foreign shipbuilding companies have invested heavily in Vietnam, but the state-run enterprise, Vinashin, may have to rely on domestic demand for work until the global economic crisis eases.

The shipyard previously signed a contract with Hoegh Autoliners to build two car carriers but the contract was cancelled due to difficulties experienced by Vinashin.

Delivery delays or even cancellations are a systematic problem for Vinashin. It completed just 15 out of 85 newbuilding contracts signed between 2006 and 2010. A Vietnam government inspection report into the debt strapped shipbuilder showed that cancelled contracts accounted for 47% of the group's debt.

The group's most prestigious order – three 105,000dwt aframax tankers for a local owner, which are due for delivery next year and will be the largest ships ever built in the former French colony, are, according to sources in Ho Chi Minh City "woefully behind schedule" and the trio are unlikely to hit the water until 2013 at the earliest.

A rare bright spot for the blighted builder came in July with the delivery of *New Vision* to sister firm Vinashin Ocean Shipping Co. The 23,000dwt boxship capable of holding 1730TEU is the largest containership ever built in Vietnam. It was constructed at the northern Ha Long Shipbuilding Industry, one of the 21 yards under Vinashin's control.

The Germanischer Lloyd-classified ship is 148m long, 25m wide and 13.5m high and capable of moving at 19.70knots. The name, *New Vision*, is one the shipbuilder must abide by if it is to come back to the fore. *NA*

Keeping its (collective) head down, but Vinashin's staff expect more disruption at the troubled shipbuilder.

Easier access to shipbuilding product data

Gaining easier access to product data in CAD/CAM and product lifecycle management (PLM) systems saves time and money for all stakeholders. Malay Pal, Director-Shipbuilding, Siemens Industry Software explains how light-weight 3D neutral format JT can work for shipbuilding.

In the shipbuilding industry, CAD/CAM systems have been a vital part of the design and construction process for many years. Integrated CAD/CAM systems are used by many shipyards, and also often different CAD systems are used during different design stages and in different disciplines (like structures and outfitting). Besides CAD/CAM, many other software tools are used by shipyards for functions like production planning and ERP (Enterprise Resource Planning). As a ship enters service, yet more software tools are used for applications like configuration management, MRO (maintenance, repair and overhaul), etc.

Also, the shipbuilding industry has the involvement of a huge supply chain which includes design agents, equipment manufacturers, block fabricators, etc. Each of these organisations uses their own design systems which are often different from the systems used by the shipyard. Every ship project also has the involvement of owners and classification societies with whom design information is exchanged.

Every CAD system has its own data format optimised for its own functions. As a result, there are many kinds of data structures and data representation schemes. The different software tools used in ship design often do not communicate with each other which leads to proliferation of data, so managing a shipbuilding project becomes a very difficult task. With the expanding worldwide collaboration network which is resulting in design outsourcing, cross enterprise engineering, contract manufacture, and through life support contracts, the shipyard and its entire supply chain has to manage this complexity of communication in a heterogeneous environment.

To support this, there is a need for a product representation method which can meet the demands of application and hardware independence, support the total lifecycle of a ship, generate view point specific representations, and rapidly share information between geographically distributed applications and users while protecting corporate intellectual property. The industry standard, light-weight, neutral 3D format JT along with the formalised mark-up language PLM XML provides such a platform.

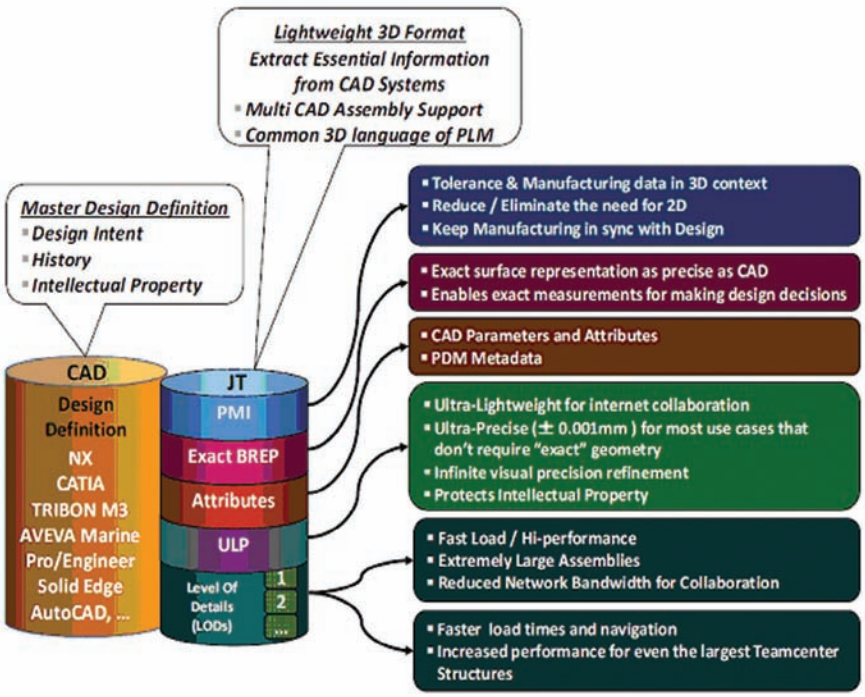


Figure 1: What is JT?

