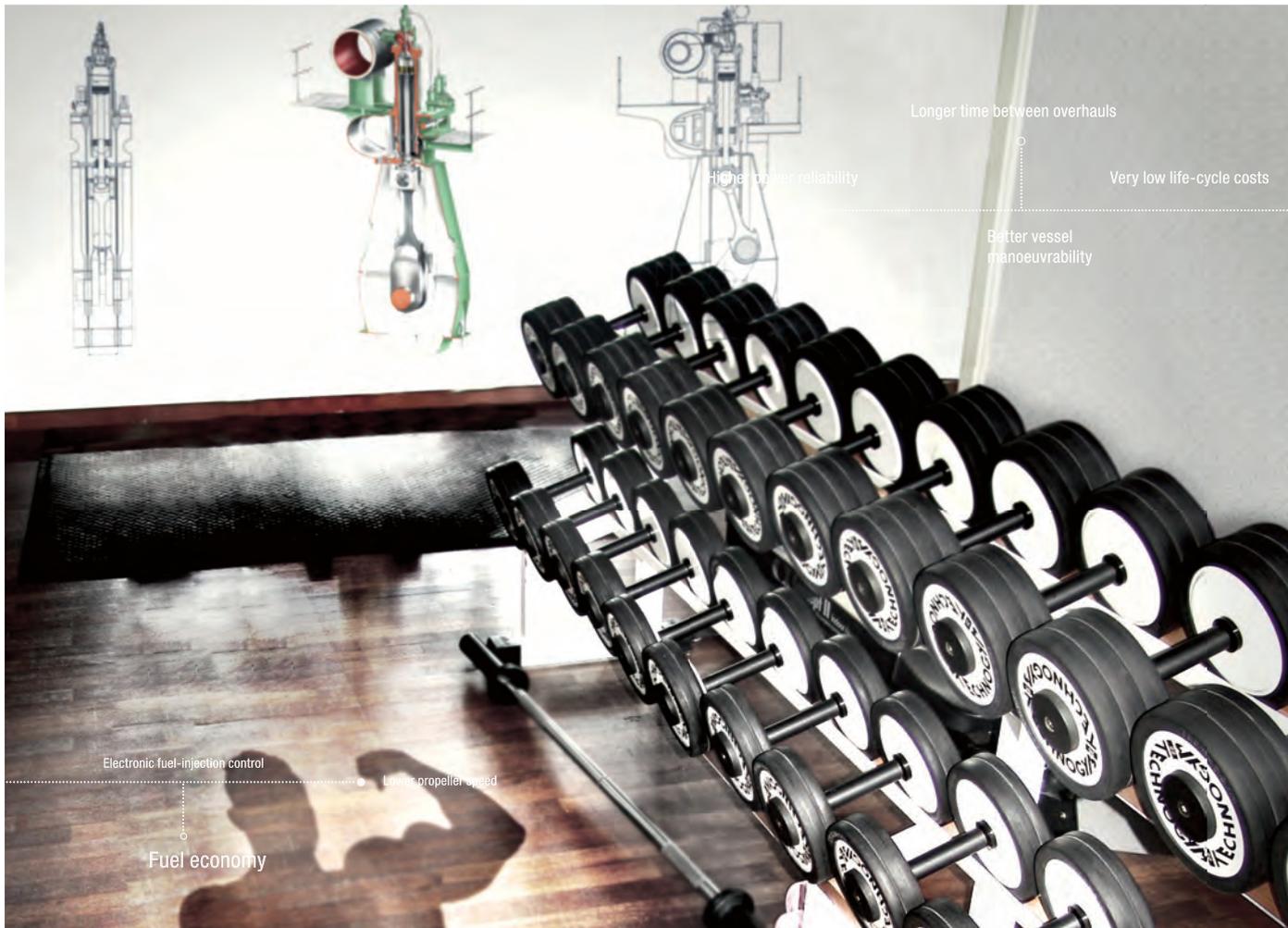




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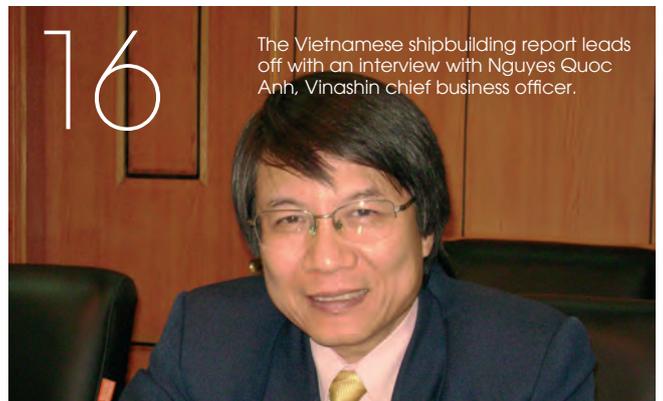
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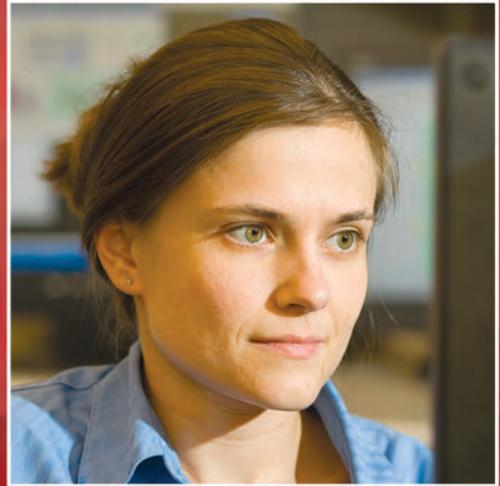
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Closed or open to debate

How it is supposed to be – *Fram* picking her way through the ice.

Two chilling reminders of the potential hazards of seaborne Antarctic tourism have occurred since the November issue of *The Naval Architect* went to press.

The first, the widely reported sinking of *Explorer*, in late November 2007, saw more than 150 passengers and crew rescued from a stricken tourist ship after the Liberian-registered vessel hit ice close to King George Island, in the Antarctic Ocean.

Gap Adventures, which owned the 2400dwt ship, emphasised that the 91 passengers, nine guides, and 54 crew members were safely evacuated to lifeboats and then transferred to the Norwegian cruiseship *Nord Norge*, before being landed safely and airlifted home, all apparently ‘in good spirits’.

However, events could have unfolded very differently, with those embarking on the upwards of \$8000 per cabin, 19-day ‘Spirit of Shackleton’ voyage getting a little bit more authenticity than they bargained for.

Explorer was passed as fit for sea by inspectors in October this year at a drydock before her tourist season began, according to Gap. Even so, the collision with ice caused a hole that, while said to be not bigger than the size of a fist, proved big enough to cause the ship to capsize and then sink.

Though less spectacular, a second incident at the turn of the year saw

an engine failure onboard the highly celebrated and newly built *Fram*, whose name alone gives an idea of its ice-going pedigree. Although the power outage lasted only 30 minutes, this was long enough for the Hurtigruten-owned ship to hit an iceberg off Browns Bluff. Power was then regained, but a subsequent cruise had to be cancelled, and the ship was sent to King George Island for inspection.

In the case of the 12,000gt *Fram*, there were no injuries to the ship’s 247 passengers and 71 crew, and nor was there any suggestion that the crushing of one lifeboat, and bending of a railing on the starboard side of the massively ice-strengthened ship would lead to an evacuation.

However, in considering what might have been, one other matter distinguished the two incidents. *Fram*, delivered in 2007, features modern, partially-enclosed lifeboats, which could be said to be better suited to sustaining life in the harshest of weather conditions. The *Explorer* evacuation, by contrast, saw passengers and crew disembarking to open lifeboats.

The relative merits of the two lifeboat types is very much a ‘live’ debate, not least at IMO, where new proposals are pending on lifeboat safety.

Enclosed lifeboats are now mandatory onboard newbuild cruiseships by order of the updated Solas convention. *Fram* features 2 x 150 capacity boats, with the rest disembarking to inflatable rafts.

It is fair to say that the passengers and crew onboard *Explorer* were lucky. Sea conditions were calm when they had to abandon ship. They nevertheless spent six hours in open lifeboats, with no protection from the elements.

Four of those rescued suffered moderate hypothermia as a result of their ordeal and, had ships willing to assist been further off, things could have been a lot worse.

Set against this is a letter from former ship master Capt Peter Newton to the *Daily Telegraph*, observing: ‘The 154 passengers and crew of the stricken Antarctic cruiseship *Explorer* survived because they took to open lifeboats, not in spite of them. [It] is wrong to assume that enclosed lifeboats offer a better chance of survival in poor weather conditions, as this assumption is not borne out by the facts.’

‘Since the introduction of enclosed lifeboats and their associated “on-load release gear”, most seafarers who have died in lifeboats have died in practice drills. The problem of finding a safe means of disengaging enclosed lifeboats from their falls has not been fully resolved, and until it is, manual release afforded in open lifeboats is much safer...even the best equipment available will not save passengers in an emergency unless they are in hands of a well-trained and experienced crew. That everybody survived the sinking of *Explorer* is testimony to this.’ NA

Gas carriers

First Polar LNG carrier

Knutsen OAS Shipping has ordered the first liquefied natural gas carrier to be specifically designed to operate in Arctic waters.

The shipowner has signed with South Korea's Daewoo Shipbuilding and Marine Engineering for what will be the fourth LNG tanker in a series, with the latest ship to be delivered by late 2010. The vessel is based on the same 173,400m³ storage capacity as its forerunners, and will feature dual fuel diesel electric Wärtsilä engines and a twin skeg propulsion solution.

However, 'NB 2275' will have the highest Det Norske Veritas Ice Class-1A, and will be winterised to operate in air temperatures as low as minus 30°C.

A Knutsen source said that the new ship would feature reinforced scantlings, while its hull would be specified as having an extended fatigue life to accommodate anticipated greater hog and sag forces generated by vibrations and stop/start motions as the ship ran through ice, while its bow section and rudder would also be strengthened when compared to its forerunners.

Discussions were continuing between customer, yard, and class over the complete propulsion solution. While a diesel electric system would be preferred, an issue remained over stresses acting on reduction gears, and whether these should be beefed up, or whether direct electric propulsion should be favoured.

Also up for discussion was the full winterisation package. There was a need to incorporate protected mooring winches in the bow area, for example, while areas of the ship, and particularly ballast tanks, would need to be heated.

Gas carriers

Largest Pacific LNG carrier

Tokyo Gas subsidiary Tokyo LNG Tanker Co has signed a shipbuilding contract with Kawasaki Shipbuilding Corp covering a newly designed 177,000m³ tank capacity LNG

The newly designed 177,000m³ capacity LNG carrier for Tokyo Gas.



carrier. It has also signed heads of agreement with Nippon Yusen Kaisha for joint ownership of the ship (Tokyo LNG Tanker: 10%, NYK Line: 90%), and a time charter for 20-year term of the carrier.

This will be the eighth LNG carrier in Tokyo LNG Tanker's fleet, but will achieve 14% more capacity than its 155,000m³ design forerunners.

Featuring four spherical Moss-type tanks, the carrier will be equipped with Kawasaki's advanced reheat turbine plant for propulsion – a first for an LNG carrier – conferring a claimed 15% higher fuel efficiency.

After its completion in 2011, together with existing LNG carriers, the ship will transport LNG cargoes from Northwest Shelf Expansion Project, Malaysia I and III Project, Darwin Project, Sakhalin II Project, Pluto Project, Gorgon Project and other projects.

Regulation

IMO bumps ballast...

Agreement has been reached at the Assembly of the International Maritime Organization to delay the enforcement dates for new ships' ballast water treatment equipment envisaged by the 2004 Ballast Convention.

Mindful of the lack of type-approved equipment capable of meeting the Convention's technical annexes, the Assembly agreed that new ships built from 2009 will not be required to have the new equipment fitted until their second annual survey or the end of 2011 (whichever is sooner). The International Chamber of Shipping, which had lobbied for the delay, said that 'a major obstacle to ratification by governments has thus hopefully been removed'. In the meantime, ICS said its members 'remain committed to performing deepwater ballast exchange, whenever it is safe to do so, and cooperating with voluntary coastal state requirements'.

Regulation

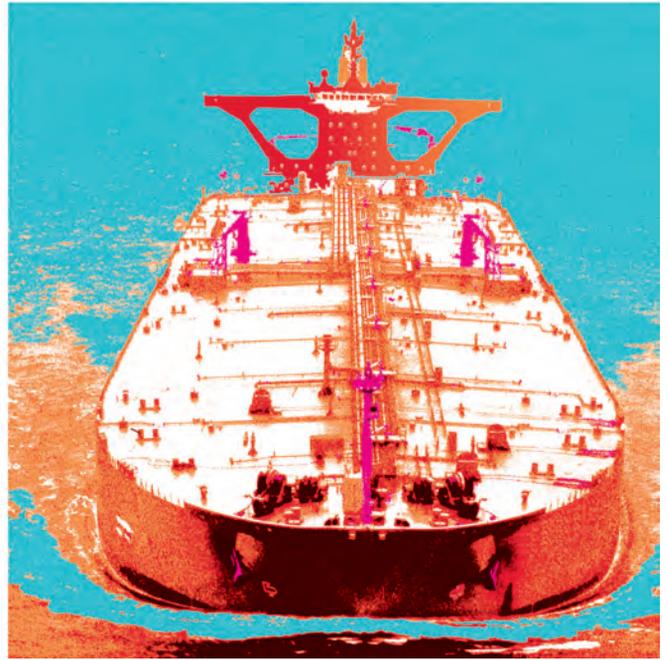
Wallenius takes lead

Wallenius Marine has signed the contract with Alfa Laval for seven PureBallast ballast water treatment systems.

The contract involves seven retrofit systems to be installed on Wallenius Lines' newest vessels. Four installations are planned for 2008 and another three for 2009.

PureBallast has been tested onboard the Wallenius car carrier *Don Quijote* since 2003. Starting with *Aida*, delivered in May 2006, PureBallast will be installed on all Wallenius' newbuildings.

PureBallast, developed in a joint venture between Wallenius Water AB and Alfa Laval, has received the IMO Active Substance Final Approval, which means it is the world's first IMO-approved ballast water treatment system. The patented method, Wallenius AOT, is the core in the ballast water treatment system.



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RO-RO

Largest ro-ro ships

WWL's owners Wilh Wilhelmsen ASA of Norway and Wallenius Lines of Sweden have also ordered four of the world's largest ro-ro vessels from Mitsubishi Heavy Industries' (MHI) Nagasaki yard in Japan for delivery in 2011 and 2012.

The new ships will service Wallenius Wilhelmsen Logistics and have a carrying capacity of 138,000m³, close to 10% more than the WW/OW partnership's most recent ro-ro carriers.

Designed in collaboration with MHI, it is said that the vessels will be very flexible and safe in the way they carry high and heavy roll-able cargoes, static non-containerised equipment, and cars. A new hull design will reduce fuel oil consumption and exhaust gas emissions. In a novel development for a ro-ro ship, the energy derived from the exhaust gases will drive the entire ship's energy needs at sea. An advanced ballast treatment system will also be installed to reduce harmful transfer of micro-organisms between different ecosystems.

WW and OW are pursuing an extensive newbuilding programme. This currently comprises some 43 vessels to be delivered up to 2012.

Class

Heavy DNV links

Guangzhou Shipyard International (GSI) has selected DNV as a partner in the classification of a pair of innovative large semisubmersible heavylift newbuildings.

These 50,000dwt vessels are purpose-designed and will be built for Cosco.

The vessels are under dual class to DNV and CCS.

Su Wei, the general manager of GSI's Marine Research Institute, said: 'Several years ago, we worked with DNV on two smaller 18,000dwt vessels for Cosco Shipping Ltd (COSL). These new vessels are much larger and more complex. The owner worked with DNV on the earlier vessels, which have done very well in the market since delivery, so the owner specifically requested to work with DNV again on this project.'

Ms Su said that the ships would have a redundant propulsion system (DNV RPS notation) and were also being built in accordance with very specific stability calculations, particularly relating to submersion for loading.

Ying Hui, the head of the DNV hull section, Shanghai, added: 'The submersion system works to a depth of 26m, which is extremely deep, so the submersion concept using compressed air is like a submarine.'

The two 50,000dwt vessels will be delivered in the second half of 2010. These purpose-built heavylift vessels have a large open cargo deck measuring 177m x 43m and will be capable of transporting the largest semisubmersible and jack-up rigs currently in the market.

The vessels are highly versatile and can handle a wide range of cargoes such as offshore structures, drilling rigs, topsides, jackets, FPU's, FPSOs, barges, and other floating and non-floating structures.

China

Jurong for Shanghai...

SembCorp Marine subsidiary, Jurong Shipyard Pte Ltd (JSPL), has entered into an agreement to acquire a 70% equity stake in Shanghai Jurong Marine Engineering & Technology Co, which offers services for marine design work. It undertakes design and drafting work assigned by JSPL.

JMET said it would recruit further engineers in China to provide the design and drafting back-up for the projects.

China

...and Blohm + Voss

Blohm + Voss Industries has launched a new sales and service station in China. The sales representative office, formerly located in the city centre of Shanghai, has been extended by a service station of its own, thus, offering all-inclusive service: sales, repair, and spares.

Located at Xinzhuang Development Zone southeast of Shanghai, the new office offers easy access to Hangzhou motorway and Hongqiao airport. With a total area of 1600m², the new building features modern office space and an air-conditioned spare parts store, as well as a workshop area.

LR class scholarships

Pictured are Dr Ulrich Förster, Lloyd's Register EMEA, Ralf Nagel, senator for ports and economics of the Freie Hansestadt Bremen and Prof Josef Stockemer of the Hochschule, following the signing of the agreement through which the Lloyd's Register Educational Trust will sponsor eight new scholarships related to marine technology and shipping operation technology studies at the Hochschule, Bremerhaven.





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Propulsion

Low-speed engine investment

Hitachi Zosen Corp announced it will be investing a total of ¥10 billion (US\$89.3 million) into two subsidiaries, Hitachi Zosen Diesel & Engineering Co Ltd (HZ D&E) and IMEX Co Ltd, in order to establish a system for the increased production of low-speed marine diesel engines. ¥9 billion of the investment will go to HZ D&E, with the remaining ¥1 billion for IMEX.

The new production system will aim to enable an annual production of 120 to 130 engines by 2012, and a total capacity exceeding 2 million hp. This latest cash injection from Hitachi follows an investment of ¥600 million for precision machinery plants to assemble low-speed engines at HZ D&E, as well as a ¥2.5 billion contribution to the finances of another subdivision, Hitachi Zosen Mechanical Corp, used to develop a total assembly plant for processing equipment, including fuel valves and fuel pumps.

Contact Hitachi Zosen Corp, 7-89, Nanko-kita 1-chome, Suminoe-ku, Osaka 559-8559, Japan

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E-mail machinery_process@hitachizosen.co.jp

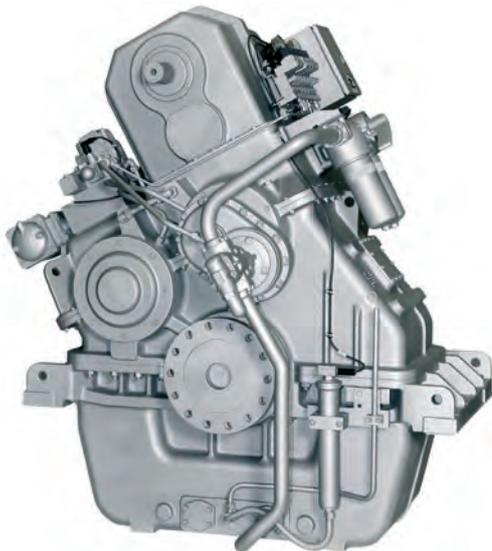
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Ancillary equipment

ZF gears up

ZF Marine has launched a gearbox series, the ZF W17000, designed for application with medium-speed engines rated between 700rev/min to 1200rev/min.

The ZF W17000 series is suitable for small chemical tankers and containerships.



The new variety is also available for reversing and non-reversing applications in a power range from 2300kW to 3000kW, making it suitable for small chemical tankers and containerships, among other vessels.

The W17000 has a maximum input capability of approximately 2300kW at 1200rev/min and a ratio range from 1.974 to 4.571. The development plan foresees a complete transmission series covering a ratio range from approximately 3.0 to 7.0, and this model extends the current offering of heavy duty gearboxes below the ZF W23000 range.

Optional equipment available includes PTOs, an integrated shaft brake for minimising the time to go astern, standby lubricating pump, pneumatic clutch actuation, and a trolling valve for slow-speed drive, especially for manoeuvring in harbour.

Contact ZF Marine GmbH, D-88038, Friedrichshafen, Germany

Tel +49 7541 77 2207

Fax +49 7541 77 4222

www.zf-marine.com

Propulsion

New plant for ABB

ABB's Azipod propulsion systems will now be manufactured at a new purpose-built facility in the Vuosaari area of Helsinki, Finland. Costing more than €30 million, the factory comprises 10,000m² of production and office premises, and was inaugurated in November 2007 by Jussu Pajunen, Mayor of Helsinki.

The plant is intended to optimise the production of electric Azipod propulsion systems, improve efficiency, and double the assembly and testing capacity. It is claimed that centralising all skills within the same facility will improve internal communication and the ability to meet customers' demands.

200 people are employed in the plant's production development, project planning, and maintenance departments, and the company is recruiting 20 engineers for specialist and management tasks.

Contact ABB Oy Marine, Strömbergintie 1B, FIN-00381 Helsinki, Finland

Tel +358 1022 11

Fax +358 1022 22350

www.abb.com

Propulsion

Voith takes to AIR

Voith Turbo GmbH & Co KG has acquired the majority of shares in AIR Fertigung-Technologie GmbH & Co KG, based in Hohen-Luckow, near Rostock, strengthening its position in ship propulsion systems.

Voith Turbo has been participating in AIR, founded in



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Ancillary equipment

More Alfa Flex

Alfa Laval has launched new S and P Flex separation systems. The company said the new range represented a rethinking of how its separation systems were supplied. It expanded and streamlined Alfa Laval's offering, creating flexible options that would let shipyards and shipowners better meet their needs and budget. Among these, are new options that improve operating ease and reliability.