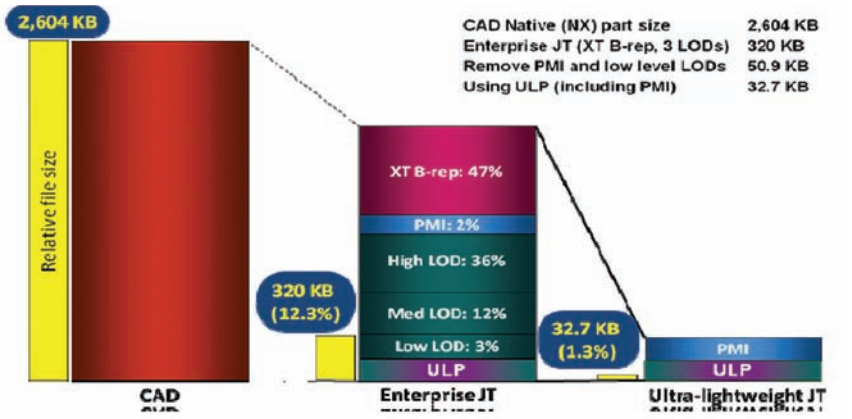
JT Representations

Lightweight representations are product model formats that do not include the mathematical richness of a 'full' CAD model. The aim of lightweight representations is to support users at different stages of the product lifecycle in rapidly browsing, retrieving and viewing product information.

JT is a binary format whose data model supports various representations of CAD geometry (Figure 1). The format can include any combination of facets (triangles for visualisation), exact surfaces (for measurement), attributes (metadata for CAD or PLM), assembly structure, and product & manufacturing information (PMI).

- Geometry Primitives: At one of the lowest levels, simple regular geometry such as cuboids and cylinders are located in a bounding box.
- Boundary Representation (BREP): BREP offers exact surface representation of the originating CAD system. BREP data is compressed using different algorithms and stored without data loss.
- Tessellated Geometry: Tessellated Geometry represents solids and surfaces as facets. Different levels of detail (LOD) can be defined within a JT file. A low LOD means a lower level of precision, but smaller volume of data, while a very high LOD means an almost exact geometry, but a large volume of data. The JT file is capable of

Figure 2: File Sizes with JT.



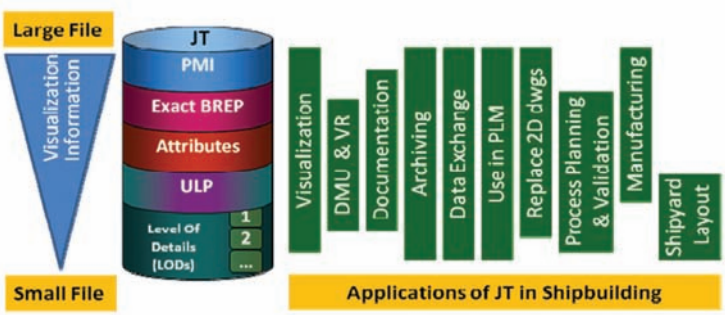


Figure 3: Use Cases

storing an arbitrary number of faceted representations with varying LODs.

- JT Simplified Geometry is used for significantly improving performance in large assemblies. It provides for every assembly and sub-assembly to be represented by its external surfaces only rather than the full detail of all the individual part surfaces. The assembly loads initially in as little as 1/10th the time for the full assembly. The individual part JT files are then loaded either on demand at the request of the user, or when needed for operations like measurement or cross sectioning. Simplified Geometry is ideal for shipbuilding where very large assemblies need to be loaded before users can navigate to the area where they need to work.
- Ultra-Lightweight Precise (ULP) format provides a lighter weight surface representation of the 3D geometry with file sizes significantly smaller (Figure 2). ULP has built in IP protection as it is accurate enough for most supplier interaction use cases but does not provide the exact surface definition (like BREP) and therefore can not be used for reverse engineering. The ULP format makes it easier to share data across low bandwidth connections. Small file size is important as the shipbuilding collaboration network extends to countries with inadequate telecom infrastructure.

  JT data can be contained in a single or multiple files. Each file can contain any relevant JT information. By properly managing the allocation of information to a given physical file, if source data changes, only the JT file corresponding to that information would need to be recreated or updated. PLM solutions like Teamcenter can manage the JT files relative to their CAD originals and synchronise the creation of a new JT for every CAD revision.

PLM XML

PLM XML is a XML based PLM format. PLM XML schema describes a model's geometry, structure, features, ownership, and visualisation. PLM XML allows for a single logical product model to have several different geometric representations, tailored to different purposes. Metadata of several different types like mass, material, PMI, application specific data, etc. can be attached to logical parts of the model or specific geometric representations. File sizes can be reduced using a reference-instance mechanism and by splitting out various sections of data into separate files (so that data not needed for a particular purpose need not be transmitted). As well as approximating and separating data, PLM XML also supports mechanisms for restricting access to parts of the model data on the basis of person, organisation or place.

Use Cases

- Visualisation & Digital Mock-up (DMU): JT is primarily used for 3D viewing by any stakeholder who does not need to edit the geometry (Figure 3). Once a ship model is converted to JT, a JT viewer can display the product structure, perform measurements, conduct interference/clearance analysis, display properties (metadata), etc. A JT viewer can be coupled with a Virtual Reality (VR) system that projects the image in stereo so that the user with the aid of stereo glasses can see the model in real-time 3D.

  It is possible to create JT files that contain structure, metadata and geometry, or alternatively the material and metadata can be imported from a PLM system.

  In DMU, collision checks for assembly/disassembly and design space checks are carried out.
- Documentation & Archiving: The most important requirement relating to the documentation and archiving of engineering data is that all relevant information be stored in a standardised format that can be read irrespective of a specific IT infrastructure and after a long period of time.

  Since the life cycle of ships can vary from 20+ years to 40+ years depending on whether they are commercial or naval, long-term data retention (LTDR) of ship product information is a serious issue. With continuous improvements in CAD technology and end of life for some of the CAD software traditionally

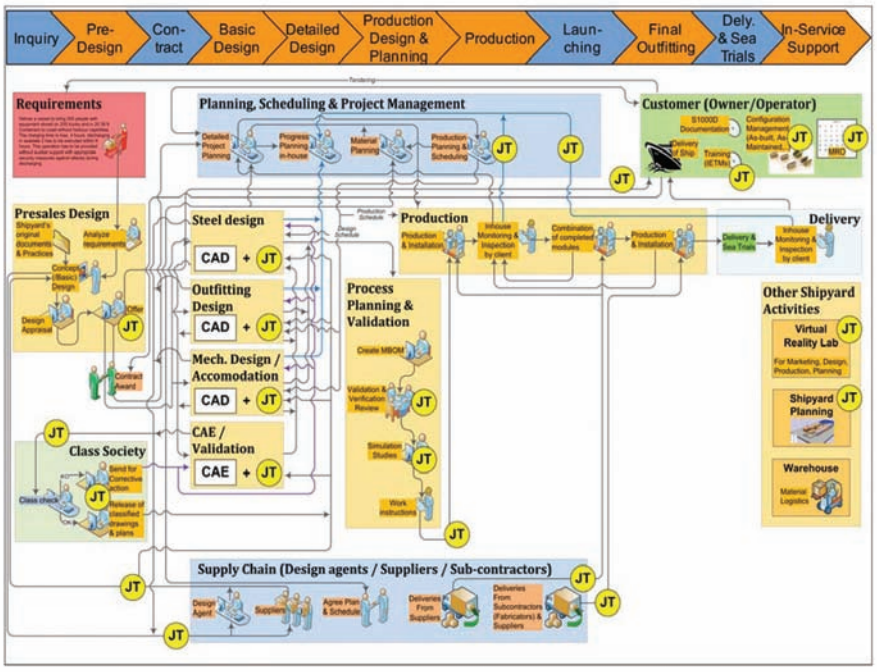


Figure 4: Use of JT in the Shipbuilding Ecosystem.

used in shipbuilding, the readability of old proprietary CAD formats can not be guaranteed.

JT can be extracted from CAD/PLM systems and used for archiving (LTDR). Non-geometric data and structure information is covered by PLM metadata containers like PLM XML.

- Data Exchange: Use of the JT format can facilitate data exchange between all stakeholders in a shipbuilding project, for example between the shipyard, design agency and suppliers.
- Use in PLM: PLM provides a shared platform for effectively capturing, representing, organising, retrieving and reusing product-related lifecycle information within and between companies, and to support the integration of existing software systems, including CAD/CAM/CAE (Computer Aided Engineering) and ERP/SCM (Supply Chain Management). PLM needs to support a collaborative environment where information and knowledge is transmitted between geographically distributed applications and users, and conventional representations such as CAD models are not optimised for such environments.

  While the STEP standard has been expanded from product design phase to incorporate life cycle phases (like maintenance and repair), it is not easy to implement because of extensive volume of software objects and consequent large file sizes. JT provides a very good format for use in PLM.
- Replacement of 2D drawings: Since all information needed to process parts and assemblies can be included in the JT file, it provides an option to reduce the dependence on 2D drawings.

  In many cases 2D drawings (like block assembly drawings for complex steel structures) take time to understand and are prone to misinterpretations. In these cases, the use of JT can complement or substitute these drawings, and helps to save time and reduce errors.

As shown in Figure 4, JT as a neutral lightweight format can handle several processes in design, construction and lifecycle support for the shipbuilding industry. The applications of JT go beyond visualisation, so it is possible to optimise product engineering processes by integrating a JT based solution into selected processes. Shipyards can use a combination of JT supported processes along with processes which need the use of native CAD and/or STEP.

JT version 8.1 has been published by the International Standards Organisation (ISO) as a publicly available specification (PAS). It is expected that JT will be available as an ISO standard by early 2012. *NA*

DELFTship launches version 4.27

The Netherlands-based DELFTship has launched the latest version of its hull form modelling programme.

The latest version of DELFTship sees the release of it latest feature, the calculation of hydrostatics in waves, along with improvements such as automatic update routine.

According to DELFTship earlier software was incapable of running some elements of the programme in Windows XP or Windows 7/Vista with the user account control (UAC) enabled.

The calculation of hydrostatics in waves is integrated into the professional hull modeller as well as various extensions. It can be used to calculate the influence of waves on the hydrostatic, stability, bending moment and shear force.