A key advantage of S and P Flex separation systems was the number of possibilities for constructing the systems themselves, the supplier said. Deliveries could be as simple as a single separator with ancillaries, or as comprehensive as a four-separator module built with both S- and P-separators.

The most open-ended option would be a Flex delivery of optimised block components, which would give shipyards full say over the use of space in the engine room. By enabling local modularisation or do-it-yourself onboard assembly, block components would provide an

ideal balance between price and design control.

According to Peter Carlberg, general manager of Alfa Laval Marine & Diesel, the Flex range will also offer the smallest footprint of any modular system on the market.

Contact Alfa Laval Tumba AB, Marine & Diesel Equipment, Marketing Communications, SE-147 80 Tumba, Sweden

Tel +46 8 530 650 00

Fax +46 8 530 345 55

www.alfalaval.com

Propulsion

BG goes electric

Samsung Heavy Industries has chosen French company Converteam to supply electric propulsion aboard BG Group's two new 170,000m³ LNG carriers. Both carriers are of twin skeg design, with the first due for delivery in 2009, and the second following in 2010.

The vessels will be fitted with 675rev/min high torque density induction motors and PWM type MV7000 converters, associated with an advanced digital propulsion control system. The electric propulsion solution is said to feature high global efficiency, increased reliability and availability, reduced maintenance time and cost, and lower emissions. Converteam will also supply the generators and the main and cargo MV switchboards.

Contact Converteam, 3 av des Trois Chênes, 90018 Belfort, Cedex, France



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Ancillary equipment

Volvo gets cool

The D16 marine genset from Volvo Penta was introduced in 2006, but has recently been updated with the addition of radiator cooling availability. The new model has been developed for emergency and in-harbour duties onboard merchant ships.

'The engine and generator options are the same as with heat exchanger or keel cooling. We have also managed to retain the high power output, thanks to the high-capacity radiator,' says technical project manager Hans Jován.

The D16 MC RC is equipped with the latest version of the MCC electronic platform, which is said to allow communication over longer distances, due to MODBUS. The genset is also claimed to safely and easily integrate into a ships' onboard management system.

All models and components are said to comply with classification society regulations, and compliance is also said to be achieved with IMO NOx, EPA 2, and EU IWW emission standards, as well as DNV's Clean Design. Volvo Penta Marine genset engines can be equipped with closed crankcase ventilation, avoiding expensive piping in the ship, and it is claimed to reduce installation costs and minimise oil spill to the surrounding environment.

Contact AB Volvo Penta, S-405 08 Göteborg, Sweden

Tel +46 31 235460
www.volvo.com/volvopenta

Coatings

MarineLine uptake

PT Berlian Laju Tanker (BLT), a large shipping company based in Indonesia, recently chose its vessel *M/T Ulupi* to receive Advanced Polymer Coating's MarineLine tank coating system. BLT is owned by DongKuk Marine Co Ltd, located in Busan, South Korea, and the company has a 64 vessel fleet, totalling more than 1.71 million dwt.

Ulupi is currently chartered to BP in Indonesia, and was built in 1999. It weighs 6690dwt and features 12 tanks, which were blasted clean of their original zinc coating in order to be re-coated in China this year. The retrofit application covered 4500m².

MarineLine is thought to withstand all the liquid cargoes specified in the IBC code, and Captain of *Ulupi*, Sung Tae Lee, comments: 'The cleaning condition of the MarineLine coating is better than stainless steel tankers. Cleaning is fast and simple, with no contamination. We are working twice as fast in loading, because there are no prohibitions.'

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'Quick Check' could improve design

HSVA has introduced software which can identify design aspects requiring work.

Most ships built today are part of a larger series of already proven designs, but if an owner is embarking on a project for purpose-designed and built vessels or a vessel tailored to a specific requirement, external appraisal can be invaluable.

However, as Juergen Friesch, managing director of the HSVA in Germany noted recently, although numerical predictions and model tests of the type typically carried out on a proposed design are vastly more efficient than older, more time consuming and less accurate techniques, very often what an owner really needs is quick answers on key aspects of a design, in order that further iterations of a prospective design can be produced and blind alleys identified or problems ironed out.

As he also noted, many owners have long since slimmed down - or closed down - their own naval architectural departments, and may have little in-house expertise on which to draw, and this being the case, the HSVA recently introduced 'Quick Check', a design assessment service for new designs.

Based on a comparison of a new design with HSVA's database of design data, HSVA believes that Quick Check can rapidly identify aspects of a new design that are in need of further work, and quite possibly save an owner significant costs that might otherwise be incurred once a vessel enters service because of, for instance, excessive fuel consumption, poor manoeuvrability, or because of the imposition of operating restrictions.

Uwe Hollenbach, head of HSVA's resistance and propulsion department, said Quick Check had aroused a good deal of interest among owners, and that yards - such as Meyer Werft in Germany - and shipowners - such as Maersk - had already made use of the service, in addition to Quick Check being used on a number of large yacht projects, tankers, and multi-purpose vessels.

HSVA uses the example of a multi-purpose/bulk carrier project that was subject to a 'Quick Check' on behalf of a well-known firm of naval architects and consultants. The Quick Check of the customer vessel's main dimensions was based on a comparison of main parameters of data for similar vessels held on the HSVA database, using which its hydrodynamic characteristics were quickly estimated.

A typical Quick Check of a vessel looks at the main dimensions of the hull; propeller dimensions and pressure pulses; speed/power characteristics; economical speed; the proposed sea margin; sea-keeping characteristics; and manoeuvring characteristics.

'On behalf of the customer, a Quick Check of the main parameters and the hydrodynamic characteristics of a 149.2m bulk carrier was performed,' Mr Hollenbach explained, the main parameters of the project vessel being a length overall of 153.00m, length between perpendiculars of 149.20m, breadth of 23.10m, draught of 9.45m, and a block coefficient of 0.8237.

The vessel also had a waterplane area coefficient of 0.9239, midship section coefficient of 0.9920, longitudinal centre of buoyancy of 77.75m, and was a single 5.00m diameter propeller vessel. Design speed was 14.50knots, estimated power for design speed 5400kW, and estimated propeller revolution was 136. The vessel was to be fitted with a single semi spade-type rudder with a total rudder area including horn of 22.0m², and rudder aspect ratio of 1.72.

Comparing this and data on similar vessels in HSVA's database, the main dimensions and main dimension ratios in principle were found to be within acceptable ranges - compared to tankers and bulk carriers of similar length (with a length between perpendiculars of 140m -160m) the block coefficient of CB=0.824 is in the upper range.

However, having compared the design with tankers and bulk carriers with the same block coefficient, and tankers and bulk carriers designed for the same Froude Number, the HSVA found that, as the block coefficient was close to the maximum of comparable vessels, an investigation of further variants with reduced block coefficient should be conducted, and that these variants and their building/operating costs be compared using cash flow analysis. 'Having in mind rising fuel oil costs, designs with smaller block coefficient may have a better overall performance and thus can earn more money,' Mr Hollenbach explained. **NA**



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Shipbuilding's rising star

Vietnam's shipbuilding star continues in the ascendant. A special report by Hugh O'Mahony.

By 2015, Vietnam's shipbuilding industry has set its sights on the number four slot in world rankings.

Some US\$3billion will be invested in new facilities over the next decade. The entire \$750m raised in the nation's first sovereign bond for the international market, in 2005, was given to state-owned shipbuilder Vinashin (Vietnam Shipbuilding Industry Group), which was tasked with developing shipbuilding as key to the development of the national economy.

Vinashin's deliveries in 2007 are expected to be 271% above those sustained in 2006, amounting to 468,390dwt.

If all options are taken into account, Vinashin's orderbook now stands at over US\$10 billion and numbers over 100 vessels. The list includes a long series of 53,000dwt bulkers, three 105,000dwt Aframax tankers for Petrovietnam, a 150,000dwt Floating Storage Offloading (FSO) vessel, container vessels of up to 1730TEU, and small LPG carriers.

While anxieties have surfaced over the direction of the World Economy, shipbuilding is set to boom for the next four years at least, and now is reckoned to be an ideal time for Vietnam's ambitions to bear fruit. The race is on to see if the builder can gain sufficient experience to build a range of high quality ships while retaining its low cost base. If so, it could remain most resilient in the case of any downturn.

Vinashin oversees 27 operational shipyards and 11 more that are under construction. It also owns six shipping companies, nine construction companies, and 12 joint ventures.

Vinashin chief business officer, Nguyen Quoc Anh, said that shipbuilding played a key role in government plans for the wider maritime industry to contribute 50% of the nation's gross domestic product by 2015.

The builder made its true international breakthrough in 2004, when Graig Shipping entered the Vietnamese market with an initial order for five 53,000dwt,



Vinashin chief business officer, Nguyen Quoc Anh: shipbuilding is playing a key role in government plans for the wider maritime industry.

DNV-classed Handymax bulk carriers. The shipowner now has some 21 'Diamond 53s' on order at Vinashin, with a further 10 'Diamond 34', 34,000dwt vessels also confirmed.

Working with KPMG, Vinashin was now heading towards a public rating in early 2008, in a move Mr Anh said would bring about new levels of transparency for the state-run group.

He added that Vinashin's six shipping line subsidiaries currently operated tonnage equivalent to 728,818dwt (84 ships) but that this would increase to 1.5m dwt (154 ships) within five to seven years, with the new tonnage a mixture of tankers of between 50,000dwt and 100,000dwt, containerships, and bulk carriers. These ambitions would help Vinashin deal with fluctuating demand.

But the shipbuilder is looking beyond its current international start-up phase, to more complex ships, including larger LPG carriers and the ro-pax market. *Mediterranea di Navigazione*, for example, recently ordered four 4500m³ LPG units from the Bach Dang shipyard, to be delivered in 2009 to RINa class.

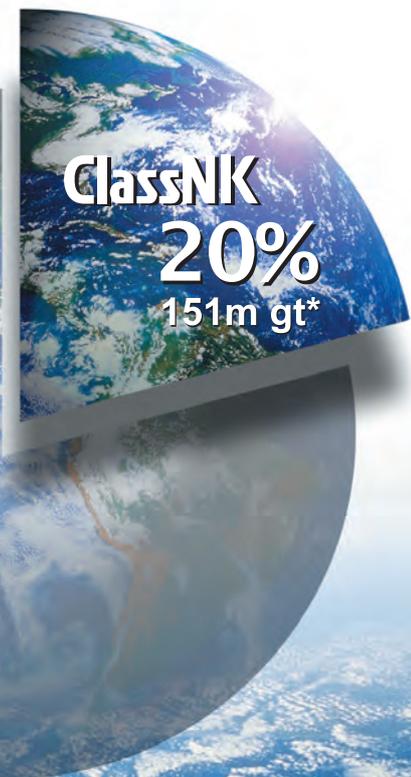
'Our target is not to stay with simple ships, because there will be big competition from the new and private yards in China,' said Mr Anh. We will try to concentrate on niche markets where there is less competition. We intend to be building ro-pax ships after 2010 and we need to prepare now.'

Steps are also in place to deliver design, as well as construction know-how. Poland's CTO is acting in a consultative capacity over the construction of a new 150m long model basin with its own cavitation tunnel at Hoa Lac, intended to be up and running within two years. Meanwhile, Vinashin has formed a joint venture – Vinashin Kitada – which is looking to develop a new Handysize bulk carrier design. The Vietnamese shipbuilder is also working with Far East Design to come up with detailed designs at shipyard level for a 7500m³ LPG carrier, to be built at the southern Sesco yard for Sinpetro and to Class NK specifications, and a 13,000dwt cement carrier.

'Naval architects need five to seven years to mature, working in a good engineering environment,' said Mr Anh. 'Our engineers and architects will grow as projects unfold.' **NA**

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Support in preparation of machinery/piping class documentation.
- Fjellstrand, Norway: workshop documentation of flying cats/catamarans.
- Bergen Mekaniske Verksted AS, Norway: workshop documentation, including outfitting 3D coordination for Y160 project (seismic vessel), workshop documentation of hull and Engine Room 3D coordination for Y161 project (ROV/Construction vessel).
- Gdansk Shipyard, Poland: supervision of hull construction and piping of Y160 vessel.
- Lloyd's Register.
- Groot Ship Design, The Netherlands: hull outfitting and ER arrangement documentation for general cargo vessel .
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Ha Long builds on experience

The northern yard is extending its portfolio of ships offered and its management will be integral in wider shipbuilding expansion plans.

Established in 1976 on just 20 hectares of land, with the assistance of the Polish Government, Vinashin's Ha Long Shipbuilding Co was the first of Vietnam's yards to build vessels of above 3000dwt.

By 2000, the northern yard was building oil tankers and general cargo ships of around 3600dwt, but significant investments were in the pipeline that were about to transform Ha Long into a builder of much larger tonnage for an international clientele.

Since that time, two new slipways have been initiated, one of which is complete and of around 50,000dwt capacity, making the Quang Ninh province yard eligible to participate in Vinashin's breakthrough order from Welsh shipowner Graig, covering a series of 53,000dwt double hull bulk carriers, the 'Diamond 53' class – the largest ships to be delivered from Vietnam to date.

The yard has a confirmed nine-ship share of the orders from Graig for these 190m long, 32.26m wide, and 17.5m high ships, designed in a collaboration between Denmark's Carl Bro Design Co and Graig itself, and built under the supervision of Norway's DNV. However, this number is expected to rise to 15 ships, as options are taken up, according to sources close to the owner.

These double bilge ships feature 5.9m diameter screw-propellers, five holds, and four cranes apiece. They include minor refinements over the Diamond 53 ships under construction in China, with extra brackets included on the hatch coamings, for example, and a changed engine room layout.

Ha Long delivered the first of its commitment to Graig in June 2007, in the shape of *Florence*. Infamously, this ship took on water at the point of launching, with damage caused when it came off the slipway. However, having been patched up, the ship is operating satisfactorily and is now trading with Turkish shipowner Deniz Nklyat Vesanyai.



Ha Long Shipbuilding Co general director, Nguyen Duc Than.

The second ship in the series, *Blue Diamond*, was due delivery in December 2007, while the third in the series, *White Diamond*, was launched in November. These two ships are due for final delivery to Ofer Shipping. The fourth ship was under block erection at time of writing, and is the first of three due to find its way into the fleet of Croatian owner Atlanska Plovidba. The remaining three confirmed ships are also set to be taken over by Ofer.

The yard's second slipway will offer capacity of 70,000dwt, and is already equipped with a 400tonne lift capacity crane. It is due to be completed by second quarter 2008, after which it will play host to construction of eight 4900 unit capacity pure car and truck carriers for Ray Car Carriers, of Israel, in a deal which also includes options for eight more vessels. Work has already begun on the first of these US\$50 million, Panamax-beam ships.

Also under construction is a new 50,000dwt capacity drydock.

Next year, reflecting the reorganisation of the wider Vinashin Group, the Ha Long yard will change its name to Ha Long

Shipbuilding Corp, increasing its number of subsidiary companies from seven to 10. For the moment, however, the shipbuilder has been concentrating on gaining the experience it needs to take forward its current workload.

Ha Long Shipbuilding Co general director, Nguyen Duc Than, described the steep learning curve that had faced the yard in delivering the first of what are comparatively complex bulk carriers to Graig. He said that the sheer speed of development of the yard, which over a five year period saw employee numbers swell from 1000 to 5000, had proved challenging.

'It took time to train our new workers,' he said. 'It also took time to put the management system in place and for our engineers to acquire the experience to arrange production effectively. Especially difficult was the supply of equipment: we have to import nearly all of the equipment and materials we use and there have been occasions when mistakes have been made, when either spare parts or documentation have been missing.'

VIETNAMESE SHIPBUILDING



Florence, the first Diamond 53 to be delivered by the Ha Long yard to Graig.

The strain had shown in slippage in the delivery schedule, but Mr Than emphasised that the teething troubles had gradually been rectified through the construction of the second vessel in the series.

‘It’s been a challenging project but it’s gone well, thanks in the main to Graig’s operating know-how with dry cargo tonnage, and DNV’s direct input on structural and regulatory issues.’

Vinashin and Graig had agreed a revised schedule of delivery. ‘We expect that, from the fourth ship on in the series, our schedule will be steadier and smoother,’ said Mr Than. ‘Our people will have acquired the relevant experience to achieve that. You have to remember that we have grown up fast from being a very small shipyard.’

Now, however, the yard is working on a range of shipbuilding projects. It is building a series of 53,000dwt bulk carriers for domestic owners, as well as five 23,000dwt, 1730TEU containerships, classed by Germanischer Lloyd, for Vinashin Shipping Co. The first in this series, *Vinashin Dragon*, was launched in 2007, with delivery scheduled for the end of the first quarter of 2008. These ships are 184m long and 25m wide. Also under construction is a 12,500dwt general cargo ship, also for domestic owners.

Furthermore, the Ha Long yard also recently laid the third keel of three 8700dwt general cargo ships for Japan’s Kanematsu,

which has been selling on Vietnamese-built tonnage to Japanese owners since 2004. The customer’s first contract consisted of an order placed with Bach Dang Shipyard, in July 2003, to build a general cargo ship on behalf of Noma Shipping Co. Construction was completed in December 2004. Kanematsu reported that the vessel had been well received by its operators.

Kanematsu subsequently ordered two 8700dwt general cargo ships from Vinashin’s Ben Kien Shipyard, following up with an order for a 10,500dwt ship to be built by the Bach Dang Shipyard.

The Ha Long yard faces a further step up in sophistication to execute its newer contract with Ray Car Carriers. The vessels, designed by Italian company Naval Progetti, are to be 185.6m long, 32.26m wide, and 36.56m high.

‘This project is very new to all of us,’ said Mr Than. ‘After reviewing the drawings, we have identified the complexities involved. We will need to pay special attention to the fact that the steel plate used for car carrier construction is very thin and can easily suffer from deformation during fabrication. Again the ro-ro system involved, with its side ramps and aft ramps, is very complicated, involving a huge amount of equipment. At the same time, the accommodation areas on the 13th deck need to be finished to a five star hotel standard.’

But Mr Than is convinced that the Ha Long yard is up to the task. ‘From the top management down in this company, any difficulties are being overcome as we gain experience. We will overcome any difficulties and produce vessels to the highest quality.’

The first ship in the car carrier series is due delivery by the end of 2008, although Mr Than said that experience so far gained had brought caution, with it being critical that all issues were ironed out before the delivery of the first ship in any series.

To remove one potential stumbling block, the Ha Long yard has asked shipowner Ray to take charge of equipment supply in the case of the first ship, while risks have also been limited by engaging ro-ro access equipment TTS as a subcontractor.

Ha Long is due to benefit from a new slipway and a new drydock. But the experience gained at the yard will also prove critical in the future development of Vietnam’s wider shipbuilding prowess. Just 150km north of Ha Long, near the border with China, there is due to be a major new facility – Hai-Ha Shipyard Co - in which Ha Long management will be intimately involved.

The US\$1 billion shipbuilding and industrial complex, which will include its own steel mill and will cover a total area of 500hectares, will feature two new drydocks and will be used for VLCC-sized ships. It is due to be in operation within five years. **NA**



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Nam Trieu enters uncharted waters

Nasico's learning curve now extends to a bold plan to build state of the art car carriers.

With 12,000 workers, the core business of the multi-faceted Nam Trieu Shipbuilding Industry Corp (Nasico) remains its 7000-strong shipbuilding operation, and its growth since 2000 has been exponential. Back then, Nasico was a small shipyard, with 300 workers, focusing on the construction of ships of up to 1500dwt.

Now, Nasico has 29 diversified subsidiaries, stretching from the north of Vietnam to the central region. It is the first company within the Vinashin Group to supply internationally-classed welding electrodes and solid and flux-core welding wire direct to shipbuilders through subsidiary the Nam Trieu Welding Co.

Over the same period, its shipbuilding capabilities have surged forwards, with orders now on the books for large bulk carriers, containerships, car carriers, and a floating storage and offshore vessel.

The yard had cut its teeth in the international arena for larger tonnage by mid-2007, delivering *Graiglas*, the second Diamond 53 bulk carrier to be built in Vietnam, and the first of Nam Trieu's commitment to owner Graig Shipping. The yard's forward bookings for Diamond 53 ships now extends to 12 confirmed ships, with other options expected to come forward.

Graiglas was delivered to Graig's own account, but has since been registered to Norwegian owner V Bulk, and the ship is now trading as *Vela* under the management of Fleet Management.

In April 2008, Nasico will deliver the first of a confirmed four 700TEU containerships, ordered by MPC Marine for third party owners, and built to Germanischer Lloyd class. This order has options for four more ships attached.

Nasico is also building three 56,000dwt bulk carriers for Itochu Corp, with the design coming from IHI Marine United, and the ships being built to Class NK specifications.

The yard is also working on the construction of a single 13,500dwt capacity



Next in line for delivery – *Sophia*, a 53,000dwt double hull bulk carrier.

tanker for domestic Vinashin Shipping Co, in a project that a spokesman said would offer a significant learning opportunity. The ship, to be built to a Chinese design, will feature five coated tanks.

In January 2008, steel cutting was due to start on the yard's latest prestigious order to build an initial four 6900 unit capacity, Deltamarin-designed pure car and truck carriers for Hoegh Autoliners (see pp29-31).

Nasico continues to add new products. Also set to test the sophistication of its building techniques will be the 150,000dwt FSO order Nasico has secured from Petrovietnam, to be built under ABS class. Work is already underway on this vessel, whose design originates in Poland. Final delivery is set for early 2009.

To realise its ambitions, a new hull shop is coming on line, featuring brand new equipment, as are two new shops for blasting and painting. A new 50tonne capacity gantry crane will be installed in 2008 to enhance block handling. Again, worker training by Class is a continuous process.