Another application which can be found integrated into the inclined hydrostatics extension is the visualisation of a ship moving through a wave length and height specified by the user. The animation can be saved directly to an animated GIF file. *NA*

Optimisation of Energy Saving Devices using SHIPFLOW

Ship based CO_2 emissions have been of increasing concern for many years. Emissions are projected to grow despite market driven efficiency improvements which caused the International Maritime Organization (IMO) to develop measures to reduce the emissions within an agreed timetable.

The Energy Efficiency Design Indexing (EEDI) shall be adopted for the initial design phase of new ships. This leads to greater demands for ship designers to develop more energy efficient hull and propulsion systems. SHIPFLOW can provide the designer with valuable tools for a better understanding and evaluation of the ship design alternatives. In addition to newbuildings requiring optimisation there is also great demand for retrofitting existing ships. In some cases it is to improve their efficiency and in other situations to improve their operational characteristics.

One distinguishing feature of SHIPFLOW is its specialisation for ship design. It provides automatic grid generation and configuration of the flow solvers. Besides the direct advantages for the users it also makes it well suited for integration with CAD/CAM and optimisation software - a key factor when it comes to reducing the lead time of design projects. The SHIPFLOW FRIENDSHIP Design Package is an integration of the CFD software SHIPFLOW and the computer aided engineering (CAE) software FRIENDSHIP-Framework. The software is tightly coupled which means that the user can configure, run and post-process the SHIPFLOW grid generators and flow solvers directly from the FRIENDSHIP-Framework. The automatic grid generation capabilities will be inherited and allows a full utilisation of the optimisation capabilities in the FRIENDSHIP-Framework. The ship can be defined using both fully and partial parametric modelling. In the first case the ship can be defined by key parameters such as ship dimensions, volume entrance angles. The latter case uses a conventional hull definition as the base and only the changes are parametised.

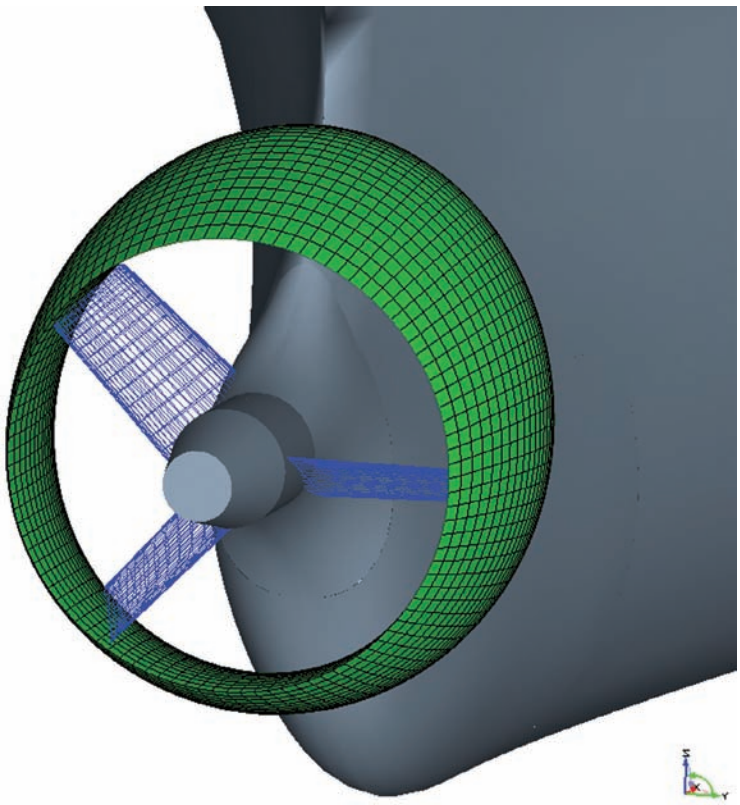


Figure 1: Surface grids for duct and fins.

Variants of the ship are easily generated and the technique is well suited for shape optimisation. The designer can control the variants by defining form parameter, constraint and dependencies. Systematic variations or automatic optimisation can then be applied to search for the best design. The tight integration provides a unified graphical user interface for the configuration, running the simulation and managing the variants.

As a standard, SHIPFLOW Design is provided to customers purchasing only SHIPFLOW. SHIPFLOW Design is a subset of the FRIENDSHIP-Framework and provides a graphical user interface and variant managements to the CFD solver. However, it does not contain the parametisation capabilities and optimisation tools that the full FRIENDSHIP-Framework does.

The overlapping grid capability in SHIPFLOW is suitable for appendage optimisation. An advantage with overlapping grids is that only the interpolations between the grid components, not the grids, needs to be updated when the appendages are repositioned. SHIPFLOW comes with parametised appendage objects that can be used directly or combined into more complex appendages. Alternatively, appendages can be modelled in Framework. Surface grids can then be

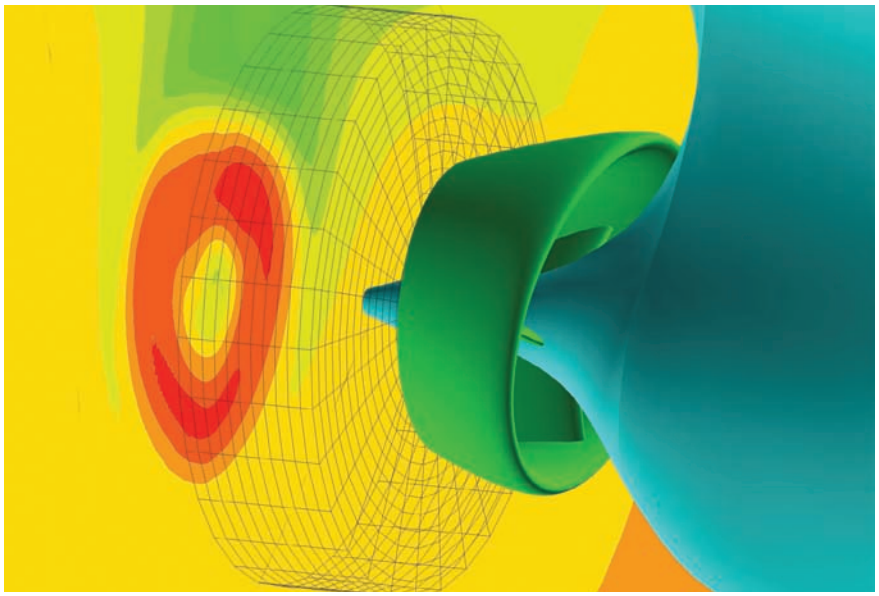


Figure 2: Self-propulsion simulation. Propeller grid, velocity contours in a transverse plane aft of propeller plane.

generated and exported to SHIPFLOW that creates volume grids around the appendages. Shape and position can be varied without losing the automatic grid generation.

The full potential of the CFD solution is illustrated with an example of an Energy Saving Device (ESD). SHIPFLOW has been successfully applied to various projects involving the optimisation of ESD's in the past few years. A case study based on a well known VLCC tanker appended with a generic ducted three bladed pre-swirl stator is outlined below, though due to strict confidentiality rules we cannot name the vessel.

The computational configuration includes a background grid and several overlapping component grids. The background grid constituting the main computational domain discretises the volume surrounding the bare hull surface. The non-axisymmetric converging duct has both varying chord and local angle of attack and it's component grid is based on a surface mesh created with the Framework (see Figure 1), and the hyperbolic grid generator available in SHIPFLOW's RANS solver. The fins are generated with a wing component (rudder object) which is built into the solver. All parts can be parametised which greatly simplifies optimisation tasks. The size, shape and positioning of the device, therefore, can be controlled by the optimiser using design variables.

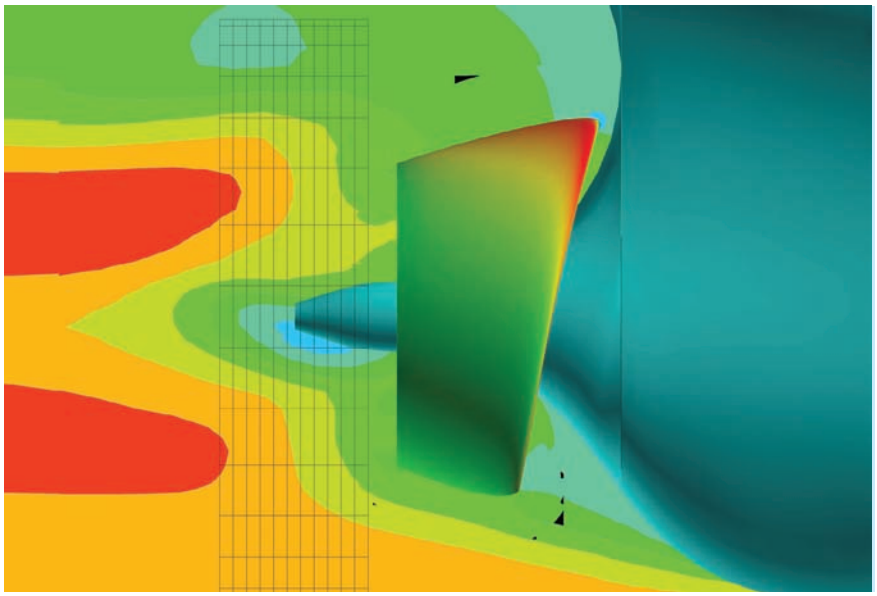


Figure 3: Self-propulsion simulation. Propeller grid, velocity contours in a longitudinal plane, dynamic pressure coefficient on the duct surface.

Due to an extreme complexity of the flow propeller efficiency, the ship performance cannot be evaluated easily even by a very experienced designer based on the wake field and resistance components. This is why many of our users utilise self-propulsion numerical simulations using SHIPFLOW, ranking alternatives with the overall performance expressed as the delivered power for the specified ship speed. The computations are, therefore, performed with a working propeller modelled with a lifting line method inbuilt in the CFD code or an external propeller model linked to SHIPFLOW. The propeller forces are transferred to the computational domain via an additional embedded cylindrical grid, Figure 2. The propeller model rpm is adjusted during the computations to balance the total ship resistance. The flow field is illustrated in Figures 2 and 3 where the axial velocity contours are shown at a transverse plane behind the propeller and a longitudinal plane close to the ship's centre plane. The pre-swirl stator (PSS) creates more rotational flow especially to the port side by directing the flow downwards equalising the tangential velocities components at the propeller plane. As a result the rotational energy loss is reduced increasing the propulsion efficiency.