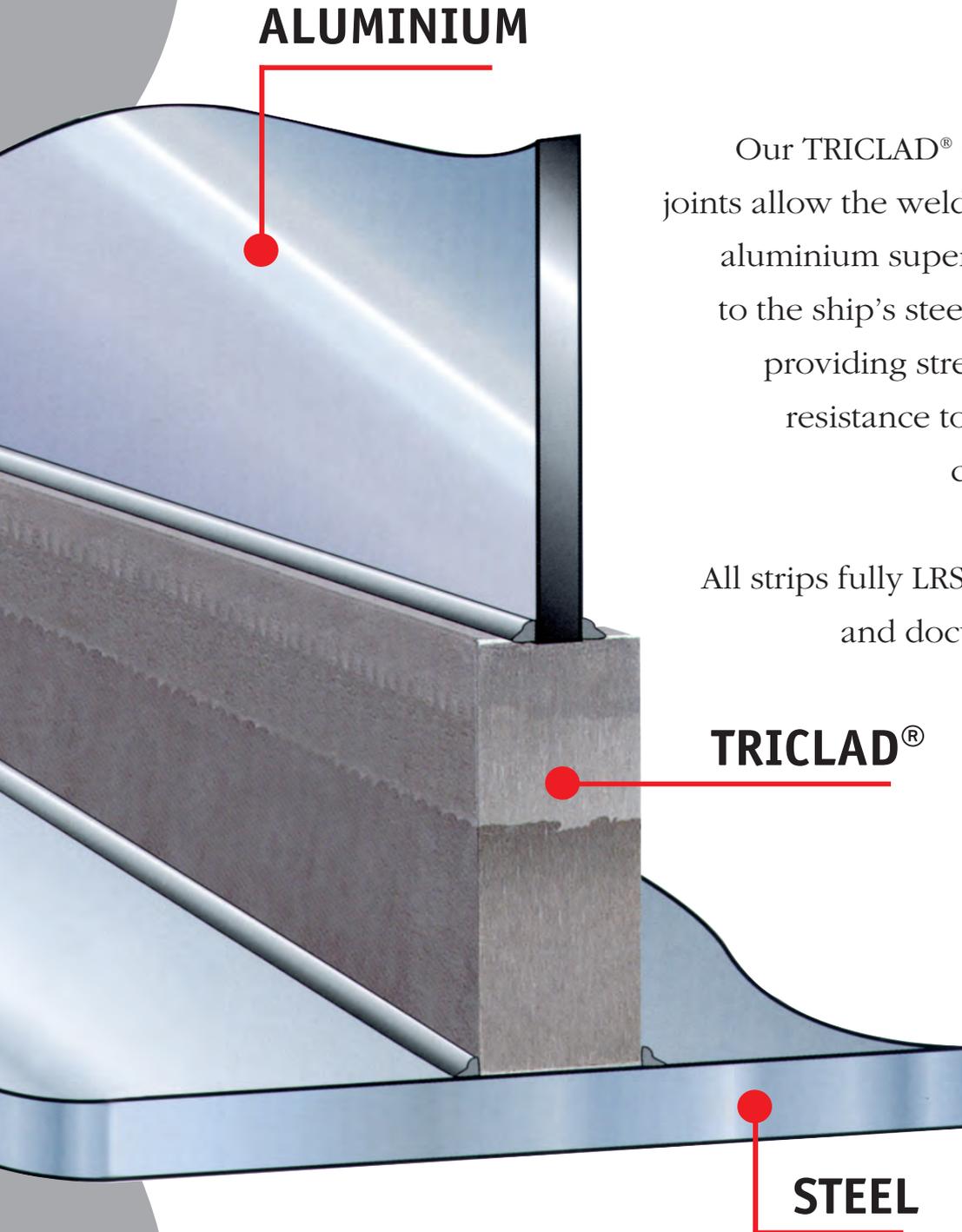
'After the first Diamond 53, we learned a lot, and gained the experience that has made our production more effective,' said the spokesman.

According to one owner with build experience at Nam Trieu, who preferred not to be named: 'Slipway work is improving and so is fitting out. It remains a good choice to build in Vietnam, because the people here are willing to learn and to accept recommendations from their customers. In some other countries, the yards listen, then do it their own way.'

The Nam Trieu yard has two 70,000dwt capacity slipways and a smaller 20,000dwt capacity slipway, but its ambitions are clear, with plans in place to build a further 70,000dwt slipway, while work is set to start in 2008 on construction of a new drydock at Tien Lang, on the mouth of the river at Haiphong, capable of building and repairing ships of up to 300,000dwt, with completion set for 2011. A new floating dock, capable of handling vessels of between 8000dwt and 24,000dwt, is also planned at the same site, which is to be dedicated to shiprepair. **NA**

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Far reaching Pha Rung

Pha Rung is building its first 34,000dwt ship, but this simply scratches the surface of the yard's ambitions.

Vinashin's Pha Rung Shipyard Co has confirmed an order for five 13,500dwt, Type 2 chemical and oil tankers from Iason Hellenic Shipping Co, with delivery set between 2008-2010, in a deal that also sees options for five more ships attached. All will be built to DNV ice class 2.

The contract, worth over \$20 million per ship, sees the design coming from South Korea's Far East Engineering. It is the latest example of the growing set of orders for specialised tonnage for the Pha Rung yard, near Haiphong.

Established with Finnish governmental sponsorship in 1984, the yard operated as a repair facility until 2003, concentrating on ships of up to 15,000dwt, its maximum drydock capacity. Since turning to the newbuild sector, the Vinashin subsidiary's drydock has completed six ships, five of 6500dwt and one of 12,500dwt, all of them general cargo ships for domestic owners.

However, the shipbuilder has just launched the first in a series of five 6500dwt chemical and oil tankers for South Korean shipping line Fortune Marine Co, with the detailed design bought in from China. These ships will each feature 12 tanks, split between mild steel and MarineLine-coated tanks.

As well as being significant in its own right, this order is seen as a stepping stone for the yard in its quest to build larger tonnage of greater complexity.

As at other Vietnamese shipyards included in this report, it is Graig Shipping that has been taking a lead in stretching the yard's capabilities for an international audience. The first of the new generation of Diamond 34, 34,000dwt bulk carriers is now on the slipway at Pha Rung. This is the largest vessel that Pha Rung has built to date.

The first of a confirmed four ships, featuring 14 storage hoppers, is due to be launched in February 2008. Six other ships are understood to be in the pipeline.

The Handysize bulk carrier, to a Graig



Pha Rung Shipyard Co deputy general director, Le Manh Truong, in front of plans for the Song Gia shipbuilding complex.

Carl Bro design, will be a geared, five hatch double hull ship, which builds on the success of Graig's Diamond 53 double hull Handymax design. On placing the firm order, Graig chief executive, Hugh Williams, commented: 'We have had excellent feedback from the five Diamond 53s already delivered, and we have developed this new Diamond 34 based on the same concepts. We are also very happy to extend our cooperation with Vinashin, which allows them to further develop their yards and Graig to procure excellent tonnage with early delivery dates.'

As with the Diamond 53, Graig is emphasising that the double hull concept will ensure easy discharging and cargo hold cleaning, as well as a strong and robust hull structure and good environmental protection, with all bunker tanks to be coffered from the ships' sides. The bulkhead framing and side frames will all be outside the holds, ensuring clean surfaces in the holds. Cargo friendliness will be ensured with large hatch openings

and no lower hopper side tanks in holds 2, 3, and 4.

Pha Rung Shipyard Co deputy general director, Le Manh Truong, conceded that the construction schedule of the first ship had been pushed back, but commented: 'This is a brand new design from Carl Bro, and our company is the first shipyard to build this type of ship. At this moment we are carrying out building work, but aspects of the design are still being revised.'

Now, with the Hellenic order, Mr Truong said the yard was entering a new field of sophistication. 'Contracting to build five 13,500dwt chemical and oil tankers for Hellenic will build our image and reputation. Demand for this type of ship is high and these ships are ideal for our existing drydock.'

Mr Truong added that the shipyard was now in negotiations with owners covering up to 10 x 50,000dwt oil tankers, up to 10 x 81,000dwt bulk carriers, and a series of 3200TEU capacity containerships.

Like other yards, Pha Rung is pursuing



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continuous improvement in its production processes. 'Vietnam is a fast developing country,' said Mr Truong. 'When supervisors from the owners and the class societies give their requirements, we try our best to meet them, and also always have in mind that we have to develop more and more. We do not force the class societies and owners to follow our requirements. Instead, we take a step by step approach, following their requirements strictly and carefully, because we are trying to meet their requirements on quantity and quality.'

'We are new in the field of shipbuilding for export and we are still learning many lessons.'

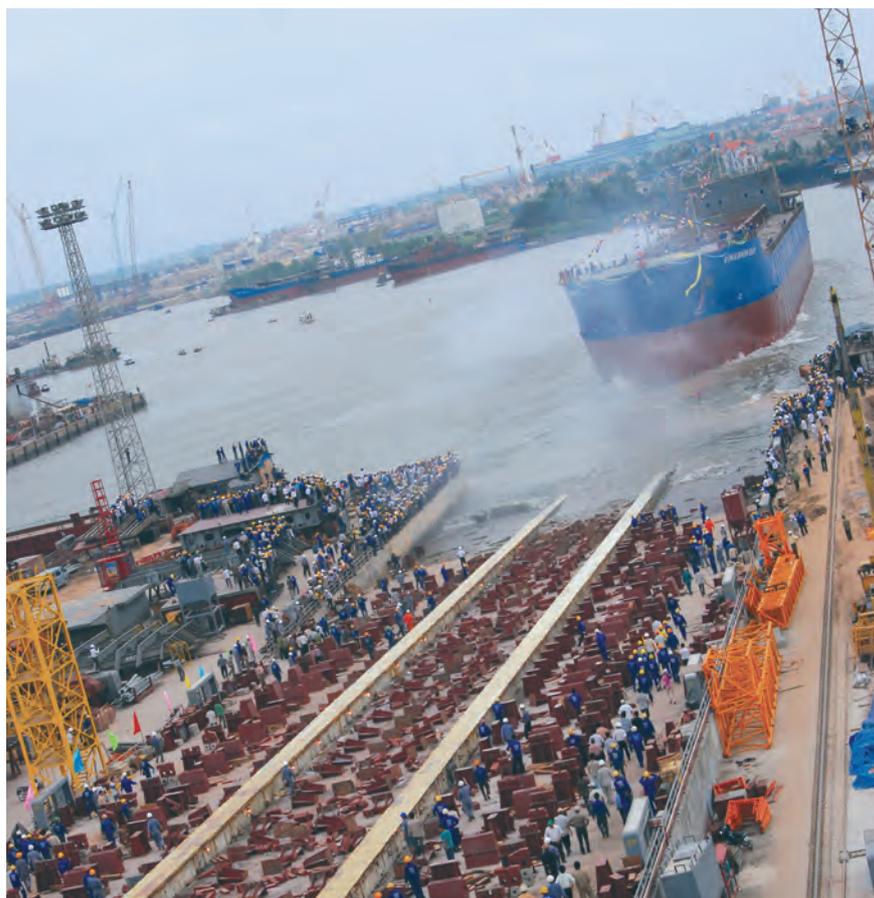
Mr Truong said that the shipbuilder was operating its own training college, which processed around 1000 workers per year.

Meanwhile, to date, it is fair to point out that all basic and detailed designs have simply been bought in. However, Mr Truong said steps were being taken to build design knowledge in-house. 'We have established a technical department of over 40 engineers,' he said, 'and we have also bought some designs from overseas for study, and in the future we will have to design for ourselves. We also have a joint venture with the shipbuilding department of the Vietnam Maritime University covering technical designs: in the future we will be able to offer complete designs and system designs.'

Also, like other Vietnamese yards, current developments simply scratch the surface of the ambitions laid out for management at the Pha Rung yard which, by the end of 2007, will transform itself into the Pha Rung Shipbuilding Industries Corp, a company with 25 subsidiaries.

Mr Truong envisaged an additional move into drilling rigs for the existing facilities, but Pha Rung Shipyard Co is also overseeing the creation of two massive new neighbouring shipyards. Construction has already begun on the first of these, known as Song Gia Shipyard, right next to the existing yard. At 100hectares, this facility will be three times the size of the current yard, with the project due to be complete by 2011 at the latest. Song Gia and Pha Rung will operate under one corporation.

With two new slipways and a single



Launch of a 20,000dwt general cargo ship for Vinashin Maritime Co (Vinashinship), due delivery in December 2007 (picture courtesy of ABS).

drydock planned, the yard will be capable of building 26 ocean-going ships a year, focusing on vessels of between 50,000dwt and 70,000dwt on the slipways, and ships of around 100,000dwt in the drydock.

Priority is being given to workshops, with some set to be in production as early as 2008, by when the drydock and a first slipway, equipped with a 450tonne capacity crane, are due to enter initial operations. From then on, work on future Diamond 34 vessels will be transferred to Song Gia.

With 2500 workers at the current facility, the new yard will need a staff of between 5000 and 6000 to become fully operational. Mr Truong said a number of the existing workforce would transfer across to the new yard when the time comes, so that the expansion could be pursued on a 'two stream' training basis.

Also on the cards is the creation of the Yen Hung Shipyard, alongside Song Gia,

which is due to completed by 2012-2013. The facility will have the same capacity as Song Gia.

The creation of these two facilities will see the corporation overseeing Pha Rung and its partner yards taking control of the management and dredging of the Haiphong River, while Mr Truong also said that all three shipyards would be served by a newly constructed plant whose role it would be to build blocks.

Furthermore, the shipbuilder was overseeing the construction of a completely new 230hectare port and industrial zone, at Dinh Vu, which was due to be operational in 2009. With 630m of quay, and served by its own container freight station, the port would operate as a general cargo and container handling facility, receiving vessels of up to 20,000dwt, and would serve as an import hub for shipyards, but also as a general purpose facility for third parties.

NA

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PCTCs take Vinashin to the next level

Höegh Autoliners and Deltamarin have developed a new generation ro-ro car carrier design with an emphasis on environmental features, to be built in Vietnam.

Steel cutting is due to start at Nam Trieu Shipbuilding Industry Corp on an initial quartet of new generation 'Horizon' pure car truck carriers for Höegh Autoliners.

The project represents a major step up in sophistication for Vietnamese shipbuilding.

It follows on from the agreement signed between Finnish designer Deltamarin and the Nam Trieu yard covering the detail and production engineering for the project, in a contract also including engineering assistance and production planning support provided by Deltamarin in Vietnam.

The design effort started with extensive concept development work through basic design and procurement assistance and is continuing with detail and production engineering.

During the concept development and basic design phase, in-house developed parametric 3D CAD modelling using CATIA software has been utilised in visualisation, optimisation, and interactive development together with Höegh Autoliners.

From the very beginning of the project, information management has been handled using the Kronodoc-based Delta-Doris system. Delta-Doris is an internet-based information management and document storage system. It is accessible with an internet browser irrespective of geographical location and time of the day. Deltamarin provides the parties involved the access to Delta-Doris during the performance of the work. All the essential



The new Höegh Autoliner Horizon class will see first time PCTC-builder Vinashin delivering new generation ships.

information generated during the project is stored in the system server, which provides the basis for the real life cycle support.

Advanced 3D modelling techniques are used in the detail and production design work using TRIBON as the main tool. The completed engineering documentation will provide all necessary work execution information enabling work preparation, material handling, fabrication, outfitting, and onboard installation work. The scope of engineering work includes all engineering disciplines: hull, deck outfitting, interior, HVAC, machinery, electrical, and automation.

The Horizon Class Pure Car Truck Carrier will be built in every respect as a new generation PCTC intended for worldwide service, able to carry trucks, cars, roll trailers, and road trailers.

Throughout the design phase the target has been to introduce a vessel meeting high environmental and safety standards.

Green concepts

The design includes an aerodynamically shaped bow section to reduce wind resistance, as well as optimised hull design verified by a comprehensive series of model tests to provide reduced energy consumption.

In addition, the vessel will have higher cargo

capacity than vessels with the same dimensions and can carry about 7000 car equivalent units.

TTS has been selected to design and supply cargo access equipment.

The vessel will have 13 cargo decks, including five liftable car decks. Decks 5 and 8 are watertight decks and there will be access to the vessel through one 150tonne stern ramp and one 22tonne side ramp.

A two-row pillar arrangement has been selected to ensure fluent traffic flow and optimised cargo stowage capacity.

A completely new design of the bow will give additional cargo space.

The so-called hinged design has been chosen for the hull structure in the upper decks to enable maximum freedom for location of ramp ways and minimum traffic obstructions as well as increased utilisation of deck area. Frame spacing and web spacing have been adjusted to take the corresponding loads.

The double bottom consists of a horizontal divided compartment, where there will be water ballast tanks in the bottom, and fuel oil tanks on the top.

The main propulsion machinery consists of one low-speed MAN B&W 7S60 ME-C mark 8 diesel engine driving a controllable pitch propeller. The main engine is electronically controlled for low emissions.

TECHNICAL PARTICULARS

Höegh Horizon class PCTC

Length, oa (maximum)	199.90m
Length, pp (about).....	190.00m
Breadth, moulded	32.26m
Draught, design	9.00m
Draught, scantling.....	10.00m
Height to deck 5.....	14.04m
Max air draft.....	46.90m
Mean speed.....	20.5knots

Diamonds are forever



The Graig Group is proud to be working with Vinashin to deliver future-proof bulk carriers. The first vessels, the largest ever built in Vietnam, are successfully in service. There are currently 27 Diamond 53 handymax bulkers and 14 Diamond 34 handysize bulkers building in Vietnam under Graig supervision for Graig and its partners.



For more information on sparkling new bulk carriers and our Vietnamese programme
contact chris.williams@graug.com www.graug.com

A controllable pitch propeller was chosen to improve safety and reliability through improved sea-keeping performance in rough seas as well as through improved manoeuvrability at slow speed. Overall performance of the vessel will be improved in actual service as a result, and thus energy consumed is reduced.

The design includes dedicated tanks for low-sulphur fuel. All fuel oil tanks are separated from side shell or bottom plating.

Ballast water solution

OceanSaver has been selected for the ballast water treatment system to comply with the stringent IMO Ballast Water Performance Standard.

The system consists of three treatment stages:

- Separation of 'larger' organisms by filtration
- Supersaturation with nitrogen — and thereby reduction of the oxygen level
- Hydrodynamic cavitation by manipulation of the water characteristics

The functional system design and the treatment unit form a ballast water system where the tank ventilation is managed by backpressure controls, leaving the tanks inert in the dry condition. This eliminates oxidation of ballast tank coatings and enhances the effect of the hypoxic water when the tank is wet.

The whole process takes place while ballast water is pumped into the ballast tanks without delay for the ballast handling. The process restores the level of dissolved oxygen in the water during discharge.

The electric power will be generated by two STX-MAN-B&W 9L21/31 diesel generator sets and one shaft generator of 2000kW. The auxiliary generators will supply ship's network at harbour, during manoeuvring, loading/unloading, and at sea as alternative for shaft generator. The shaft generator will supply electric power for ship's network at sea and it will also be used for power feeding of bow thruster.

Vessel survivability meets the new SOLAS 2009 damage stability rules. Extensive platform optimisation work has taken place to optimise to subdivision, tank arrangement, and reduce required ballast amounts in typical loading conditions. **NA**

Class Particulars

The Höegh Horizon Class of vessel will be built for operation under NIS flag and under special survey of Det Norske Veritas Class notation: +1A1, Car Carrier, MCDK, ICE C, E0, NAUT-AW, CLEAN, TMON, BIS.

The vessel is to meet the new harmonised damage stability rules (IMO Resolution MSC 194 (80)) as well as fuel oil tank protection according to forthcoming MARPOL annex 1, regulation 12A.

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The building blocks of ship construction

Building homegrown industries capable of supporting shipbuilding will be critical to Vinashin's bold vision.

Where Vietnam's local shipbuilding equipment content currently runs at around 30%, key blocks have been put in place to foster the advancement of the nation's ambitions.

Critical here will be meeting Vinashin's self-imposed 2010 target for local content to rise to 60%, and Vinashin has been cultivating cooperation with foreign manufacturers to achieve these bold plans.

Vinashin has long been open to joint ventures and partnership deals with foreign investors. As long ago as 1999, Vinashin formed the partnership with Hyundai Mipo Dockyard that would result in the Hyundai-Vinashin Shipyard at the port of Nha Trang, with the Vietnamese state company holding 30% of equity.

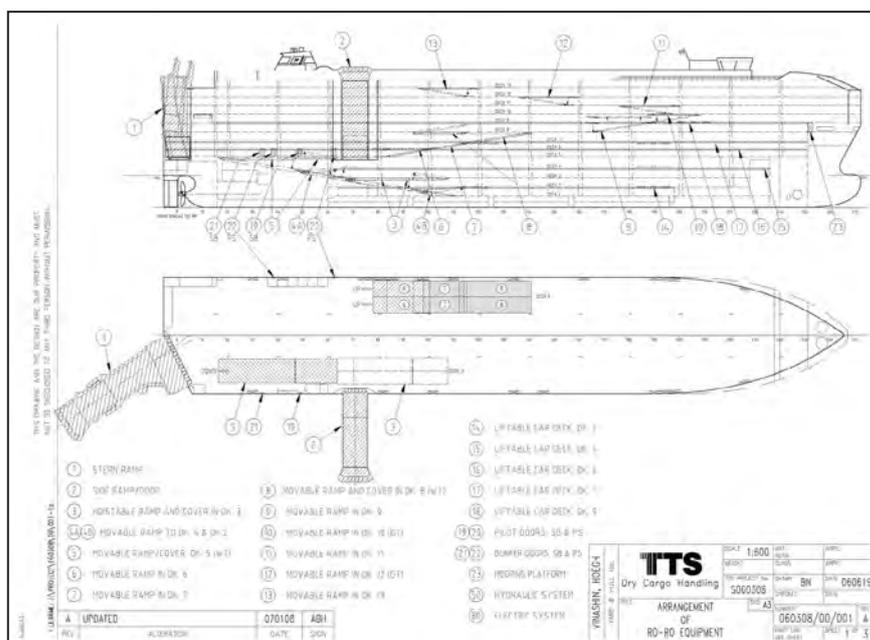
Vinashin has also shown itself willing to partner other overseas yards. Damen has signed with Vinashin to develop a joint venture shipyard in Haiphong, in the north of the country, to build vessels of up to 10,000dwt.