A well optimised PSS shows gains of more than 5% in performance, reducing both emissions and fuel costs. SHIPFLOW validation to towing tank results agree with measurements proving SHIPFLOWs potential in optimising complex appendages in self-propulsion mode. An additional advantage of the system is that many designs and unusual configurations can be evaluated with ease with no risk of costly model tests. *NA*

Foran and Tribon move into the third dimension

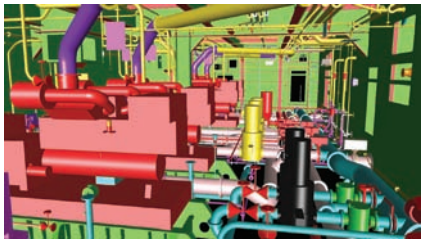
Marine projects demand sophisticated design, resulting in staggering amounts of data and documents, complex schedules and huge quantities of materials and resources, with engineering teams being able to make full reuse of past designs, and rapidly create and validate new designs to maximise the efficiency of vessels and their production process.

To achieve this, designers require applications that include instrumentation, electrical and piping schematics and all aspects of hull design and outfitting, which must be tightly integrated with the planning and production disciplines used throughout the project lifecycle. The multi-disciplinary nature of engineering and design means that most shipyards employ a wide range of 2D and 3D design applications, from a host of different software suppliers that provide little or no operational integration.

In other industries, such as automotive or aerospace, Product Lifecycle Management (PLM) tools and techniques, incorporating 3D stereoscopic visualisation or Virtual Reality (VR) are the norm. Initially just used by designers for real-time design reviews, VR technology soon spread to training and assembly. VR specialists, Virtalis, first entered this arena over twenty years ago when Vickers (now part of BAE) sought to replace the physical prototype for its submarine designs. At that time, the demands placed on computers by models of this size meant that the 3D visualisation had to be hosted on costly mainframe computers and operated by a small, highly trained team, housed in a specialist department located at some distance from the dock halls.

Virtalis has gained experience from working of large projects such as the Type 45 Frigate.

Virtalis' Tribon adaptor has allowed models created in Tribon to be easily translated into PTC's DIVISION MockUp without any loss of data or formatting.



Five years ago, BAE Systems Submarines, aware of the technological advances in visualisation, approached Virtalis to design and install a network of assembly-only VR pods. These revolutionary, self contained pods were strapped to the side of the submarine fabrication building and were manned, almost round the clock, not by computer specialists but by welders, electricians, fitters and representatives from other manufacturing trades.

The Virtalis development team has worked with numerous massive data sets over the years, from the Type 45 Frigate for the Royal Navy to whole chemical plants and geospatial terrains. This has given the team expertise in dealing with not only the enormous virtual models, but also with a wide range of different CAD software providers. Uniquely, Virtalis has development agreements in place with all the industry leaders, including PTC, Dassault Systèmes, Siemens and Autodesk.

However, the driver for the creation of a VR software adaptor that seamlessly exports data created in AVEVA's Tribon into PTC's DIVISION MockUp and Virtalis' Visionary Render came in the form of Virtalis' Chinese agents, the Shanghai-based RBD Computer Technology Company, who understood the potential of 3D visualisation within global shipbuilding.

Jacky Zheng, RBD's sales and marketing manager, commented: "Most companies have their own VR facilities and the two most commonly used software packages are Tribon and MockUp. However, we identified that moving data between these packages was no simple matter. Everyone seemed to have the same headache. Thankfully, we discussed this with Virtalis technical director, Andrew Connell, last year and he and his team have created the ultimate solution to this previously intractable problem."

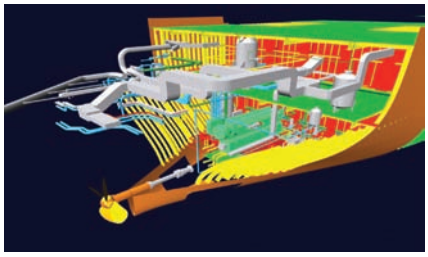
AVEVA dominates the shipbuilding industry, with 43 of the top 50 global shipyards relying on its software solutions. The acquisition of the market-leading Tribon Software in 2004 provided AVEVA with expertise in the creation of design and production information for shipbuilding.

The first installation of the Virtalis Tribon Adaptor was at Dalian Shipbuilding Industry Company Limited, a leading Chinese

shipbuilder. It reported that, not only is the Tribon Adaptor faster than any other package that purports to do the same thing, the quality of the translated data is unsurpassed, especially in the sphere of pipe data translation. Virtalis' breakthrough allowed models created in Tribon to be easily translated into PTC's DIVISION MockUp without any loss of data or formatting. Similarly, the VR models could move in the opposite direction and be translated into Tribon.

The success of the Tribon Adaptor led to calls for Virtalis to work with SENER to create a solution for FORAN. Another software package within shipbuilding, FORAN has been developed by SENER for more than 45 years and was created for the design, engineering and production of ships and off-shore platforms.