Furthermore, the shipbuilder has entered into an agreement with a team of ex-managers from Hyundai Mipo looking to set up a homegrown block production facility. Vinashin holds 51% of the new Songsan-Vinashin Co, which plans to build a new plant to turn out blocks, flat segments, and block curves, with capacity of 102,720tonnes per year, in the Vinashin-Shinec Industrial zone, Haiphong.

Now, however, after the nation's accession to the World Trade Organization in early 2007, foreign investors have been piling into Vietnam, and a key area for investment has been the fundamentals of shipbuilding.

South Korea's Posco, Malaysia's Lion Group, and India's Essar all have joint venture plans to build steel mills in Vietnam, while Vinashin said a 350,000tonne per year capacity hot-roll steel mill was scheduled for development near Haiphong by next year to serve surrounding shipyards in Vietnam's northern building enclave.

Ha Long Shipbuilding Co general director, Nguyen Duc Than, was in no



Layout for the cargo handling equipment for Höegh Autoliner's latest PCTC, with fabrication to be carried out in Vietnam.

doubt as to the impact such steps will have. 'If we can supply steel plate locally, it will cut costs to 30%-40% of their level today. As well as being cheaper in general, we will reduce the transportation fees and the storage fees and, after steel cutting, there is the huge amount of scrap steel that the shipyard can gather and return to the mills. At the moment, we import 100% of our steel from China, so if there are even small delays it can lead to big difficulties for us. After domestic mills come into operation, our voice will be more effective.'

From the ship's equipment point of view, Aalborg Industries, of Denmark, has proved the trail-blazer. In 2005, Aalborg formed a joint venture with Vinashin to manufacture boilers in Vietnam. By March 2006, it had opened a new factory in Haiphong, with capacity to build between 70 and 80 boilers per year, and lots of room for expansion. For the moment, the majority of boilers built by the new facility are exported, because Vietnamese-built vessels of the size suitable for Aalborg's production have been

few in number to date. However, the nature of the orderbook now in place indicates that this will change.

TTS Vietnam opened for business in Haiphong City at the end of 2006. To date, its role has been to support deliveries of TTS-built hatch covers to the Nam Trieu and Pha Rung shipyards, but it has also now been contracted to supply both hatch covers and deck cranes to the Ha Long yard.

According to TTS Vietnam, a 20,000dwt capacity bulk carrier under construction for Vinaships at the Pha Rung yard will feature TTS hatch covers fabricated by the shipbuilder. Again the second of two 700TEU capacity containerships under construction at Nasico for owner MPC will feature 12 hatch covers fabricated by the yard under a TTS licence. Nasico staff are due to be dispatched to China for training purposes.

Furthermore, Nasico is preparing to play a fabricating role in the supply of TTS stern and side ramps for the four 4900

VIETNAMESE SHIPBUILDING

unit capacity pure car and truck carriers to be built for Ray Car Carriers, with TTS supplying key components from Europe. The Ha Long yard, meanwhile, will play a similar role in supplying ramps for Höegh Autoliners' larger series of car carriers.

TTS Ships Equipment sales director, Nils O Ericsson, said: 'Our relation to Vinashin is as supplier of cargo access equipment. However, as we have also supervision of fabrication as well as installation of the equipment onboard, this is by all means a kind of technology transfer to teach the Vietnamese how to build and equip a type of vessel they have never built before.'

Vinashin chief business officer, Nguyen Quoc Anh, said that Vinashin had also invited MacGregor to form a joint venture focused on deck crane and hatch cover production. The MacGregor-Vinashin Maritime Equipment JV Co has obtained a licence from the Haiphong city administration to build a new plant in the Vinashin-Shinec Industrial Park, to produce hatch covers, ro-ro access equipment, and deck cranes. With 49% in the venture, MacGregor is committed to invest \$16 million in the first phase of development, setting up capacity to deliver around 16,000tonnes of equipment per year. In the second phase, capacity is expected to rise to 30,000tonnes.

Critical to homegrown production, needless to say, will also be engine manufacturing. According to Mr Anh: 'If we paid a deposit now [for a foreign-built engine], we would not be able to get one until 2011. Vinashin has to be independent. If we do not have localisation at low labour costs, we will lose our competitiveness.'

In 2006, Pha Rung Shipyard Co and South Korea's STX Shipbuilding Corp formed a joint venture (respective ownership is 51% for Pha Rung and 49% for STX), envisaging the construction of marine diesel engines in Vietnam to MAN Diesel two stroke designs. With the first engine due delivery in 2008-2009, Pha Rung Shipyard Co deputy general director, Le Manh Truong, said that the plant would focus on engines of up to 32,000kW output.

Mr Anh said that the first objective was to supply engines for ships of Handysize and Handymax classes, before taking the partnership forward to build engines suitable for Panamax and Aframax scale.



Ever more complex ships will demand homegrown industries to support economical construction.

November 2007 saw ground acquired by Vinashin from local authorities for what will become a new, purpose-built joint venture facility to build engines to MAN Diesel design near Haiphong, opposite the Pha Rung yard, in a 400hectare industrial zone. The plant will also be able to cast propeller blades of up to 10.5m diameter.

Last year, meanwhile, Vinashin also signed with Wartsila Switzerland Ltd to manufacture and sell Wartsila low-speed marine diesel engines in Vietnam in the 48cm to 82cm range, suitable for a wide range of vessels, from Handysize bulk carriers to VLCC-size tankers. The first delivery is scheduled for the beginning of 2010, with production building up to a targeted annual output of 30 to 40 engines.

In 2005, Vinashin also signed an agreement with Mitsubishi Heavy Industries that will enable the corporation to produce low-speed diesel engines under licence. The agreement applies

specifically to the Mitsubishi UEC-LA, LS, LSII, and LSE engines. Running to 2014, the agreement also encompasses the marketing and servicing of these engines in Vietnam. Moreover, Mitsubishi will offer training for Vinashin experts in design and assembly so that the shipbuilder can start assembling the first engines.

In March, Vinashin's Bach Dang yard began manufacturing MHI marine engines in the 8400hp to 32,000hp range.

Low-speed engine production will, for the moment, be concentrated around the Haiphong area in the north, but Mr Anh said that his expectation was that production would extend to the central region around the Dung Quat yard.

The shipbuilding group also holds a licence with Italian company Issotta Fraschini covering high-speed engines. The missing piece appears to medium-speed engines, which Mr Anh said Vinashin was 'considering'. **NA**

SAM Electronics takes control

German equipment maker tightens its grip on a market that offers significant potential.

In a further consolidation of its position as a major systems supplier to the growing Vietnamese shipbuilding industry, SAM Electronics has secured the contract switchboards and consoles for the eight Italian-designed car carriers due to be built at the Ha Long yard in Haiphong for Ray Car Carriers, of Israel. The equipment will be produced by SAM's Chinese subsidiary plant at Taizhou - SAM Taihang Electronics.

SAM said it had been engaged in providing Vietnamese yards with equipment for installation on more than 40 newbuildings since 2004 under contracts collectively worth over €13 million.

The latest contract follows one awarded last summer to SAM subsidiary, Lyngsø Marine, through which the Danish company

is to provide integrated automation packages for 14 x 54,000dwt bulk carriers due to be delivered between 2008 and 2010 from the Vinashin Group's Ha Long and Dung Quat yards for service with its own shipping line.

Local partners

SAM said a local partner was assisting yards with technical support and installation of proprietary MCS 2200 integrated monitoring and control systems, EGS 2200 electronic governors, and PCS 2200 propulsion control units housed in specially designed engine control room consoles. All the equipment is being assembled under DNV supervision at the SAM Taihang Electronics factory in China.

SAM Electronics has also been actively involved in supplying automation systems for Cardiff-based Graig Group's series of 53,000dwt Diamond 53 handymax double-hulled bulk carriers under construction at Vinashin's Ha Long and Nam Trieu yards. The ships are each being equipped with SAM/Lyngsø Marine modular integrated monitoring and propulsion control systems and associated equipment.

Graig, which is also providing the local yards with design, procurement, finance, and quality control assistance, says each DNV-class vessel features five cargo holds equipped with end-folding hydraulically-operated hatch covers and four 36tonne electro-hydraulic cranes. *NA*

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V A F I N S T R U M E N T S T O B E R E A L L Y S U R E

Central yard with central role

Dung Quat will become a centre for VLCC construction.

Vinashin is investing US\$40 million in building ten facilities to support the Dung Quat Shipbuilding Industrial Plant, its most ambitious shipbuilding centre to date, in central Vietnam, at the Quang Ngai Province economic zone.

Local reports suggest that the new facilities will focus on manufacturing engines, pumping equipment, boilers, and lifting equipment.

The first drydock at Dung Quat, a 354m long by 83m wide by 14m deep facility, is due to open at the end of 2008, in time to take forward the completion of a first of three 105,000dwt Aframax tankers, the first two of which will be for Vinashin itself, through Vinalines. Construction on the first ship has already started. These 245m long by 43m wide by 20m deep ships will be dual classed by ABS and the Vietnam Register.

The facility will be geared up to build one Aframax tanker and one Handymax bulk carrier in tandem. The intention is to build a second, 520m long by 110m wide drydock, for

tandem VLCC and Handymax construction, for completion within 20 months. By 2012, the facility will employ 10,000 workers.

Petrovietnam has already signed letters of intent covering the construction of what will be the nation's first pair of 300,000dwt-plus VLCCs.

Vinashin chief business officer, Nguyen



Quoc Anh said that the facility already had a full orderbook stretching to 2012, with 12 VLCCs, eight Aframax tankers, and 10 Handymax bulk carriers on order for the yard.

He declined to discuss the identity of any owners involved in ordering ships from the yard.

The 120hectare Dung Quat site is not the largest shipbuilding facility planned for Vietnam, but it is the largest currently under construction. With a sea front of 1km, and including 130,000m² of covered workshops, the yard will employ two 350tonne capacity gantry cranes, as well as two 150tonne rotating cranes. Its production machinery will include two steel treatment and panel lines, five CNC cutting mills, and two hydraulic presses. **NA**

A welder training at the Dung Quat yard. Picture courtesy of ABS.

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Class bridges the gap

Class is proving pivotal to the ambitious plans to develop Vietnamese shipbuilding, where Vinashin (Vietnam Shipbuilding Corp) signed its first export contract as recently as 2000.

Speaking of Vinashin's breakthrough international order to build a long series of 'Diamond' class double hull bulk carriers to Graig Shipping, Pham Thu Hang, Vinashin director of business and international relations, said she was proud of what has been achieved so far, adding that she was also grateful to those that have cooperated with the company. She said: 'We, as a new shipbuilding group with limited experience, have been eager to learn all the way through from before the keel laying to after delivery. Graig Shipping has been patient, and our collaboration has been good, despite the original plans having to be postponed and this being our most challenging project to date, both in size and complexity.'

'The third pillar in this model of cooperation has been Class – and in particular DNV.'

DNV said its share of the orderbook for Vietnamese-built ships now stood at in excess of 70%.

DNV is also classing the initial eight 4900 unit pure car and truck carriers scheduled for delivery by Ha Long Shipbuilding Co to Ray Car Carriers, and the initial four larger PCTCs due delivery from the Nam Trieu yard to Höegh Autoliners.

Qualification counts

As well as expanding facilities themselves, achieving its end will require a sharp increase in the number of qualified people working at Vinashin. 'Money you can borrow – pretty fast, but people have to have qualifications and work experience – both of which take time,' said Nguyen Duc Than, general director of Ha Long Shipbuilding Co.

Mr Than said the shipyard had been working across a range of projects with DNV, but also Germanischer Lloyd and Class NK in a 'step by step approach to gain experience and work through problems.'



Florence – built to DNV class.

Head of the DNV Academy Vietnam, George McHenry, said: 'The long-term objective is to support the development of the ship newbuilding industry in Vietnam to ensure that its products satisfy the requirements of international rules and standards. To achieve such an objective, we must deliver high quality training programmes for Vinashin. At the same time, we also have to do internal DNV training.'

Class NK has been busily transferring know-how into Vietnam for a number of years, focusing on smaller tonnage and, with demand particularly high for coastal tankers among Japanese owners, there is every prospect that this trend will continue.

Meanwhile, ABS signed an expanded agreement of cooperation with Vietnam Register (VR) covering the provision of a wide range of classification and statutory certification services in 2007. The two societies had been operating under a more limited cooperative agreement, originally signed in 1994 and subsequently amended in 1999.

A key element of the new agreement is a programme that will be instituted by ABS to train and qualify VR surveyors to ABS standards.

International contracts

At the time of the agreement, Christopher J Wiernicki, ABS president, said: 'Vietnam's shipping and shipbuilding industries are expanding rapidly with a specific focus on international contracts. The Vietnam Register has a great deal of experience with smaller, coastal ships and some offshore installations, but the changing nature of the nation's shipping industry means they must now expand their horizons and capabilities. This agreement will allow ABS to assist them in meeting that challenge while, at the same time, giving us greater access to the expanding Vietnamese market.'

ABS has also been making inroads in Vietnam this year. Its current 'request for class' list includes one 105,000dwt Aframax tanker and one 115,000dwt Aframax tanker under construction at

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the Dung Quat Shipyard, one 150,000dwt floating storage and offloading vessel under construction at Nasico, Nam Trieu, and 12 x 50,000dwt MR tankers under construction at the Bach Dang yard (the first two are for Vinashin Ocean Lines and subsequent 10 for Shinpetrol – in this case the RFC is pending).

The 150,000dwt FSO will be built at the Nam Trieu Shipyard (NASICO) to a design from Sinus (based in Poland), with ABS London Engineering providing the design review. Delivery is estimated for the end of June 2008.

Russian agreement

Again, the Maritime Administration of Vietnam and the Russian Maritime Register of Shipping (RS) have signed an agreement authorising RS to undertake statutory surveys and issue certificates on behalf of the Administration under IMO and ILO conventions.

RS and Vietnam Register of Shipping

(VR) have a long-standing cooperation, with RS opening its first office in Vietnam in 1983.

RS said a comprehensive exchange of views had taken place between the two organisations on surveyor training, placing additional focus on human element issues, with VR experts trained at RS on both theoretical and practical levels. The Baltic and the Nizhny Novgorod Branches of RS were chosen as the base for theoretical training. Meanwhile, practical training was conducted at Russian yards, including the Baltic Shipyard, and the Okskaya Shipyard at Navashino, where VR trainees familiarised themselves with RS principal requirements for the initial surveys of ships under construction. Over the course of a week-long programme staged at the Okskaya yard, VR representatives had an opportunity of practical training in surveying ships at different stages of construction in the RUSICH series, under the supervision of their tutors. All

Vietnamese trainees passed subsequent tests, receiving RS certificates as a result.

Germanischer Lloyd has also been pushing forward with new service offerings in Vietnam, and is now operational at three locations. With orders for 29 container and multi-purpose ships at Vietnamese shipyards last year, the German society said that all containerships built in Vietnam to date had been classed with Germanischer Lloyd and more than 70% of container vessels calling to Vietnamese ports carried the class sign GL.

Gas connections

Mediterranea di Navigazione of Ravenna, Italy, meanwhile, recently ordered four 4500m³ LPG units from Bach Dang shipyard in Vietnam.

They will be delivered in 2009 at a total price of \$145 million. Bach Dang is part of state-run Vinashin (Vietnam Shipbuilding Industry Group) in Vietnam. The four units will be classed by RINA. **NA**

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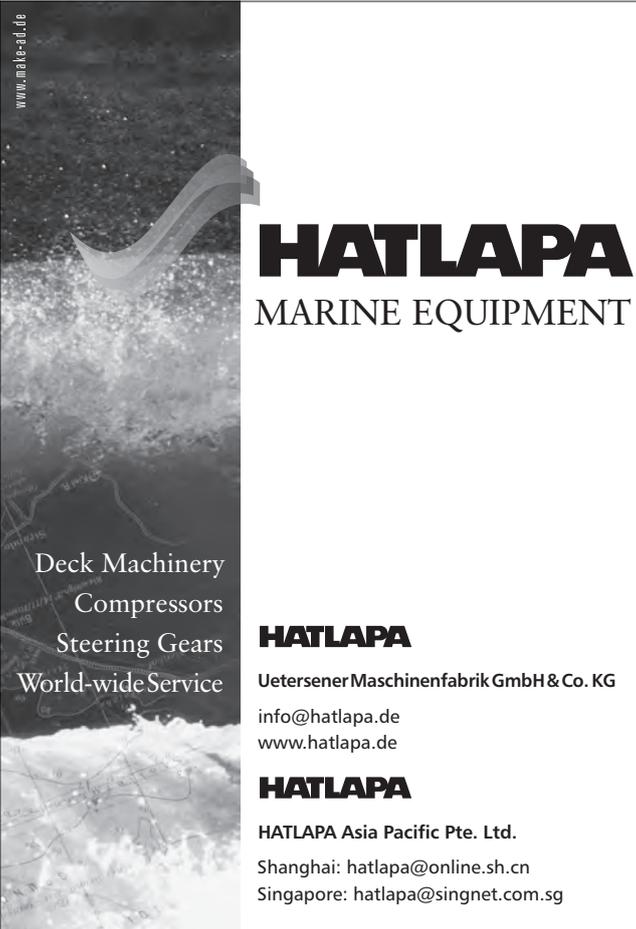
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Record orderbook not without challenges

The Norwegian shipbuilding and marine equipment industries are thriving, with orderbooks that stretch to the end of 2010 and beyond, but such a boom is not without its problems. David Foxwell reports.

Speaking to *The Naval Architect* towards the end of November, Birger Skår, a spokesperson for the Norwegian Shipbuilders Association, said he was obviously very happy with the current situations at yards in Norway, but added that any market, however busy, has its good side and downsides.

'The shipbuilding industry in Norway is almost too busy at the moment,' said Mr Skår, noting that delays in deliveries are becoming more prevalent, and that these delays in deliveries were worrying for several reasons.

'Norwegian yards have always had a good reputation for building ships on time,' said Mr Skår, 'but when there are delays it costs yards money because of penalties in contracts and it makes life difficult for owners. It spoils yards' reputations too, even if the delays that are being experienced are not their fault, but due to problems in the supply chain.'

Mr Skår said that to his knowledge yards were experiencing delays of two to three months with deliveries. Asked how many vessels were delayed, Mr Skår said, 'too many', and added that delays were mainly due to problems in the supply chain with the delivery of key items of equipment such as engines, generators, pumps, cranes, propellers, and switchboards.

These problems are, of course, hardly unique to Norway, with the ongoing newbuilding order boom having placed many manufacturers worldwide under increasing strain.

Mr Skår estimated that, of the vessels being built in Norway at the moment, some 80% are intended for the offshore industry, with the rest comprising ferries, seismic ships, a few reefers, live fish carriers, fishing vessels, and a few tankers, as for example at Florø shipyard, plus a few examples of one-off vessels, such as a unique cable carrier/maintenance vessel for Statnett.



Norwegian yards are full, but many report problems in the supply chain and/or in recruiting sufficient skilled workers.

The value of this order backlog is at an all time high – some Nkr65 billion (US\$11.84 billion) – but such a huge orderbook also needs large numbers of skilled workers to execute it. Increasingly, therefore, Norwegian yards have turned to workers from Eastern Europe, from countries such as Poland. In some yards, the number of Polish workers now far exceeds the number of Norwegian workers, and Norwegian yards are still looking for more. 'The Norwegian industry could easily take another 20,000 such workers,' Mr Skår explained, noting that to try to fulfil this demand for workers, campaigns were being run in the Baltic states and elsewhere in eastern Europe.

Given that there are very many migrant workers in Norwegian yards – many of which yards are located in small, fairly rural communities – there have, said Mr Skår, been fairly few problems integrating them, socially, and in terms of required skills and expertise. Yards also continue to sub-contract hull work in countries such as Poland, have the bare hulls shipped to Norway, and finish vessels themselves, but again, such is the level of demand in the

supply chain that even this kind of work is being delayed at times.

Erik Jakobsen, an analyst at Menon Business Economics, agreed with Mr Skår's analysis of the situation. 'The offshore shipping part of the maritime cluster seems very healthy at the moment,' he explained. 'Yards specialising in building anchor handlers, PSVs, and construction vessels are having a very good time at the moment. This segment of the industry is very ambitious and very innovative, but it remains to be seen exactly how profitable they will be.'

'There is no doubt that there will be further delays in the future, and that the supply chain is very brittle at the moment,' Mr Jakobsen said. 'Delays will undoubtedly affect profitability, although unlike other sectors of the shipping industry in Norway, it is hard to see a chain of events – at least in the next two to three years – which will lead to a significant negative effect on demand.'

Turning to what he described as 'the more volatile and vulnerable' tanker and bulk shipping sectors, Mr Jakobsen said success in this sector of the market was

more capital intensive but less innovative and less 'knowledge specific,' and although reasonably healthy currently, is not the strongest sector of the shipping/shipbuilding sub-cluster.

Much has been made of recent tax changes proposed by the Norwegian government but, said Mr Jakobsen, although deeply unpopular with shipowners, viewed in a long term perspective, the changes would not be that important, and there would, he anticipated, be no crisis of confidence among owners or relocations.

As for the overall productivity of the shipbuilding and marine industries, there would, said Mr Jakobsen, probably be an improvement, as a result of further innovation, economies of scale, and a growing employee skills base. Even so, recruiting and retaining sufficient skilled employees would be a 'huge problem,' he said, and given the intense level of competition from yards in low cost countries, more and more shipbuilding concerns were likely to become centres of expertise, building a few vessels themselves, and exporting expertise, designs, and associated skills and technology.

'Yards know that a downturn will come, and that when it does it could be rather sharp,' said Mr Skår. 'The orders are still coming in, and in the year to September the order intake amounted to Nkr24 billion, so a few yards have work until 2011, but we know that this is a cyclical business.'

By the end of 2007, said Mr Skår, he expected the orderbook to be in the region of Nkr28-30 billion. The vessels being built are also increasingly sophisticated and of high value. Orders taken in 2006 amounted to Nkr43.5 billion.