A non-disclosure agreement was signed and Virtalis' team set to work. This time, they broadened the suite of adaptors, drivers and VR enablers and called it Virtalis Exchange. These tools promote the seamless reuse of 3D engineering and manufacturing data in VR environments. The Virtalis Exchange portfolio includes translators to Virtalis' own visualisation software, Visionary Render, as well as PTC software, from 3ds Max, PDMS, FORAN and Tribon. Models, created in various packages, can now be exported to a file format ready for use in VR, including materials, polygons, vertices, metadata and some animations.



Virtalis has worked with SENER to broaden its suite of adaptors, drivers and VR enablers.

The Virtalis Exchange adaptors for Tribon, Foran and PDMS are available in two parts, the Object Adaptor and the Metadata module. The object adaptor provides the geometry, whilst the metadata module gives access to the additional data contained within the files. Using the files that are generated from the host CAD package, Virtalis Exchange adaptors generate a series of files that can be read by PTC's ProductView, PTC's Division MockUp or Virtalis' Visionary Render, complete with all the geometry and tree structure of the original CAD package. The Metadata Module accesses the XML file and adds detail to the structure. It provides all the part names and any other data that is associated with the CAD. For example, it conveys detail like the material type, its weight, thickness, the part type etc. In fact, it transfers across any data that is embedded in the CAD file.

The files from these major CAD systems can be accessed in VR through the use of the Virtalis Exchange using both the Object Adaptors and Metadata modules. Virtalis Exchange enables the fast creation of high visual quality content for VR installations across the world, so that design reviews can be more insightful and manufacturing and training processes made more efficient. *NA*

Trimming the stern flap equation

Trim tabs and stern wedges are well-known devices used to reduce planing hull drag by providing lift and altering the running trim. The full hydrodynamics of these devices are complex, but relatively simple techniques are available to include the effect of these devices in planing hull resistance prediction.

The principal prediction method for the effect of stern flaps is based on a model test series of rectangular flaps [Brown 1971]. This test series and corresponding prediction method has been cited in many subsequent technical papers [Savitsky 1976], and is utilised in many planing hull resistance prediction tools (e.g., NavCad). The scope of the flap models in the test series are for rectangular plan form flaps with (span-chord) aspect ratios from 1.25 to 5.0 and deflection angles less than 15degs (although the bulk of the data was for deflection angles less than 5degs).

In the original source, the prediction coefficients for flap lift and drag were based on a linear fit through the data points. The plot (Figure 1) shows the nature of the original fit ("EQN BROWN"), which offered a single line for all flaps regardless of aspect ratio.

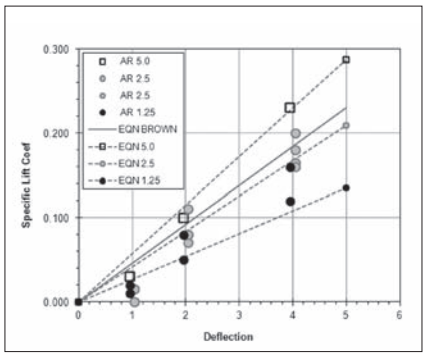


Figure 1: Lift coefficient versus deflection angle (new & original).

HydroComp has conducted a re-analysis of this original data to develop an aspect ratio (AR) multiplier to the original equation for lift coefficient. This multiplier is based on a well-known aspect ratio correction for the lift coefficient of ideal foils [Jones 1941]. The form of the multiplier, which is based on rectangular plan forms, is:

$$\text{Multiplier} = \frac{2\,AR}{AR+3}$$

As shown in the figure above, the multiplier greatly improves the precision of the prediction of flap lift, and thus reasonably allows extrapolation to higher and lower aspect ratios. Since flap drag is directly related to lift, no change was made to the form of the drag equation [Savitsky 1976].

The prediction of the longitudinal centre of flap lift was also re-evaluated as part of the HydroComp study. The original prediction algorithm [Brown 1971] recommended that the centre of the flap lift was 60% of the vessel's beam forward of the flap. It was deemed that ship beam was not entirely suitable as an independent variable, so the test data was rearranged to determine the center of effort of flap lift forward of the trailing edge of the flap (XCE) as a function of the flap span.

This, too, displayed a correlation to aspect ratio, whereby the position of XCE was substantially further forward with low AR flaps (suggesting that low AR flaps would be less effective in producing a trimming moment). The position of XCE approached one flap span as aspect ratio increased. Flaps with reducing aspect ratio approaching unity, however, displayed an XCE position of many flap spans ahead. The following plot (Figure 2) demonstrates the new estimation of XCE:

Of course, prudent constraints should be applied to the application of the estimation of XCE (e.g., limit to positions aft of the vessel LCG).

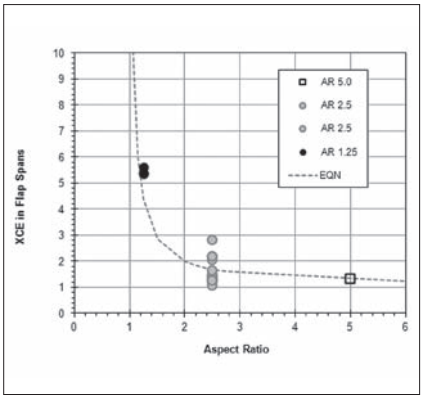


Figure 2: Longitudinal centre of effort (XCE) of flap lift forward of trailing edge of flap (new).