The maritime cluster in Norway remains internationally competitive and is still growing fast, because it is dynamic, innovative, and competent, but overall Norway is not an attractive location for shipping due to the unfavourable tax regime. 'However, countries compete to attract activities – not companies – and Norway is competitive for attracting knowledge intensive maritime activity, and there is every reason to believe that the Norwegian cluster will remain competitive and that, in particular, the Oslo region will strengthen its position as an international knowledge-based maritime hub.' [NA](#)



Norway's 'maritime cluster' – which links yards, equipment manufacturers, and many other players – remains dynamic, and continues to produce innovative products.

Promas wins plaudits

Rolls-Royce has secured the first contracts for Promas, its integrated bulb, propeller hubcap, which was recently nominated for the Best Engineering Achievement of the Year in Norway.

Promas is designed to improve overall propulsive efficiency and reduce environmental impact. The slipstream from the 5.2m diameter Kamewa CP propeller flows on to the leading edge of the rudder, which is twisted so that some of the swirl energy in the propeller wash is converted to useful forward thrust. A bulb is incorporated in the rudder, and a hubcap is attached to the propeller. The nose of the bulb and the shape of the hubcap have been the subject of an intensive R&D programme to ensure that smooth water flow is maintained as the rudder is turned.

The initial order for Promas is for a quartet of bulk carriers being built in China, but Rolls-Royce believes that the concept could be equally applicable to other vessels, including passenger vessels.

The main advantage of Promas is that the propeller and rudder are designed as one, tightly integrated solution. The rudder is designed to work with the propeller and the propeller with the rudder. This results in a bulb/hub/twisted rudder concept in which the flow from the propeller is very well controlled, and from the hub and blade, root region flow is directed smoothly over the hubcap on to the bulb, which forms part of the spade rudder.

As the rudder in Promas turns, the rounded forward edge of the bulb moves sideways, but without negative effects on the flow in the range of rudder angles encountered when in transit. The rudder has a twisted leading edge, which allows some of the swirl energy in the propeller slipstream that is normally wasted to be recovered as useful thrust.

Rolls-Royce says it believes that Promas is suitable for use on a wide range of single screw vessels. Some twin screw vessels may also benefit from using it too, and on vessel types where reduced levels of noise and vibration are important – such as passenger vessels.

Ulstein takes another bow

Norwegian design and shipbuilding specialist takes further steps towards diversification.

The Ulstein Group continues to make waves through acquisition, after its bid to purchase Dutch designer Sea of Solutions (see *The Naval Architect*, November 2007, p8) and its agreement to take over engineering company Maritime and Mechanical Technology (MMT).

Having established the Ulstein Es-Cad partnership, in Turkey, in mid-2007, with a view to taking its revolutionary X-Bow design to the merchant marine market, the proposed Sea of Solutions acquisition sees Ulstein spreading its wings in its traditional offshore sector, with a leap into more specialised tonnage than has hitherto been its mainstay.

Ulstein deputy managing director, Per Olaf Brett, said that, in concluding that high oil prices were here to stay, the ship designer and builder was of the view that offshore exploration and production activity of oil and gas reserves would only accelerate.

'Reserves in harsh and challenging waters will play an even more prominent role than of the past,' he said. 'Costs of these services will escalate and cost-effectiveness thinking will become imminent. Oil companies will increase their control over the value chain in these offshore exploration and production activities. Work vessels of all kinds will, therefore, have to be better coordinated from a functional and operational standpoint. The Ulstein group will, in the future, become a central single point of contact for oil majors and offshore contractors to pursue this issue and find new and better offshore solutions. The new and much broader portfolio of work vessel designs and complementary project maker services the Ulstein Group and Ulstein Sea of Solutions together will provide from here on, is instrumental to achieve this position. Sea of Solutions has already demonstrated capabilities in the field of finding competitive heavy offshore solutions. Their position will be further strengthened by Ulstein's fame, financial solidity, experience, expertise and resources pool.'

The acquisition saw the Ulstein Group expanding its area of business interests to cover the whole range of offshore work vessels - oil



Ulstein's X-Bow configuration could have application for Sea of Solutions' designs for vessels operating in heavy seas.

rigs, FPSOs, crane vessels to platform support vessels and anchor handling tugs, Dr Brett said.

'As the second leg of the UMHV [Ulstein Mekaniske Verksted Holding] operations, the short sea shipping segment will be supplied with novel and cost-effective competitive cargo carrying vessels in almost all segments and size ranges (container feeders, box-bulkers, general dry cargo ships, smaller tankers, chemical carriers, reefers, ro-ro vessels and others).'

Sea of Solutions is a company of 12 people. However, Dr Brett said it produced about 50 to 70 man-years worth of design and engineering work each year. 'They specialise in developing and producing competitive conceptual designs, and subcontract most of the engineering work,' he said.

The new parent would take over a company heavily involved in finalising projects that include: multi-purpose installation vessels (S-lay, J-lay, or Reel-laying vessels); dynamically positioned crane and pipelaying vessels; dynamically positioned heavylift crane lift vessels; ultra deepwater drillships; shallow-water draft drilling barges; and mega-crane and pipelay barges. Projects are now underway with Scandinavian, American, and Dutch interests in Singapore, China, and The Netherlands.

Dr Brett added that 'it might be relevant to look at X-Bow both in the forward and stern part of such vessels to improve their heavy weather performance.'

Asked in late November what still remained

missing from the Ulstein portfolio, Dr Brett offered: 'More engineering capacity, aftersales services, and international infrastructure.'

Accordingly, early December saw Ulstein agree the purchase of Norway-based MMT.

'This company has highly valuable skills and expertise that is very interesting to us, and that will strengthen our operations,' said Tore Ulstein, Ulstein Group deputy chief executive.

'To be able to increase volume in existing and new market segments, the sale of design and package solutions is an important area for the group. And a vital factor in realising this is more and competent resources on the engineering side. MMT's experience with building and leading international engineering networks will therefore complement our growth strategy extremely well.'

MMT offers engineering services with focus on electro and hull structure. The company owns engineering companies in Croatia and has partnerships with engineering environments in India. It employs approximately 20 people and has extensive experience of coordinating Norwegian and foreign engineering groups. MMT was set up in 2006 by Harald Bigset. He still leads the company, and together with the other employees he will join the Ulstein Group.

The Ulstein Group said it needed a coordinated unit for engineering and therefore wished to set up Ulstein Engineering. The company will build up a robust international engineering network by coordinating and developing existing resources. **NA**



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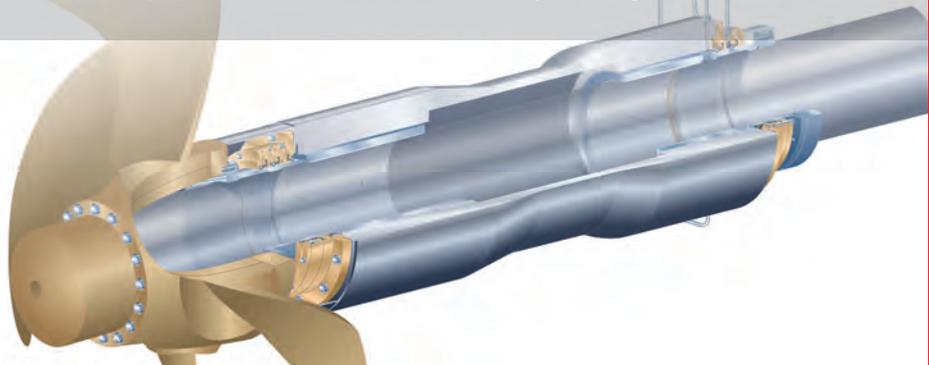
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Heavy lifter for offshore turbines

Polarkonsult lifts the lid on its latest design for a new type of general cargo and heavylift vessel.

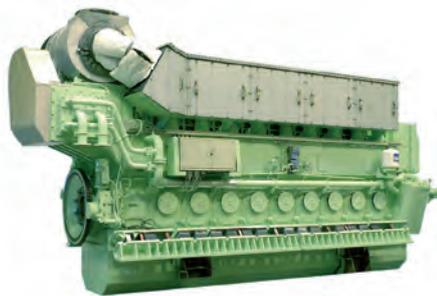
Polarkonsult has developed a new type of general cargo and heavylift vessel for SE Shipping Lines of Singapore, in the shape of the PK 148-I. The owner recently placed an order for a series of vessels based on the new design at two (as yet unspecified) Chinese shipyards. The order is significant for suppliers in the marine equipment market in Norway, including Rolls-Royce.

Designed by Polarkonsult, with yard survey and contract negotiations carried out by broker Jann K Lindberg of JKL Shipbrokers, the contract comprises an initial series of four ships with options for eight additional vessels, with the first quartet of vessels due to be delivered at the end of 2009.

A £24 million (US\$48.78 million) contract has been awarded to Rolls-Royce by SE Shipping for complete marine power systems for the heavylift vessels, which is the largest ever power systems contract for the company's merchant business. Options for eight more vessels would triple the order value. Rolls-Royce is supplying a complete package of equipment including diesel engines, propellers, tunnel thrusters, and steering gear, allied to automation and control equipment that fully integrates the various items of equipment.



S E Shipping Line's heavy lifters are of twin skeg design in order to accommodate two engines.



Rolls-Royce is supplying diesel engines – including Bergen B32:40L9P main engines – propellers, tunnel thrusters, and steering gear for S E Shipping Lines' newbuilds.

Rolls-Royce president, merchant, Birger Myklebust, said: 'The project is a good example of the change in the traditional relationship between shipowners, suppliers and yards. Our customers can now see that by partnering with a key supplier like Rolls-Royce, they can improve their efficiency through better use of new technology.'

With a length overall of 167.70m, length between perpendiculars of 157.30m, and beam of 26.00m, the newbuilds will have a deadweight of 25,000tonnes, and will be fitted with a pair of 400tonne cranes, which will be

capable of working in tandem.

The vessels will be of twin skeg design with two screws and 2 x 4500kW, providing a speed of 16.5knots. Classed by DNV and bearing the class notation DNV +1A1 – General Cargo Carrier – CONTAINER – ib (+) – BWM-E – E0 – CLEAN – BIS, they have been primarily designed for the transportation of windmills for Suzlon Energy, an Indian company, and will have a significant Norwegian equipment content, including Bergen main engines, Tenfjord steering gear, and Ulstein Hinze rudder.

At the time of writing, the supplier of the cargo handling equipment and hatches had not been announced. Electrical power onboard will be provided by a pair of Mitsubishi S 12R-MPTA, rated at 1190kW, a pair of Stamford 1400KVA machines, and a single Mitsubishi S6B3-MPTA and Stamford 375kVA machine.

SE Shipping Lines is affiliated with, but independent of, Suzlon Energy, which is one of the world's largest producers of wind turbines. Although the ships are specially designed for transportation of wind turbines, they are also well-suited to heavylift operations, carrying general cargo, and containers. **NA**

TECHNICAL PARTICULARS	
Polarkonsult PK 148-I	
Length, oa.....	167.70m
Length, bp.....	157.30m
Breadth.....	26.00m
Depth to 1st deck.....	14.30m
Draught, max.....	11.00m
Speed.....	16.5knots
Deadweight.....	25,000tonnes
Hold.....	28,000m³
Containers, 20ft.....	1100TEU
Gross tonnage.....	18,800
Net Tonnage.....	8300
Main Engines.....	Bergen B32:40L9P
Output.....	2 x 4500kW
Class notation.....	DNV +1A1 – General Cargo Carrier – CONTAINER – ib(+) – BWM-E – E0 – CLEAN – BIS

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Offshore drives accommodation market

Recent months have seen a number of companies invest in new generation monohull accommodation vessels.

A slew of orders for new generation accommodation vessels see investors tempting oil companies with claimed cost savings and a number of other advantages compared with the traditional offshore use of semisubmersibles.

The most recent order for this kind of vessel has seen Sembawang Shipyard Pte Ltd, a wholly-owned subsidiary of SembCorp Marine, secure a Sing\$300 million contract from Equinox Offshore accommodation Ltd, to convert a number of passenger/car ferries to DP2 accommodation and repair vessels (ARV) during the period 2008–2010.

Under the terms of the contract, the yard will rebuild and refurbish the existing cabins onboard on behalf of Equinox Offshore – which is owned by Norwegian interests – and add another 50 cabins to house 400–500 people, also adding new offices and public areas such as a restaurant and cinema. The ships' car decks will be converted to workshops – to be equipped with owner-supplied equipment and machinery. Other important work includes the installation of stern thrusters with DP2 capabilities and new 60tonne and 80tonne cranes, plus an offshore gangway to enable those accommodated onboard to 'walk to work.'

Equinox Offshore has opted for conversions rather than newbuilds, but several other entrants in this market have taken the newbuild route, and Norwegian owners and naval architects are already heavily involved in this fast-developing market.

Among them is Vik-Sandvik, the well-known Norwegian naval architect responsible for the design of the VS4004 from offshore newcomer Ocean Hotels, and for the design of new accommodation vessels ordered by Edda Accommodation (see *The Naval Architect*, September 2007, p30).

Ocean Hotels is a Cyprus-domiciled



Ocean Hotels' new vessels are part of a growing market for monohull accommodation vessels.

company founded in 2007, which intends to become a leading player in the floating accommodation ship market. The company has entered into a contract with Davie Yards in Québec, Canada for the construction of two (plus 2+2) VS4004 accommodation vessels, at a cost per vessel of around US\$112.5 million. The first is due for delivery in the third quarter of 2009, with the following vessels delivered every three-four months thereafter.

New kids on the block

Ocean Hotels may be a new name in the offshore industry and a newly formed company, but the organisations and people behind it have a long track record, as a recent investor presentation from Ocean Hotels pointed out – Vik-Sandvik is an investor in the project, as is Davie (itself owned by Teco, a Norwegian company) and companies controlled by investor George Economou.

Ocean Hotels describes itself as 'the first player to offer purpose-built accommodation vessels outside the North Sea', and notes that demand for

such accommodation is growing quickly, driven by offshore fixed/floating field developments, growth in maintenance on operating fields, and decommissioning of old fields. The company believes that accommodation ships hold competitive advantages in 'benign' operating areas, and also notes that the average age of existing accommodation units is circa 20 years, most of these units being conversions, rather than purpose-built vessels or platforms.

Strong and stable

Demand for accommodation units is being driven by several factors, which should ensure strong and stable growth, says Ocean Hotels, including many new installation projects offshore, fuelled by high levels of exploration and development activity; the need for maintenance activity offshore, which is driven by the number of installations in operation, average age, and HSE requirements; and the growing market for platform and rig decommissioning work, which is currently highly visible and driven by depletion of existing fields.

At present there are few players in this sector, and limited availability of units – 25 high-end floatels are currently available, of which three have ship type hulls, 22 are semisubmersibles, and a significant share of these units is on longer-term contracts.

Ocean Hotels and other players in the accommodation ship market, such as Edda Accommodation and C&M Group, which is close to completing conversion of a former Russian icebreaker into an accommodation vessel, believe that newbuild monohulls have several important advantages compared with semisubmersibles – or, in the case of companies that have opted for newbuilds, converted monohulls.

These include reduced downtime, better HSE performance, more modern facilities, and faster transit speeds. As Ocean Hotels notes, its vessels will have 400 beds, a length of 100m, beam of 30m, a 150tonne knuckleboom crane, plus a 10tonne service crane. The VS4004

design will offer station-keeping to DP2 standard, a transit speed of 12knots, and facilities that include offices and conference rooms, Internet room/coffee bar, two cinemas, two dayrooms, and a gymnasium. The design also has a good level of in-built storage, a deadweight of 10,000tonnes, 1500m² deck area, 7000tonne deckload capacity, and can offer quick mobilisation.

Heavy multi-purpose

Apart from their primary role as accommodation vessels, such designs will be capable of multi-purpose rig support. They can provide accommodation, storage facilities, and an ability to conduct ROV operations; they can also handle a diving spread and supply offshore heavylift capacity when required.

Edda Accommodation is part of the Ostensjø Group in Norway, which has been involved in the offshore accommodation market since the 1970s. Its newbuild is somewhat larger than the Ocean Hotels

design, at 130m length overall, and can accommodate 600, and will also be used to accommodate personnel onshore when moored alongside a jetty, in which case its capacity rises to around 1000 beds.

The vessel will be a DP Class 3 ship with five Voith Schneider Propulsors (VSPs), which the company believes will offer faster, more precise, and accurate positioning with reduced fuel consumption compared with alternatives. This vessel is also expected to be equipped with a telescopic gangway, installed on the 1400m² deck.

Classed by DNV, the Edda Accommodation vessel will have a deadweight of 7500tonnes, a total deck area of 1400m² (including a 260m² covered workshop area), and will be fitted with a heave compensated knuckleboom crane and two marine deck cranes. The ship's helideck will be suitable for Sikorsky S-61 and S-92 types, and will also feature a refuelling plant. **NA**

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Skipskonsulent reaps bumper returns of building boom

Naval architects Skipskonsulent, part of the Vik-Sandvik group, has more than 50 ships to its designs under development, across a broad portfolio range.

Olivind Aanensen, a naval architect and project engineer responsible for marketing and sales at Skipskonsulent, said that the company currently had 12 newbuilding contracts on its books. Most, if not all of these, are repeat orders for vessel types that Skipskonsulent is well known for, such as tankers. These include tankers ranging in size from 800dwt to 19,000dwt.

In total, more than 50 vessels of Skipskonsulent design are under development worldwide. Ten newbuildings to Skipskonsulent designs were delivered in 2007, along with 10 conversions from single to double skin Panamax tankers. Skipskonsulent is

also working on a number of seismic vessel conversions for this now-buoyant market.

Driving force

Mr Aanensen said: 'Due to the exceptionally good market for offshore vessels for a very long time, Skipskonsulent has also done a lot of work on Vik-Sandvik designed vessels recently. All in all, a very good year for Skipskonsulent, and the prospects for next year are very good.'

Among recent orders are three more vessels to the SK 5054 CT design for Rederiet Stenersen, vessels which are building at Jiangnan Shipyard in China. Skipskonsulent notes that in the period

2001-2007, Stenersen also ordered 13 tankers of the SK 5054 CT design, a 17,000dwt tanker for oil and chemicals with length between perpendiculars of 133.80m, breadth (moulded) of 23.00m, and draught of 12.40m.

Also on order are three more SK 5054 CDs at Türkter Shipyard, Turkey, for as yet unnamed clients; and two SK 5054 CTs, for Knutsen OAS, the latter of which is on order at Jiangnan Shipyard for Haugesund, Norway-based Knutsen.

These vessels are due for delivery in 2008-2009 and are 16,400dwt tankers for chemicals and oil products with length between perpendiculars of 133.8m, breadth of 23.0m, and draught of 12.4m.

NA

Offshore goes for size and sophistication

Such is their small size compared with most merchant vessels, offshore vessels do not normally feature in *The Naval Architect*, but recent months have seen orders for Norwegian-designed ships comfortably in excess of 100m long.

Mainly large anchor handling tug supply vessels (AHTS), construction ships, Dive Support Vessels (DSVs) or innovative, ship-shaped, monohull well intervention vessels, the new generation of larger, sophisticated offshore vessel is designed to work in deeper waters than foregoing designs.

Boa Sub C is the second of two subsea construction ships for Boa Group in Norway. Handed over to Boa at the end of July, the vessel is of the Vik-Sandvik VS4201 design, and at 138.5m will undertake subsea construction and installation work in water

depths of 3000m, lifting payloads of up to 400tonnes with generous safety margins.

Another Norwegian operator, Farstad, has several high specification vessels on order, among them a UT761 CD due to be delivered in December 2008 by Aker Yards Langsten. This construction/trenching vessel comes in at 121.50m and is noteworthy for several reasons, not just its immense bollard pull, which, at 400tonnes, comfortably exceeds that of any other vessel like it.

Cecon in Norway now has several Vik-Sandvik-designed VS4220 offshore

construction vessels building at Davie Quebec in Canada which are 130m overall, but perhaps the largest of the ever-larger offshore fleet are the monohull light well intervention vessels that Aker Yards is building for Aker Oilfield Services. Built to an Aker Yards Project design - the Aker OSCV 06 WI - they are 157m in length, with a 27m beam, and designed to service oil fields and enhance production from those fields, and do so at a much more reasonable cost than semisubmersibles that have carried out this kind of work hitherto. NA

Thrusters push into the deep

Since the upsurge in drillship orders, Rolls-Royce says it has been successful in capturing nearly 90% of the contracts for thrusters for these high-specification vessels.

The new breed of high specification drillships will use DP to keep position while drilling in ultra-deepwaters. The favoured thruster type is the UUC range in various sizes, designed to be mounted and dismantled underwater without needing to drydock the vessel.

Samsung Heavy Industries in South Korea is building many of these vessels, including the three-vessel Stena DrillMax series for Stena Drilling, to be fitted with six UUC455 azimuthing thrusters apiece, each rated at 5500kW. The thrusters will work in conjunction with the vessel's Class 3 dynamic positioning system.

The recently launched first vessel, *Stena Drillmax*, will work in the Gulf of Mexico initially, but is also suited to harsh environments such as the Norwegian and Barents Seas. It is designed to operate in water depths of up to 3000m.

Seadrill is building three drillships of a Samsung design with double derrick drill package, for which Rolls-Royce is providing six azimuthing thrusters each accepting 4500kW, operating either in dynamic positioning mode (these vessels being DP 3 class ships), or in transit mode, giving a speed of 11.5knots. The first of these drillships, *West Capella*, is due to start operations in the first quarter of 2009.

Rolls-Royce thrusters are also on order for other vessels at Samsung, including drillships for Pride International, Cardiff Marine, Saipem, and Tanker Pacific Management. Transocean has ordered four drillships for operation in ultra-deepwaters from Daewoo (DSME) in Korea. Due to start

operations in 2009, *Discoverer ClearLeader* and its companions are enhanced versions of Transocean's 'Enterprise' drillships. The first three are scheduled for operation in the Gulf of Mexico, and the fourth, offshore Angola. All will have Rolls-Royce azimuthing thrusters, six units each, with a total power of six x 5500kW.