This re-analysis of the stern flap test data can be applied to all planing hull resistance prediction that is based on an equilibrium-trim analysis (i.e., the Savitsky "general case"). From this re-analysis, we can clearly conclude that:

- Aspect ratio does affect stern flap performance.
- Consideration of aspect ratio should be part of any planing hull drag prediction where stern flaps are used.
- Flaps of higher aspect ratio (i.e., wider span and shorter chord) provide greater lift for the same plan form area.
- These same higher aspect ratio flaps also have a center of effort farther aft, thus providing a more effective trimming moment.

References

Brown, P.W., "*An Experimental and Theoretical Study of Planing Surfaces with Trim Flaps*", Davidson Laboratory Report 1463, Stevens Institute of Technology, April 1971.

Jones, R.T., "*Correction of the Lifting Line Theory for the Effect of the Chord*", NACA Report 817, July 1941.

Savitsky, D. and Brown, P.W., "*Procedures for the Hydrodynamic Evaluation of Planing Hulls in Smooth and Rough Waters*", Marine Technology, Vol. 13, No. 4, October 1976. *NA*

Boxing clever

Dear Sir,

The very interesting 40th Anniversary article, *Since Liverpool Bay*, states: "the origins of containerisation are variously attributed to Atlantic Steam Navigation, Seatrain Lines, Sea-Land [Malcom McLean] and others." I believe that Seatrain, whose origins date to the 1920s pioneered in the innovative transport of railroad box cars, not containers. Alaska Steamship also carried containers on deck on their break-bulk Liberty ships during the 1950s. Atlantic Steam began a ro/ro service using war surplus LSTs after WWII. I have heard of other claims involving the use of metal CONEX boxes, Dravo vans, large wooden crates, the White Pass and Yukon's experiments with 8 by 8 foot, 5 ton boxes and *John Brown*, etc. described as containerisation. However, the first container ship operation dedicated to carrying only van-sized, demountable intermodal shipping containers was Pan Atlantic's (later called Sea-Land) S.S. *Ideal X* in 1955 and the first cellular containership was the S.S. *Gateway City* in 1957.

Very truly yours,
Charles R. Cushing, Ph.D., P.E.

Setting the BWTS record straight

Dear Sir,

After reading *The Naval Architect* October 2011 editorial "Koreans Join BWTS battle", I was concerned about the factual inaccuracy "Weaknesses" of "Chlorinator Electrolysis" systems listed in the table on page 2 of the article and page 40 of the October issue.

The weaknesses were detailed as:

- Control over dosing
- Neutralisation for short voyage
- H_2 gas removal
- Corrosion issue
- Fresh water issue

And the companies listed in the table with systems showing such weaknesses are SHI, Severn Trent and HHI.

I offer the following rebuttal as to the technical inaccuracy of associating these weaknesses with the BALPURE ballast water treatment system of Severn Trent De Nora.

Control over dosing

The BALPURE system operation determines chlorine demand of ballasting water and sets production rate to achieve pre-determined residual to properly disinfect and meet IMO D2 efficacy requirements.

Neutralisation for short voyage

BALPURE uses an ORP controlled neutralisation system to ensure discharged ballast has less than 0.2ppm available chlorine. Sulfite storage volume is for four typical ballast operations or one immediate discharge at point of ballasting (emergency).

H_2 gas removal

The slip stream treatment approach of the BALPURE system removes hydrogen from the hypochlorite stream at point of generation. The marine-tested redundant air dilution system used with the BALPURE system ensures hydrogen stream concentration to less than 1% hydrogen (four times below combustion limit) in the vent stack. Hydrogen gas, the by product of the electrochlorination process is vented to safe space above the deck on aft of ship.

Corrosion issue

It is widely known that effective corrosion control in ballast water tanks is one of the most important features in determining a ship's effective lifespan. Third-party corrosion testing against the IMO MEPC 59/2/16 recommendations is a must for every viable ballast water treatment system.

A corrosion testing program undertaken by GL Noble Denton for the BALPURE system was successfully completed in March 2011.

This test program conclusively finds that for seawater treated by the BALPURE system with higher than normal levels of free chlorine there is no measurable effect to the normal life of ballast tanks, ballast tanks coatings and associated pipe work, valves, fittings and instrumentation. The testing proved the BALPURE system has no effect on coated steel, naval bronze and Cu-Ni alloys. Testing proved an insignificant effect on bare steel – so small that the acceleration of corrosion due to the presence of free chlorine has minimal practical implications in ballast tanks.

Severn Trent De Nora has letters of confirmation from AkzoNobel (International Paint Ltd.) and AMERON International that further attest to the non-corrosive nature of the BALPURE system. BALPURE is approved and acceptable for use on their paint up to a dose rate of 8ppm. Therefore, the BALPURE ballast water treatment system will not impact the life expectancy of a ship.

Fresh water issue

During intermittent fresh water applications, when the salinity is less than 25% of normal seawater, the aft peak tank can be loaded with sea water and used as the slip stream water supply for the BALPURE system. The slip stream technology only requires 1% of the total ballast volume to generate enough disinfectant to meet the D2 Standard. BALPURE mixing technology further reduces the seawater requirements to 0.5% of the total ballast for this application. Therefore the capacity in an aft peak tank will typically allow enough water to provide three or more ballast filling cycles.

Best wishes,

William Burroughs
BALPURE Product Manager

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