A UUC thruster-equipped drillship is also on order at DSME for Taiwan Maritime Transport, and, also in Korea, Hyundai Heavy is building a drillship for Global Sante Fe using Rolls-Royce thrusters for propulsion and dynamic positioning. This last ship will be an upgraded version of the existing *C R Luigs* and *Jack Ryan* vessels. **NA**

Stena Drillmax, for which Rolls-Royce is providing six 4500kW azimuthing thrusters.



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New steering gear for larger vessels

A new design of four-vane type steering gear intended primarily for applications on larger vessels, such as VLCCs and larger types of containerships has been developed by Rolls-Royce.

Rolls-Royce says a prototype of its latest four-vane steering gear will be completed early in 2008, after which it will undergo extensive testing.

The rotary steering gear will go head to head with the ram-type of steering gear produced by the company's competitors, which currently tend to dominate the market. Rolls-Royce highlights the fact that rotary vane steering gear is more flexible than the ram-type, as well as being more compact. It also allows for greater rudder angles, and can thus enhance manoeuvrability and provide improved control at low speeds, such as when docking.

Another important advantage is that, with fewer components, the new concept weighs 50% less than conventional ram-type steering gear, and is much easier to install. Furthermore, almost all of the piping for the new steering gear is internal, with the exception of the piping between the actuator and the power pack, so the risk of leakage is much reduced, and the new design has no external moving parts.

Less vibration

The company also notes that the rotary vane principle - which ensures constant torque throughout the steering sequence, providing maximum power output - produces less vibration, and hence less noise, than some of the alternatives.

Rotary vane steering gear usually uses two or three vanes. Three-vane steering gear has the advantage of providing more torque than two vanes, but it also limits rudder angle. In the new, four-vane configuration, the rudder angle is limited to 35deg but, being a four-vane system, a high level of torque and a particularly powerful steering gear results.

There are two versions of the new four-vane steering gear, for non-IMO applications (the RV-6000-4) and

for IMO compliant applications (the IRV, IMO Rotary Vane), both being versions of the well known 'Frydenbö' rotary steering gear. The company notes that IMO regulations require compliance with the principle of 'single failure criteria' for large tankers over 100,000dwt, a requirement met by the IRV series, which incorporates automatic isolation of the actuator's dual hydraulic system. The actuator is equipped with a double sealing system, completely separating the actuator in two individual pressure chambers. In addition, the specially-designed sensor system maintains constant control of the integrity of the seals.

Polymer seals

In the new steering gear, industrial-standard screw spindle pumps and electric motors are combined with carefully selected polymer seals and the Frydenbö range's proven modulated flow control valve.

'The actuator in the IRV series has a double sealing system, and a specially designed sensor system that maintains constant control of the integrity of the seals', the company says. 'The control system modulates the flow of oil to the actuator in order to give a soft start and low rudder speed for small rudder movements, and the oil flow gradually increases up to full flow, allowing full turning speed on the rudder.'

Precise positioning

The system thus ensures very precise rudder positioning for small rudder angles, with close course-keeping, while the full flow provides for full manoeuvring requirements when needed. In this way, the simple and reliable fixed displacement screw pump is efficiently controlled to provide smooth and accurate steering in line with a variable displacement pump, without introducing the complexity of such a pump.' *NA*

Sinopacific deal seals record year

Rolls-Royce has signed its largest contract with Chinese shipbuilder Sinopacific, to provide steering gear and deck machinery worth US\$42 million.

Bjorn Johnsen, Rolls-Royce vice president sales and marketing (Greater China) - marine, said: 'This order takes us to a record in China this year, with contracts for more than 700 ship sets of steering gear and to 300 ship sets of deck machinery. The Chinese market is now the biggest global market for Rolls-Royce for commercial merchant ships.'

John Jin, Sinopacific director and vice-president, said: 'This extensive contract is a result of Sinopacific's wish to work with fewer and stronger companies able to offer quick and reliable service.'

The contract covers 34,000dwt-118,000dwt bulk carriers and 16,500m³ capacity LPG vessels. The first equipment will be delivered in the first half of 2009.

Rolls Royce said its marine facility in Shanghai was its largest investment in China to date. Equipment completed includes tunnel thrusters, rudders, control and steering systems, and deck machinery.

Aker Kvaerner in steering gears upgrade

Aker Kvaerner Porsgrunn says it has noticed growing demand from owners to upgrade the steering gear on older vessels which they intend to continue to operate. In some cases the company has been asked to upgrade steering gear that was 40 years old, and upgrade work on steering gear is currently accounting for around 15%-20% of after sales activity.

The most common retrofit packages provided include components such as hydraulic valves and power units; PLCs for control and alarm handling; installation of frequency converters; and rudder control systems on the ship's bridge. Frequency controlled power units have a number of advantages, the most important being cost savings through fuel consumption, and reduced maintenance.

Aker Kvaerner Porsgrunn is experiencing what is an all time high in its orderbook and has a particularly busy and demanding after sales business. 'This is in part due to high activity in the shipbuilding industry, however, we also believe it is a result of the acknowledgment our steering gears have gained in the market, the company says, noting that, to handle the growing level of business, it was focussing on increasing engineering and production capacity, and on further improving quality control procedures. 'We aim to cooperate with Aker Kvaerner Pusnes to utilise their new hub in Singapore... and believe this will enable us to be a lifetime partner for rotary vane steering gears.'

Sister company Aker Kvaerner Pusnes is also particularly busy at present, recent orders including deck machinery, bow loading systems, and crane offloading systems for use in Arctic waters.

Three oilfields in Russia's Arctic waters are currently being developed and Aker Kvaerner Pusnes is delivering equipment to all of them. The contracts include supply of Pusnes deck machinery, bow loading systems, and a newly developed offloading system, all specially designed for use in the demanding Arctic environment. Both the bow loading and crane offloading systems allow transfer of oil under the extreme weather and temperature conditions prevailing in the Arctic.

Recent deliveries include Pusnes deck machinery for seven Arctic shuttle tankers; bow loading system for five shuttle tankers for the Sakhalin Field (operated by Primorsk and Sovcomflot); and a Pusnes crane offloading system for the Pirazlomnoye Field operated by Sevmorneftegaz).

Recently, the company has also announced that it is to deliver a complete offloading system for transferring stabilised crude oil from a HiLoad system developed by Remora in Norway to a shuttle tanker's midship manifold.

The scope of work includes detail engineering, design, interface engineering, fabrication, inspection, and testing. The offloading system is designed in accordance with Remora's functional requirements and will be installed between HiLoad's two towers.

Aker Kvaerner Pusnes' scope of supply includes: the hose reel; quick release flange; spooling gear; hose connection winch; hose ropes; slipway; portable remote control; equipment for CCR; and valve unit and accumulator skid.

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SeaMetric passes heavy milestones

Plans for SeaMetric International to build a pair of unique Twin Marine Lifter (TML) heavylift vessels continue apace.

SeaMetric International's plans to build a pair of innovative heavylift ships (see *The Naval Architect*, June 2006) envisage vessels primarily designed for work on decommissioning offshore structures.

Norwegian consultancy Multi Maritime was awarded the contract to design these very specialised vessels, which will be fitted with a patented heavylift system to install and remove offshore platforms and rigs.

The heavy lifters are intended to carry out operations offshore, working in tandem, removing offshore structures and lifting them onto barges for transportation ashore in order to work in the fast-growing decommissioning market. The ships will be capable of removing jackets and topsides and, with a length overall of 140m, and with a breadth of 40m, the MM130 designs will be equipped with four lifting 'arms' that can be adjusted to the dimensions of the object to be lifted.

The lifting arms will be 75m long, to be extendible by 15m. Each will have a lifting capacity of 2500tonnes, giving the two Twin Marine lifters a maximum lifting capacity of 20,000tonnes and 18,000tonnes in wave heights of 2.5m. The lifting force is created by de-ballasting the buoyancy tanks and at the same time ballasting the ballast tank on the opposite side.

The vessel concept is designed to be independent of water depth, and is capable of installing and removing both topsides and jacket structures. The DP 3 semisubmersible vessels will be capable of submerging by 20m, so that they can also work in the 'float on - float off' market when not fitted with the lifting arms, and are also expected to play a role in the salvage market when and as required.

Broader horizons

In recent months a number of important developments have taken place at SeaMetric. At the end of 2007, the Stavanger-based contractor signed a Memorandum of Intent (MoI) with Mexico City-based marine and offshore service company, Blue Marine Technology Group. SeaMetric and Blue Marine intend to establish a new, jointly owned marine operations contracting company, based in Mexico, which will operate 20,000tonne TML transportation vessels and associated equipment, for installation and removal of large offshore structures as well as offering other offshore construction services in Latin America.

In addition to the two DP class 3 heavy transport vessels that form the basis of the TML System, SeaMetric and Blue Marine are also planning to build at least one 180m

submersible heavy transport vessel (HTV) as part of the spread. These vessels will be similar to the vessels now being built in China for the TML system, but are expected to have a larger accommodation facility. Blue Marine will also take an active role in financing the TML.

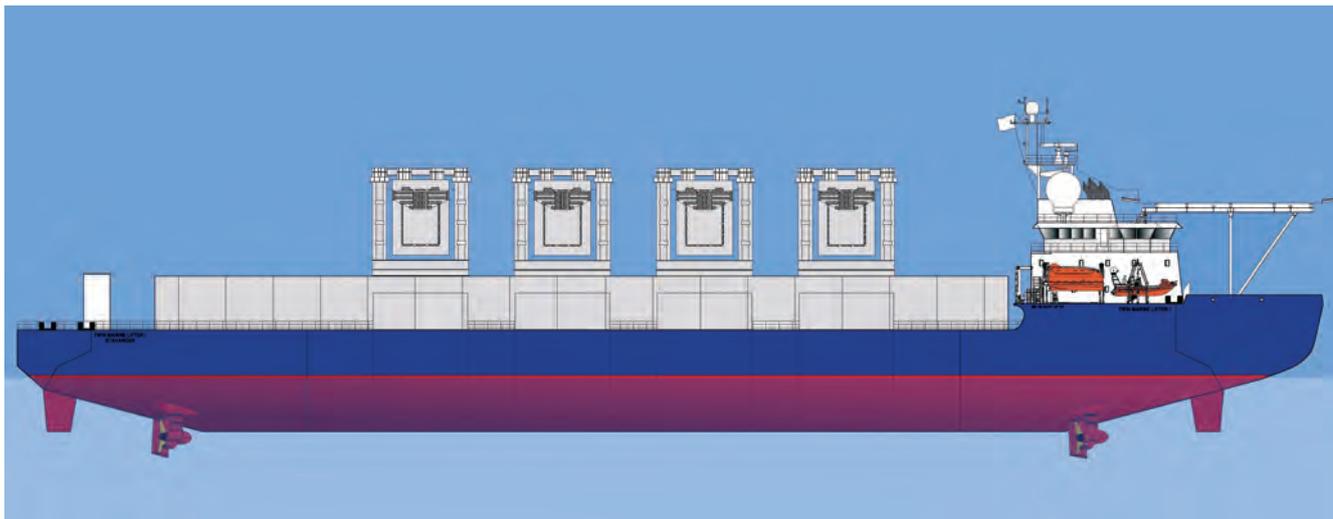
SeaMetric International has also recently announced that it has secured delivery of diesel engines and thrusters for Twin Marine Lifter number two and two heavy transport vessels.

The company said it anticipated that it will have the first TML marine heavylift system – which consists of two DP class 3 heavy transport vessels and a 20,000tonne lift arm system - available on the market in the third quarter of 2009.

Under the same construction contract with ESSCA (Hong Kong) Ltd (in consortium with CNPC - China National Petroleum Corp), a second order is planned in the first half of 2008 for another identical TML system and two 180m long DP class 3 HTVs.

Among the most critical items that could affect timely delivery of the second order are the diesel engines and thrusters, and SeaMetric has now successfully secured production slots for these items which will facilitate delivery of TML number 2 in the second quarter of 2010 and delivery of two 35,000dwt HTVs in the

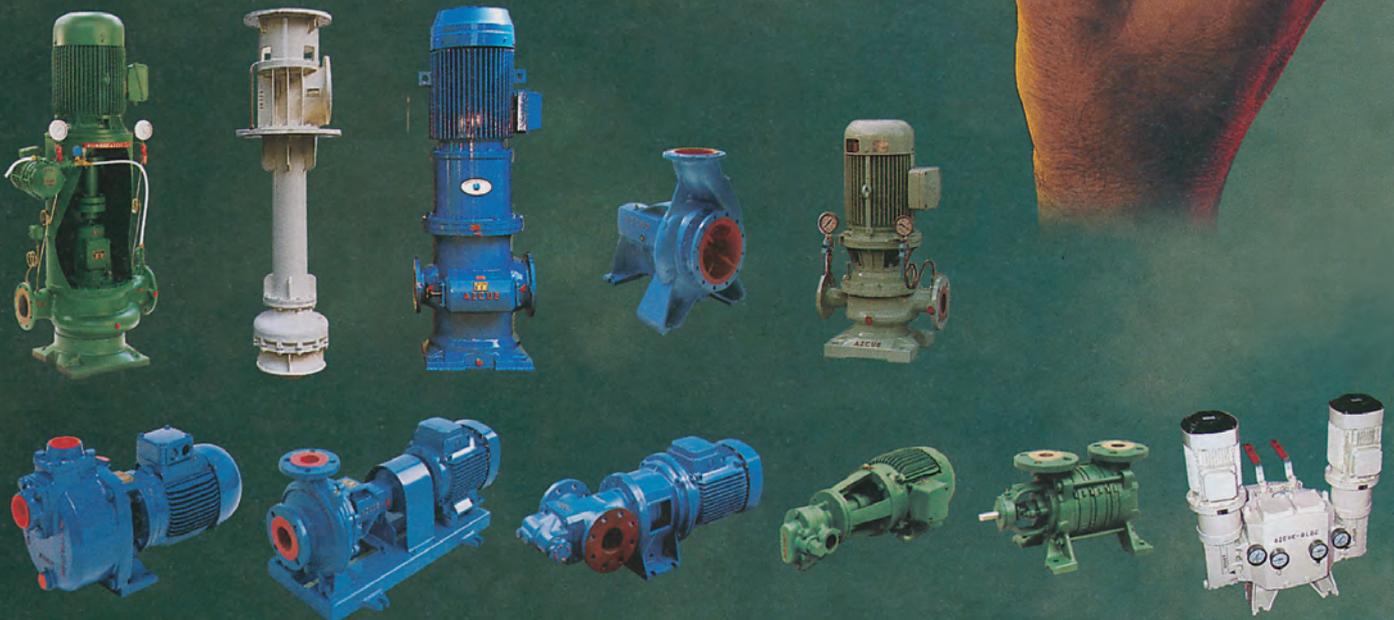
SeaMetric has secured delivery of key items of equipment for the innovative Twin Marine Lifters.



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third quarter of 2010. A Letter of Intent (LoI) for the thrusters was signed in mid-October and a LoI for the diesel engines will be signed shortly.

More recently, and in order to secure the delivery date and quality of the TML system, SeaMetric International and its main contractor, Essca (Hong Kong) Ltd, have transferred the sub-contract for the construction of the first TML vessels to a subsidiary of China National Petroleum Corporation (CNPC).

CNPC Liaohe shipyard, a new yard directly owned by CNPC, will now take over construction of the two TML vessels and has committed to deliver the vessels, in accordance with the original schedule, that is, by the third quarter of 2009.

The shipyard's immediate parent company, Liaohe Exploration Bureau, one of the major subsidiaries of CNPC with approximately 100,000 employees, has provided SeaMetric with a parent company performance guarantee for the project. CNPC has recently injected approximately US\$400 million of new capital into CNPC Liaohe shipyard. *NA*

New gearboxes ahead of market demand

Rolls-Royce has launched a new range of marine reduction gearboxes. The new range will be phased into production through 2008, and can be fitted with a variety of power take-offs that enable large shaft generators to be driven, and electric motors to feed power in for 'get-you-home' propulsion, or as part of a hybrid propulsion system.

The design changes mainly take the form of increased stiffness and more modular construction. The attraction for customers is that the new range both complements and supplements the existing one.

Following an extensive analysis, the power, torque, and shaft offsets of the new sizes correspond to current and anticipated market demands in terms of engine power and speed, and propeller revs for a wide variety of merchant, offshore, and fishing vessels. The new gearboxes will be type numbered after shaft offset in millimetres, whether vertical or horizontal to port or starboard. First to be introduced will be the size 550, followed by the 950, 1050, 850, and 650. Three of the older sizes will be retained, to give a range covering torques from 90kNm to 1,200kNm.

Large reduction ratios are inherent in the design, allowing for all the popular medium-speed engines and permitting low efficient propeller speeds to the extent that the hull lines allow. It is likely that most of these reduction gears will be supplied as part of integrated propulsion systems with shaft lines and CP propellers.

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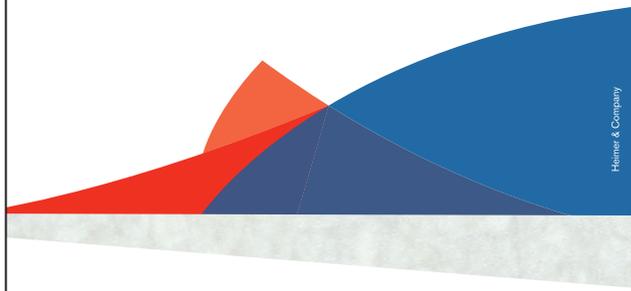


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DNV exports 'cluster' concept to China

Norway's 'maritime cluster' and the benefits that 'cluster working' confers are often cited as one of the reasons for the continued success of the industry.

As Professor Torger Reve of the BI Norwegian School of Management and Nanyang Technological University (NTU) explained recently, cluster working can be characterised not just by a geographical concentration of related companies, but by factors such as a 'critical mass' of companies at all points in the value chain. Closeness to demanding customers and advanced suppliers, leading edge research; dynamic service providers, specialised labour and capital markets, cooperation and keen competition between the various actors in the cluster, innovation and entrepreneurship, and linkages to global markets and global clusters are all aspects of cluster working.

Firms working in clusters demonstrate higher value creation than those on the outside, and experience higher growth, higher levels of productivity, and pay better salaries. They also tend to be highly innovative, have higher commercialisation rates, higher levels of spin-off activity, better access to competent people and innovative ideas, better access to specialised suppliers and demanding customers, and better access to venture capital and competent investors, and lower transaction costs.

Given all of these advantages, it is not surprising that shipbuilding and marine industries in other countries would also like to develop their own maritime clusters, not least China, and Norway's model as a maritime cluster has important lessons for the fast-growing Chinese shipbuilding industry, particularly for the further development of marine equipment in Wuhan, in Hubei province, according to classification society DNV's vice president and regional manager for Greater China, Bjørn K Haugland.

Addressing the China (Wuhan) International Marine Equipment Industry



Bjørn K Haugland, DNV regional manager, Greater China.

Development Forum in September 2007, Mr Haugland said: 'Norway is justifiably proud of its maritime cluster, which as a winning formula is not least due to the proximity of its players – an advantage that Wuhan and Hubei-based companies could take note of when building their own local cluster. Excellent communications and industry platforms for discussion, research, and lobbying government policy support have also been vital for Norway.

'Today, the Chinese leadership has prioritised developing inland locations. The scale of this event in Wuhan demonstrates such a policy focus. It is also clear that shipbuilding and inland development intersect in Wuhan,' said Mr Haugland.

Technology and service

He cited a March 2007 report by COSTIND pointing out that the risks to the Chinese shipbuilding industry mainly come from currency appreciation and the shortcomings of marine equipment industry. 'Technology and service will be the two key elements that decide the development trend of China's marine

equipment industry,' said Mr Haugland.

In addition to CSIC's Wuchang Shipyard and CSC's Qingshan Shipyard, Wuhan is home to Wuhan Marine Machinery Plant Co Ltd, which is the largest and most powerful manufacturer of marine machinery in China. Wuhan Marine Equipment Industrial Park, jointly developed by Norway's I M Skaugen and Changjiang National Shipping Corp, has recently been put into operation.

DNV has an increasing focus on the Chinese market, and recently opened a joint technology Institute with China Classification Society (CSS). The 'CCS & DNV Technology Institute,' which is being established in Shanghai, aims to support both the maritime and offshore industry on various laboratory and research challenges, initially related to coatings.

Several large vessels have recently been contracted at Chinese yards to DNV class. These include a quartet of 300,000dwt ore carriers at China Shipping Group and Dalian Shipbuilding Industry, vessels which will be designed and constructed under a dual class collaboration between CCS and DNV.

The new contracts add to more than 15 very large crude carriers (VLCC) on the DNV orderbook in China, most of which are also dual class with DNV and CCS (China Classification Society). The world's largest ore carriers - four 388,000dwt ships being built by Bohai Shipyard for Bergesen Worldwide – are also being built to DNV class.

Deliveries of the vessels built by Dalian Shipbuilding Industry are expected to take place between August 2011 and March 2012. The first of the world's largest VLOCs from Bohai Shipyard is to be delivered in April 2011, while its last sister in the series of four ships is scheduled for delivery in April 2012. **NA**

Instructor tools for training and assessment

Kongsberg Maritime has introduced a next generation monitoring, assessment, and configuration tool for its Neptune engineroom and cargo handling simulators. The Neptune Instructor System has been designed to enhance the quality of simulation training by providing complete, user-friendly control of student exercises.

It enables the instructor to develop bespoke exercise modules for individuals, teams, or a combination of both from any PC running the application. Using an advanced but intuitive suite of tools, instructor-created exercise modules may comprise any of the following components:

- Initial Condition - describes all the variables at the start of the exercise
- Triggers - a combination of events that initiate an Action, e-Coach message, or Assessment
- Actions - derived from Input Variables and Malfunctions, which can be initiated instantaneously, or pre-programmed as part of the exercise

- E-Coach Messages - built in, bespoke, and automatic student mentoring and performance feedback system
- Student Station Configuration - defines what information is accessible and visible to students
- Assessment - monitors and assesses alarms, and any of 6000 variables in the simulation models

A key aspect of the Neptune Instructor System is its integrated recording and playback functionality. Recording of all activity during the simulation exercise takes place automatically and review/debriefing can include the replay of parts of, or the entire, exercise in order to focus on specific learning objectives.

The Neptune Instructor system was developed in close cooperation with the Norwegian Maritime Directorate, classification society DNV, and experienced simulation instructors from all over the world. It can be integrated into any existing Kongsberg Maritime Windows-based engineroom or cargo handling installations. *NA*

PG Marine spreads out

PG Marine, the well-known supplier of pumps and systems including engineroom pump packages, cargo offloading pumps and systems for tankers and offshore supply vessels, has recently secured access to additional manufacturing capacity, after acquiring a 50% share in specialised manufacturing company, TP Construction.

TP Construction has been a supplier to PG Marine for a number of years, providing components for hydraulically-driven liquid cargo handling systems for offshore support vessels. TP has also participated as manufacturer in the production of the initial examples of PG Marine's revolutionary Multi Application Cargo Solution, PG-MACS.

Earlier this year, PG Marine also acquired 25% of the shares of Flowsafe, which specialises in dry-bulk systems, and is also now a partner with PG Marine for production of PG-MACS. PG Marine reports that it has now secured orders for PG-MACS worth around Nkr20 million (US\$3.66 million).

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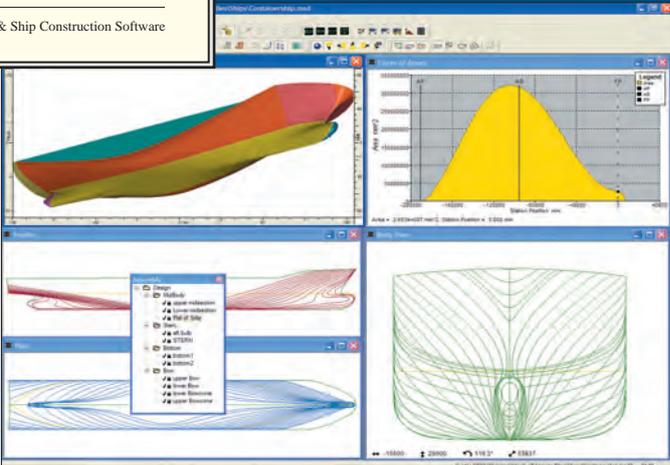
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Pragmatic solutions to regulatory problems

Wolfson Unit has been undertaking stability research for the MCA.

Stability is an aspect of naval architecture that continues to attract widespread research, justified because stability accidents carry a relatively high fatality rate. The modern trend is towards increasingly complex numerical simulations or probabilistic methods of assessment, targeting naval or large commercial vessels because that is where the interest behind the research funding lies. Unfortunately, a familiar result of much research is a recommendation for further work to improve predictions or validate them. Another sad fact is that most lives are lost on very small boats, in sectors of the industry where such approaches will never be applicable. The loss of 24,000 fishermen every year, predominantly from the small craft fleets of developing countries, is evidence of that.

The Wolfson Unit has been conducting stability research for the UK Government for 20 years. Much of the work has been aimed at small craft, where simple, pragmatic, solutions to safety are essential, but this approach has also been developed for application in those projects relating to larger vessels. Throughout the projects, the Unit engineers have consistently found that many of the conventional stability criteria address parameters which are not the best measures of safety. Simple alternative formulae have been provided to facilitate safety assessment, regulation, and the provision of information to enhance operational safety, and the projects' objectives have been met without concluding that further research was required, except where a project was specified as the first phase of a study.

A thorough research study was commissioned in 1988. It included collating stability data for yachts and sailing ships, studying documented casualties, wind tunnel testing a variety of rig types to quantify heeling moments and their variation with heel angle, creating a new facility in a wind tunnel where floating models could be subjected to gusts, and installing data acquisition systems on two vessels to gather wind speed and heel angle data over a full sailing season. Two



Figure 1. A catamaran during tests with reefed sails.

of the principal findings were that the conventional methods of calculating heeling moment and gust response were invalid. It was determined that there is virtually no dynamic response to a gust, because the rise time of a severe gust is similar to the natural period of a quarter of a vessel's roll cycle, and the aerodynamic damping of a sailing rig minimises any dynamic effects of shorter rise times. The Wolfson Unit proposed an entirely new method of assessment, recommended new criteria, and developed a graphical presentation to advise the crew of their level of safety from downflooding or capsizing in a gust or squall. Heeling moments are so dependent on sail shape and sheeting that estimation of maximum moments is unreliable. The method avoids any restrictive regulation of the sail area, and instead provides information to assist the crew in deciding when to shorten sail, using guidance on maximum safe heel angles. The methods and criteria have been adopted by several other national authorities, and the guidance is widely used and respected by crews.

The earlier capsizing tests had shown that all vessels are vulnerable to capsize in breaking waves of height similar to the vessel beam, and that a large range of stability was the essential characteristic to ensure recovery from capsize. Given the link between beam

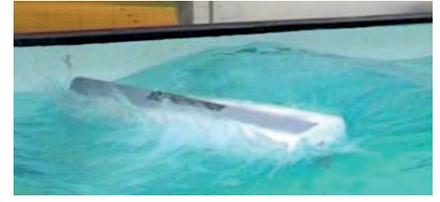


Figure 2. An intact monohull capsizes in moderate waves.

and wave height, smaller vessels are more likely to encounter dangerous waves, and the minimum range criterion therefore was dependent on size. Externally ballasted yachts have a high level of stability to carry sail effectively, and this gives them adequate safety with regard to other hazards.

Adjusting methods

In 2006, the MCA commissioned Research Project 534, to determine whether the

methods should be adjusted for the largest yachts, now approaching 100m. It was concluded that the existing methods and criteria remained valid, but that there may be instances where a yacht has a very high maximum righting moment in relation to the potential heeling moment, perhaps because of extreme beam or a very small sail plan. In such cases an alternative approach was proposed, which harmonised with the requirements for sailing multihulls.

The safety of sailing multihulls was addressed in 1995 because a number were operating commercially and the methods used to assess them had not been developed in the previous studies. The work identified aspects that were poorly understood, and was followed in 1998/9 by Research Project 427, with tests conducted in the towing tank to investigate vulnerability to capsizing in breaking waves, and pitchpoling. An interesting result was that the range of stability again was important, this time in determining whether capsize occurred following an encounter with a large breaking wave. Wind tunnel tests were conducted to quantify the heeling moments, Figure 1, and a new formula for calculating the heeling moment was developed. This included the deck area, which is neglected in conventional formulae, but has a significant influence on the lift force and its contribution to the heeling moment.

Further work on the wind heeling moments of catamarans was conducted as part of a coordinated group of research projects in support of the IMO review of the 2000 High Speed Craft Code. The work was conducted in phases, as Research Projects 503 and 537. Models of monohull and catamaran ferries, and a systematic series of rectangular blocks, were tested in the wind tunnel to develop improved formulae for wind heeling moment, and its variation with heel angle. As with the sailing multihulls, the deck area and beam of the vessel were found to have a strong influence on the heeling moment, because the vertical lift is a major component. This had been found during tests conducted in 1988 by the Wolfson Unit, acting as sub-contractors in a previous MCA project, and the principal contractors had made some recommendations for adjustment of the method, but they were not adopted. Resulting from the Projects were proposed formulae for heeling moment,

“The MCA commissioned the Wolfson Unit to determine the validity of the roll prediction within the criterion, in particular for wide, shallow draught passenger vessels”

and its variation with heel angle, based on the profile area, but also dependent on the beam to height ratio.

The IMO weather criterion has been problematic for some ship types, and has been the subject of much research. With the introduction of EC Directive 98/18, all European sea-going domestic passenger vessels will be required to comply, but some UK ferries cannot. In 2007, with Research Project 571, the MCA commissioned the Wolfson Unit to determine the validity of the roll prediction within the criterion, in particular for wide, shallow draught passenger vessels. Five vessels were modelled and subjected to rolling tests in waves representative of those assumed in the weather criterion. A total of 19 configurations were tested and it was clear from the results that the existing criterion does not provide a reliable prediction of the roll angle. The method generally gives an under prediction of roll for vessels of low beam/draught ratio, and an over prediction for those of high beam/draught ratio. Wide, shallow draught vessels therefore are at a disadvantage in the assessment. Researchers in Russia and Italy had proposed adjustments to some factors in the criterion and, while these do not provide reliable estimates, they offer a more consistent correlation with the model test data. It appears that the criterion is flawed in several ways, but it was appreciated that its elimination is unlikely to be acceptable in the short term, and it was recommended that the existing proposals be supported by the UK.

Returning to the HSC Code review,

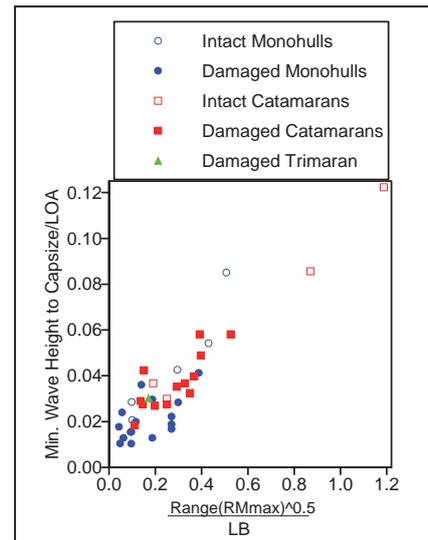


Figure 3. The strong relationship between minimum wave height to capsize, and a proposed stability parameter.

another issue was to address the relative levels of safety provided by the monohull and multihull stability criteria. The former were widely accepted conventional criteria while the latter had no sound technical basis. In Research Project 509, the Wolfson Unit tested two monohulls, three catamarans, and a trimaran, in a range of loading conditions, upright and heeled, intact and damaged, with damage openings towards and away from the waves. The tests were unusual in that the models were ballasted to conditions designed to test the minimum criteria, rather than to test a particular vessel. The models were stationary, but unrestrained, in waves. Tests were conducted at a matrix of frequencies and heights, and at all headings, to determine the minimum wave height required to capsize the model in each case. The large number of variables resulted in a test programme of 800 cases, each of which was tested at all headings.

Rescaling for larger sizes

Whilst a model at a particular scale can be ballasted such that it just complies with the criteria, if it is re-scaled to represent a larger size vessel it will comply with ease because the GZ values will be greater. If the model capsizes in a certain wave height, this has obvious implications for the validity of the fixed criteria in terms of immunity from capsize. The tests therefore verified the simple fact that safety is dependent on vessel

size and sea state, parameters which are not incorporated into conventional methods of assessment, and it proved impossible to compare monohull and multihull safety in general, simply on the basis of the HSC Code criteria. Although hypothetical craft could be compared directly, actual multihulls tend to be much safer than monohulls because they tend to have greater margins of stability over the minimum criteria.

The findings were interesting, and demonstrated that conventional criteria are not the best measures of safety. It is the residual stability in the presence of moments such as passenger crowding or wind heeling that governs the safety, but it is the upright stability that is assessed most rigorously. Vulnerability did not appear to be influenced by the form of the vessel, number of hulls, or the existence or extent of damage. All configurations may be considered as floating bodies characterised by their residual stability curve. The vulnerability to capsize is most dependent on the range of positive residual stability and, to a lesser extent, the maximum residual righting moment.

A new method was proposed to assess the level of safety on the basis of these characteristics and the size of the vessel relative to the operational sea state. The single formula developed may be applied to all types of hullform, intact or damaged. It follows, therefore, that it may be applied to all types of ship.

In some cases, the waves in which it was possible to capsize the models were lower than the operational limits of the ferries on which the models were based. The tests represented the dead ship condition, and

the worst possible combination of wave period and heading, so there are few full scale casualties for correlation purposes, but those that were found, mostly fishing vessels, appear to validate the method. It has therefore been presented to the IMO for consideration, but it is expected that further validation for a range of vessel types may be required before it can be given full consideration in that forum, and the MCA has invited tenders for Research Project 583, which will address that.

The conventional system of stability assessment discourages fishermen from considering their stability, because they go to sea confident in the knowledge that it complies with the relevant requirements in all operating conditions. Inadequacies of the conventional system are that it does not necessarily address the effects of operational loads or moments, does not address safety in terms of the size of the vessel in relation to the sea state, does not provide practical guidance on varying levels of safety, and does not present information in a simple format. Regulatory boundaries have driven designs in undesirable ways and this was something to be avoided in this work.

The recommendation was for a Stability Notice; a single page of information posted prominently on the vessel, simple enough to be understood and memorised by the crew. It is proposed to provide information that stability is variable, may be inadequate, and is under the control of the fishermen.

The method developed in Project 509, to relate residual stability to safety with regard to vessel size and sea state, was ideal for application to fishing vessels, and was

used as the basis for guidance. For a vessel with full stability data, it is quite simple to determine the maximum load, or the maximum lift on a particular towing block or derrick, at which the residual stability is reduced to some particular level. Two levels were proposed; amber, at which the vessel may be described as having a low level of safety, and red, at which there is danger of capsize. In each case, the situation is associated with a maximum recommended sea state. The amber level was aligned with the safety offered by the minimum criteria, and the red level at 50% of that in terms of the maximum sea state. The guidance cannot be precise, but is intended to raise the safety awareness of the crew, assisting them in their decisions on loading and lifting, having regard to the prevailing conditions.

For the smaller vessels, the source of guidance information was more problematic, because the expense of a full stability assessment would not be acceptable politically. The research involved a study of fleet characteristics, and the stability of sample vessels, together with calculations on systematic variations of hullform and loading. The proposed method is for the same information to be provided as for the larger vessels, but basing the guidance on the residual freeboard. Heavily loaded vessels, or those lifting heavy weights over the side, are far more vulnerable to capsize, and this is reflected on the Stability Notice, Figure 4. An additional recommendation was for a freeboard guidance mark to be placed on the vessel's side, indicating the residual freeboards corresponding to the safety zone boundaries. These would have no regulatory purpose, but would enable the crew to relate the stability notice directly to the vessel operation. They would also indicate the relative safety of different vessels, and perhaps increase the safety awareness of a fishing community. The information for the notice can be derived in a few minutes with a calculator, using only the length and beam of the vessel to determine the guidance freeboards and sea states, and might be a valuable tool with which to improve the very low safety levels that occur in some parts of the world. *NA*

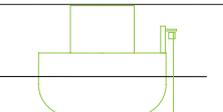
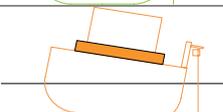
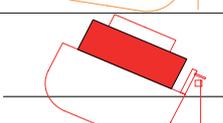
STABILITY NOTICE					
Name: Jolly Polly No: AB789 LOA: 10.6m Beam: 3.85m Owner: John Potter	LOADING & HAULER USE	SAFETY GUIDANCE			
		Zone	Minimum Freeboard	Maximum recommended seastate	
	Good margin of residual freeboard	Good margin of safety	At least 47cm		
	Loading or hauling reduces minimum freeboard to less than 47cm	Low level of safety	24 to 47 cm	1.3 metres	
	Excessive loading or hauling reduces minimum freeboard to less than 24cm	Danger of capsize	Less than 24cm	0.6 metres	

Figure 4. Example Stability Notice for a small fishing boat with no stability data.

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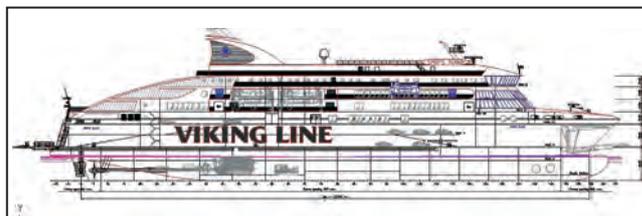
Foran design for Viking Line

Sevilla Shipyard selects Sener package for complex ro-pax vessel design.

Spanish engineering and consultancy company Sener has linked with Sevilla Shipyard over the basic and detail engineering of a new Viking Line ro-pax ferry. According to the agreement, Sener will use its own FORAN CAD/CAM system.

The integrated computer system, specifically developed for design and construction of ships, will be used in the design of the 133m length, 1500 passenger and container vessel, which is planned to operate short international routes on the Baltic Sea. The design will feature nine decks, a 21.9m beam, and a 5.7m draught, while the propulsion machinery will consist of four diesel engines with two shaft lines with variable pitch propeller.

The Viking Line ferry will be the first vessel built in Sevilla Shipyard after the Huelva Shipyard acquisition. Sevilla Shipyard was previously part of the state-owned IZAR group that has been recently dissolved, with



General arrangement for Viking Line's new ro-pax ferry, to be built at Sevilla Shipyard.

separate parts purchased by private groups. Since its acquisition, the yard has been focusing on developing its expertise in the ro-ro, ro-pax, and ferry markets, although latest reports indicate that the yard will also build chemical tankers, oil tankers, and multi-purpose vessels within a short period of time.

Sener said that the user base of the FORAN System now stretches to over 130 shipyards and design offices. Running on Windows workstations connected through LAN or WAN, FORAN permits a fully

interactive and concurrent definition of the ship 3D product model. The package includes hullform definition, naval architecture, hull structure, outfitting, electrical and accommodation features, as well as a number of common modules (build strategy, drafting, walk-through design review, collaborative engineering), links with production equipment (cutting machines, bending machines, robotic systems, etc), interfaces to management systems, and its own integrated development environment. **NA**

Collaboration holds the key for CFD

Computational-based engineering firm CD-adapco and classification society Germanischer Lloyd are to work more closely together.

CD-adapco and Germanischer Lloyd have signed a new agreement in the sector of Computational Fluid Dynamics (CFD) for marine applications. The collaboration will include mutual publications, development, and validation, as well as workshops.

Dr Ould el Moctar, GL head of department fluid dynamics, said: 'Germanischer Lloyd and CD-adapco have already been working together for many years. Both parties have considerable experience in the field of CFD analyses.'

In the past, the organisations have published papers on wave loads and on the simulation of sloshing in LNG tanks, which have been jointly authored by Dr el Moctar and CD-adapco technical director, Prof Milovan Peric.

The importance of computer-aided engineering in shipping cannot be



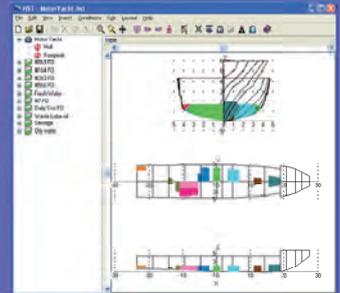
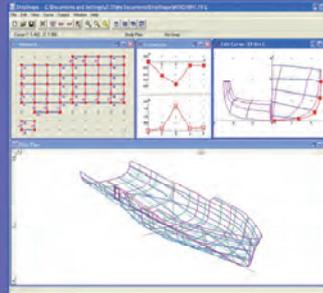
From left to right: Engin Cetindogan, and Raimund Schipp, CD-adapco, Karsten Fach of GL, Prof Milovan Peric, technical director for CD-Adapco, and Dr Ould el Moctar, head of Department Fluid Dynamics at GL.

underestimated, Dr el Moctar stressed: 'The technological progress of simulation in this sector is rapid, both for software and hardware. Simulation technology is employed in a wide range of marine applications and often plays a

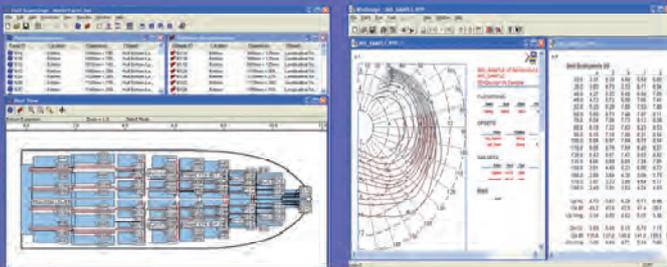
critical role in the decision making process.'

Raimund Schipp, CD-adapco European director of sales, added: 'Computer simulation technology is finally fulfilling its enormous potential. The availability of accurate and reliable predictions at the earliest stage of the design process leads to significant savings in effort and money, compared to performing tests and amending the design later in the process.'

'The true value offered by advanced engineering providers lies in the symbiosis of software or hardware and highly skilled staff,' Dr el Moctar said. 'Modelling therefore also requires considerable collective experience.' 'This was why the new cooperation was so very interesting, Mr Schipp said: 'We will combine both the theoretical as well as practical experience of our two companies to come up with beneficial solutions.' **NA**



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hyperMILL upgraded for all comers

2D, 3D, and 5-axis strategies with one user interface from German developer Open Mind.

Open Mind Technologies has completed development of hyperMILL V9.7, whose launch sees the German company offering users of the CAD software program SolidWorks a complete, integrated solution for the very first time.

hyperMILL's integrations with Pro/ENGINEER Wildfire, Autodesk Inventor, thinkdesign and hyperCAD 2007.1 have also been updated as part of the release.

The new version brings users of hyperMILL's CAD integrations up to date. Open Mind says users can now access all of the software's functional benefits in an integrated manner, including the new millTURN module.

Open Mind says the advantage provided by the CAD-integrated CAM solutions is that they enable continuous process chains. The CAD and CAM systems both access the same pool of data. A uniform data model is used during the entire process in order to ensure the accuracy and transparency of the manufacturing process and to prevent errors. The standard user interface from the CAD environment simplifies CAM programming and raises the user's acceptance of the CAM solution.

Maxsurf taken to the max

Formation Design Systems has updated its Maxsurf suite of naval architecture software. The new 'version 13' release adds new functionality for the analysis of existing vessels and the generation of vessel structure.

Used by over 1000 naval architects and shipbuilders worldwide, Maxsurf provides a comprehensive suite of tools for all types of ship and boat design.

Key features include -

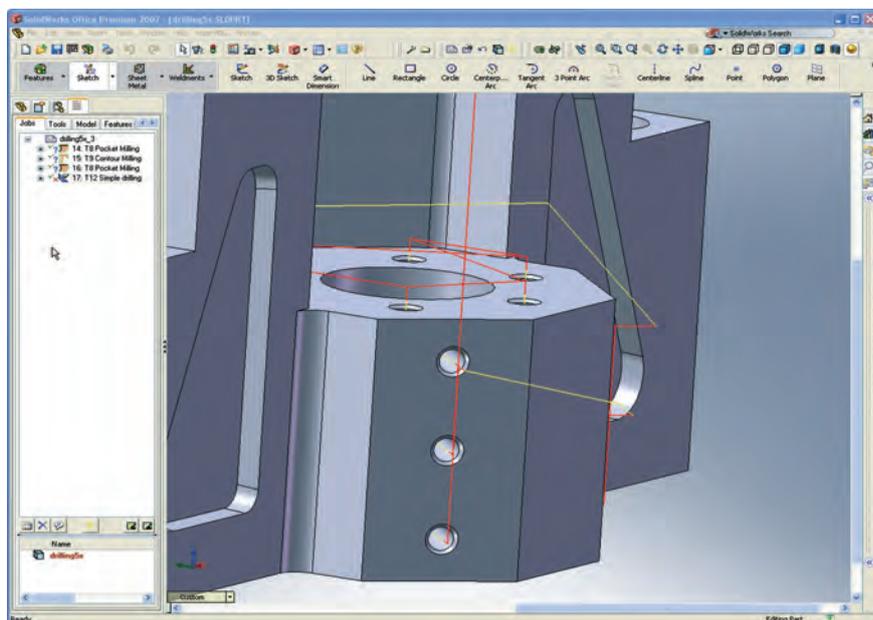
- Complete suite of design, analysis and construction capabilities
- Works from one common 3D NURB surface model
- Graphical Windows interface
- Smooth bidirectional data exchange with - Word, Excel, AutoCAD, Rhino and other systems
- Data transfer to ShipConstructor for detailing and production

FDS said the new features in version 13 of Maxsurf would help both monohull and multihull designers. They include automated fitting of existing designs, enhanced stability criteria, motions prediction of catamarans, and improved generation of hull structure.

For the first time, hyperMILL V9.7 realises continuous process chains for SolidWorks CAD users. In addition, hyperMILL V9.7 already supports the recently released Autodesk

Inventor 2008. hyperMILL thus supports all leading CAD applications in its current version as an integrated CAM solution.

The supplier says hyperMILL offers users an array of strategies for 2D, 3D, HSC, and 5-axis machining, as well as milling and turning, in one user interface. Programming efforts are reduced with sophisticated feature technology, including feature recognition, automatic mapping of hole and pocket features, feature list, feature browser, macro technology, and macro database. With new workspace monitoring, the user can check in advance whether the machining job can be performed within the given workspace or whether limit switches will be crossed. [NA](#)



hyperMILL - seamlessly integrated with SolidWorks.

The World Superyacht Awards

Young Designer of the Year 2008

A new prestigious award for talented young superyacht designers is to be awarded at the Boat International Group 2008 World Superyacht Awards in Venice

Camper & Nicholson's International, the Royal Institution of Naval Architects and the Boat International Group are proud to announce the introduction of a new prestigious award for the world's most promising young superyacht designer. The award recognises the achievement of an outstanding young designer and the potential impact of their work on current or future designs for the superyacht industry. The Young Designer of the Year award will be presented at the 2008 World Superyacht Awards in Venice, which recognises the remarkable ingenuity and innovation demanded in the design, engineering and construction of the world's finest luxury yachts, and is the most obvious place for new designer talent to be recognised and celebrated.



The Award

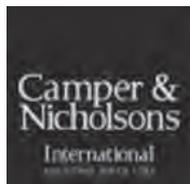
The award is open to anyone who is studying for a degree or vocational qualification in a subject relating to yacht or small craft design, or anyone who has already graduated within three years of the closing date for entries, which is 31 January 2008. Young naval architects and yacht designers from all over the world have been called upon to enter the competition via the extensive RINA global network. RINA has already had an impressive response from universities in countries as far afield as New Zealand and China, to those closer such as the UK and Italy. RINA's CEO Trevor Blakely is proud that RINA is supporting the new award for young designers: 'The superyacht industry is one of the most successful sectors of the maritime industry, and owes much of that success to the work of its designers who provide that unique combination of form and function, which is the modern superyacht. 'The World

Superyacht Awards Young Designer of the Year prize 2008 will be presented to the young designer who produces the best concept design for a superyacht. The entries will be judged by a group of leading world-class designers selected by the Boat International Group and RINA. The judges will be announced in the next issue of Boat International. 'The World Superyacht Awards Young Designer of the Year competition will provide an opportunity for superyacht designers of the future to demonstrate their ability and talents. I certainly do not envy the

judges in their task of selecting the best,' adds Blakely. The winner of the Young Designer of the Year 2008 will receive a prize of €5,000 and will be invited to receive the award at the renowned World Superyacht Awards ceremony on 18 April 2008 in Venice, Italy.

Sponsored by Camper and Nicholson's International:

'Following the joint Camper & Nicholson's International - Boat International initiative three years ago to reward the work of yacht designers and naval architects, we thought it was only natural to continue to collaborate with the Boat International Group and RINA in order to identify the young designers of the future,' says Camper & Nicholson's International's CEO Jillian Montgomery. 'Taking an active part in this competition prepares the grounds for the future in many ways. Firstly, by giving up and coming designers exposure and the opportunity to get in touch with potential clients, and secondly by offering our existing and future clients a glimpse of designs that could soon be on the drawing boards,' explains Laurent Perignon, director of marketing for CNI.



Entries should be submitted on CDROM or DVD, by 31 Jan 2008. If you are interested in submitting an entry or would like more information, please contact Giuseppe Gigantesco, E-mail: ggigantesco@rina.org.uk, Tel: +44 (0)20 7235 4622

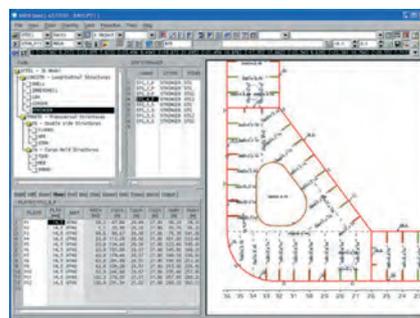
The Royal Institution of Naval Architects, 10 Upper Belgrave Street, London, SW1X 8BQ

Napa manages with Lloyd's Register

The development of a new NAPA application, based upon the Manager platform, was achieved in collaboration with Lloyd's Register.

NAPA 2007.1 was recently released by Napa, with new features including the ability to enable the designer to easily investigate, at the design stage, whether a ship complies with the regulations concerning stability and damage stability. Lloyd's Register aided the development of this software, consulting on the interpretations of the stability rules and applying its own approval process to the application, which is also intended to streamline the ship approval process.

The Manager development platform offers claimed effective tools for the modelling of processes in the planning of different ship types, and is said to be easy to use, with an intuitive interface. Other applications based upon the Manager platform have also been updated,



A screenshot of NAPA Steel, one of the software packages that has recently been updated by Napa.

and revisions include applications for planning of ship painting, automation of planning the isolation of passenger vessels, reviews of offshore structures, and for simulation of ship flooding.

The new features of NAPA Steel, a system

for ship structural design, comprise tools for cost accounting, calculation of painting surface areas and functions for classification designs, as well as considerable improvements to the user interface. The basic functionality is also reckoned to be improved by the development of a new geometry editor that offers a visual and straightforward way of modelling the ship's geometry.

The NAPA software packages are type approved by Det Norske Veritas, Germanischer Lloyd, and Lloyd's Register. [NA](#)

Virtues of HSVA towing tank

Hamburg Ship Model Basin's (HSVA) CFD development project, Virtual Towing Tank (VIRTUE), funded by the EU, has been augmented with the creation of VIRTUE Integration Platform (VIP).

VIRTUE Integration Platform was recently developed as a major part of the entire concept of the virtual basin for HSVA, with the software being aimed at a flexible and extendible platform architecture. The platform is said to facilitate the interplay of numerous individual CFD tools, which formerly existed in separation, requiring a large effort to interface.

Introducing dedicated data translation modules and wrappers, the VIP now enables easy generation of complex process chains, combining several interacting analysis tools. During a recent demonstration of the platform, presented by HSVA's Scott Gatchell, a propeller analysis and optimisation application was displayed, making use of a combination of RANSE methods, which are used for the prediction of a ship wake, and a dedicated propeller panel method to compute thrust was also presented.

Another of HSVA's main activities in



Scott Gatchell, HSVA, presenting the VIP.

the numerical towing tank focuses on the prediction of propeller flows. A new RANSE code, FreSCo, a joint development with TUHH and MARIN, has been adopted for propeller predictions inside the VIRTUE project. Despite its rather short development time, FreSCo is now claimed to show encouraging results for propeller flows and cavitation.



A CFD diagram of propeller pressure distribution (suction side).

The use of a completely unstructured mesh allows for relatively simple grid generation, facilitating fast model generation and shortened analysis times. In a recent open workshop performed by VIRTUE's propeller group, the code is said to have proved highly competitive. HSVA will soon introduce FreSCo into CFD analysis practice, to generate an immediate exploitation of project results. [NA](#)

Aveva responds as opportunities knock

Aveva has extended its reach in Asia in providing marine design and engineering solutions, with new contracts and agreements announced in quick succession.

Korea Shipyard Co - a newcomer to shipbuilding - has become the latest shipyard to invest in Aveva process and design engineering technology.

The shipbuilder, based in the Southwest region of South Korea, focuses on 180,000dwt bulk carrier construction. To date it has an orderbook valued at US\$200 million, but this will significantly increase to US\$2 billion in 2008.

Chae-Woo Lee, executive vice president of Korea Shipyard said: 'With the expected surge in orders, we cannot take risks. We need a complete solution that integrates hull design with outfitting; design automation that maximises efficiency; and a database that allows collaborative, parallel working - all of which are provided

by Aveva Marine Solutions.'

Meanwhile, Aveva has announced an academic-industrial cooperation with Seoul National University (SNU) to provide 50 Full Package versions of Aveva Marine to the naval architecture and ocean engineering department.

The agreement is also aimed at increasing the exchange of shipyard design information and manufacturing technologies between both parties, conducting joint research to overcome challenges faced by shipyards, and enhancing students' skills in Aveva Marine via training by Aveva's specialists.

Jung Chun Suh, head of the naval architecture and ocean engineering department, SNU, said: 'Korea's shipbuilding prowess is largely due

to a strong supply of ship engineering graduates from its universities, mainly SNU. With the agreement, we hope that SNU undergraduates will be "field-orientated" with experience in Aveva's industry-standard solutions by the time they enter the working world.'

At the end of November, Aveva followed up by opening its new and enlarged China Marine Division office, in Shanghai, simultaneously announcing the signing of a multi-million US Dollar licence agreement with Sinopacific Shipbuilding Group Co. The agreement was signed in the same week as Aveva released its latest engineering solution, Aveva Marine, with Sinopacific becoming the first customer in China to adopt the approach. [NA](#)

ShipConstructor behind Korean design panache

South Korean shipbuilding design firms A-System Co Ltd and Onetop Co Ltd have purchased ShipConstructor Software Inc's newest generation design software program, 'ShipConstructor 2008', to provide 3D product modelling and production planning to the world's leading shipbuilding nation.

To further support Korea's international status and help companies keep pace with the ongoing need for skilled shipbuilding personnel, A-System has also become a ShipConstructor training centre, providing in-depth training in which an experienced instructor works with the client to help them get started on their specific production project.

A-System's first application for

ShipConstructor 2008 will, in fact, be elsewhere, with the package to be used for modelling and detailing a new 290m pipelaying vessel for Yantai Raffles Shipyard, under contract from Saipem.

'We're very excited to be using world-class ShipConstructor to design this large, complex vessel,' said S G Kim, president, A-System Co Ltd. 'ShipConstructor is the most dependable, powerful, intuitive, and easy-to-use ship design software on the market today, and we are confident that it will help us to deliver the very best results for our client—on time and on budget.'

The ice-strengthened, purpose-built DP pipelay and subsea construction vessel will lay pipelines and support developments in deepwaters. With

a main deck height of 24m, it has a breadth of 39m and an operating draught ranging from 7m to 10m. The 43,000 light ship tonne vessel will include an S-Lay Pipe System with a future option of installing a J-Lay System. It will be equipped with a 600tonne mast crane and two 55tonne pipe handling gantry cranes. It will accommodate up to 538 people. The vessel will be built under ABS classification.

ShipConstructor's AutoCAD-based software provides a DDROM SmartParts 3D parametric modelling and revision system and is completely compatible with programs such as Inventor, Rhino, MaxSurf, Multisurf, NavisWorks, and all versions of SQL Server 2000 and SQL Server 2005. [NA](#)



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By Joe Stiglich

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- Incidents/accidents

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

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Dassault in the lap of luxury

Yacht designer chooses CATIA platform for vessel planning.

Arthur M Barbeito & Associates, Inc, one of the world's premier luxury yacht designers, has chosen Dassault's CATIA design authoring software as its primary design platform.

RAND North America, Dassault Systèmes' partner, worked with Barbeito to find the solution that best streamlined Barbeito's design and manufacturing planning processes. CATIA will consolidate in one solution the functionality its engineers currently struggle to access by switching between several different applications.

Barbeito & Associates specialises in highly customised 50m-160m megayachts with luxury interiors. The company will use CATIA for every facet of yacht

design, including hull design, steel structure design, piping, and interior design. It also plans to use the DELMIA digital manufacturing solution for communicating production information with the shipyards that build Barbeito's designs.

'We were wasting a lot of time going to one application for conceptual surface design, then another for the steel detailing, and another for the piping and equipment,' said Arthur Barbeito, company founder and president. 'The different systems also multiplied the time it took to modify a design because a change in one system had to be manually repeated in the others. With CATIA, we have all of our essential functionality in one system. We expect

CATIA's combination of advanced design functionality and scalability to make us more efficient by orders of magnitude.'

The designer recently partnered Wuhan Nanhua High-Speed Ship Engineering Co, a Chinese shipyard that uses Dassault Systèmes' CATIA design authoring software. The single platform collaboration between designer and shipyard, PLM, is anticipated to yield significant efficiencies.

'Barbeito's designs have to combine space-age engineering with elegant aesthetics. CATIA's integration and range of functionality will give Barbeito's staff more flexibility to create innovative designs that meet their clients' expectations,' said Dan Smith, vice president, business development, RAND North America. [NA](#)

OpenNURBS 4.0 toolkit for .NET

System eliminates 3D model rebuilding.

Robert McNeel & Associates has released the openNURBS 4.0 toolkit for .NET, supporting all of the features in Rhinoceros 4.0 native 3DM file format including history, annotation, meshes, and images.

'The inability to transfer geometry between applications stifles designers' use of 3D,' said Bob McNeel, president of Robert McNeel & Associates, 'Building a 3D model during the design process, then rebuilding it for product

engineering, again for analysis, and yet again for tooling, introduces errors and modifies the original design. The openNURBS.NET toolkit eliminates the need to rebuild by making the industry-standard 3DM file format accessible to any .NET-enabled application.'

The toolkit includes:

- Documentation
- .NET 2.0 Assembly to read and write Rhino's 4.0, 3.0, and 2.0 3DM file format and read 1.0 files

- Windows 2000, XP, and Vista support
- NURBS evaluation routines
- Quality assurance and revision control
- Supporting libraries and utilities
- Free technical support and training

The openNURBS toolkit for .NET is free. There are no restrictions. Neither copyright nor copyleft restrictions apply. No contribution of effort or technology is required from the members, although it is encouraged. [NA](#)

S & I partners Autoship

Distribution deal aims to benefit the Asia Pacific region.

S& I Systems, of Singapore, has joined the Autoship dealer network, with a remit to distribute Autoship's suite of CAD/CAM programs to the Asia Pacific region.

S & I has over 200 employees in the Asia Pacific area, with direct presence in China, Hong Kong, Malaysia, and Thailand. It provides infrastructure and business solutions to a customer base of over 1000 customers representing a broad spectrum of industries

across Asia Pacific.

Working with ASC, S & I will actively distribute ASC's integrated suite of CAD/CAM programs and Stowage Planning Systems (SPS). The complete CAD/CAM product line includes Autoship Pro (hull design and surface modelling), Autohydro Pro (hydrostatics and stability), Autostructure (internal structural design), Production Manager (nesting and other production support), Autopower

(resistance and powering prediction) and Autoplate (plate design, expansion, and management system).

Stowage Planning Systems (SPS) provides extensive stowage solutions for cargo management activities and can be customised to different levels of complexity from managing rig decks and supply vessels, to complex ro-ro ship cargo management. [NA](#)



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Optimised hulls lower gas emissions

A latest report from Swedish research body research SSPA concludes that early hull optimisation can provide significant reductions in greenhouse gas emissions from ships.

SSPA has conducted a number of studies of different ship types, including product carriers, Panamax and Suezmax tankers, VLCCs, and liquefied natural gas carriers, with a view to optimising hull lines to enhance fuel efficiency.

Operational, port, and seaway requirements and restrictions were used as the basis for parameter selection, and main hull dimensions and different hull concepts such as twin skeg and single screw were of most interest in the studies. SSPA has a hull database with over 6000 models tested, including over 300 twin skeg hullforms.

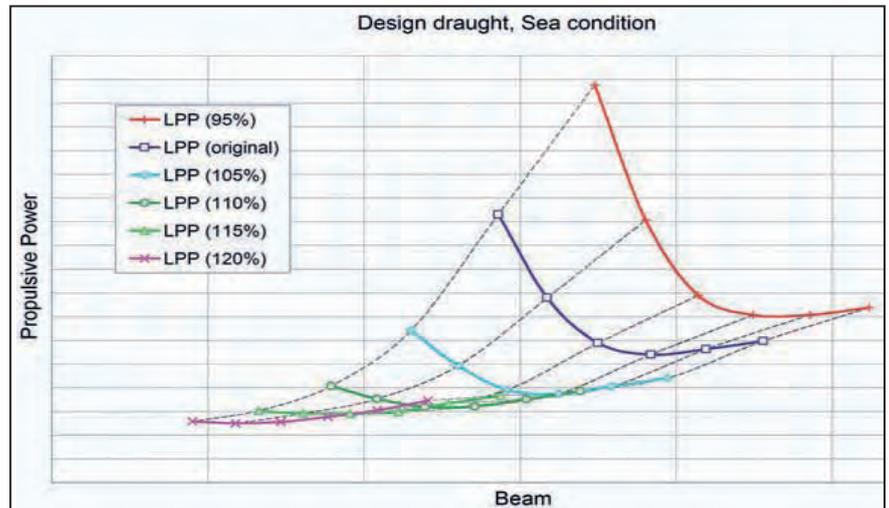
By using this database, SSPA says it has been possible to perform parametric hull optimisation at a very early stage of the design process. A procedure for theoretical calculation of hull resistance and propulsive power in a seaway as well as in calm water has been developed.

Influence of hull type and hull dimensions such as length, beam, draught, block-coefficient, and displacement were investigated.

The study showed that the gain achieved by choosing the optimal hull type and hull main dimensions that conform to stated operational restrictions could equate to a significant difference in required propulsive power – typically up to several per cent in a seaway, and in some cases, 10% or more.

BP Shipping Ltd commissioned SSPA to carry out a study, the 'BP Hydrodynamic Development Program 2006', specific to Panamax tankers, to establish the trade-off between propulsive power and various hull parameters. The study includes both single screw and twin skeg hull designs, where the power demand for a single screw versus a twin skeg vessel is highly dependent on ship size and restrictions in ship draught.

The aim of the project was to include environmental and operational considerations when choosing hull type and hull main dimensions with respect to minimum power. Hull resistance and propulsive power were calculated for operation in a seaway as well



Predicted propulsion power for the Panamax concept at design draught for a range of different main hull dimensions. With consideration given to operation and terminal restrictions, optimum main hull dimensions – with respect to minimum power – can be selected from this type of diagram.

as in calm water. The main hull dimensions – length, beam, draught, block-coefficient, and displacement – were varied over a wide range for each concept, while the payload was kept constant. The influence of sea condition and operating environment in choosing hull and propeller main dimensions with respect to minimum power was studied.

Verifying tests

To verify the results of the dimension study, one set of hull main data per concept was selected. One twin skeg and one single screw Panamax form was designed and refined by CFD. Hull models were then built and tests in calm water and waves were carried out in the SSPA Towing Tank. In addition to resistance in calm water, added resistance in a seaway due to waves, wind, and leeway was predicted. Wave data were collected from Global Wave Statistics (BMT Fluid Mechanics), which provide wave data for a number of ocean areas. Wind resistance coefficients were collected from wind tunnel test data for tanker hulls at design draught.

The route used for the Panamax tankers was from Ventspils in Latvia, through Store Baelt in Denmark, Kattegat, Skagerrak, North Sea, English Channel, and North Atlantic to the East Coast of the USA.

Not surprisingly, the North Sea environmental conditions when going westward added a higher sea power to the ship than the Baltic conditions did. Going west across the Atlantic ocean requires a higher average power because of the dominant SW-NW wind and sea direction where the wave height can build up due to longer fetch. It was found that when going eastward, the sea margin was about one quarter of the magnitude when going westward.

An interpolation software program was developed within the project that SSPA says will be a helpful tool for comparing different hull designs and main dimensions with respect to fuel consumption. The comparison of newbuilding costs of different designs with reliable lifetime fuel cost predictions will make economic decisions easier. The outcome from the study will also help BP to reduce fuel costs during the ship's lifetime. **NA**

Mixed signals on cold ironing

Shipping's reaction to cold ironing as a method of reducing emissions has been mixed, not least due to logistical challenges, with some in outright opposition to its usage, writes Clare Nicholls.

The drive towards cold ironing, where ships in port cut emissions by drawing on shoreside facilities for power, is being pioneered at the port of Los Angeles. Here, the port and Nippon Yusen Kabushiki Kaisha (NYK Line) recently announced their first successful implementation of a 'direct' shoreside electric power connection to a container vessel at berth. *NYK Atlas* arrived at Yusen Terminals in November 2007, and was connected to a 6.6kV alternative maritime powered (AMP) shoreside plant a few hours after docking, utilising shoreside power until its departure three days later.

'*NYK Atlas* is leading us into the next generation of clean, at-dock ship operations,' said Geraldine Knatz, executive director of the port of Los Angeles. 'NYK and Yusen Terminals have been terrific partners in helping the port of Los Angeles deploy AMP, demonstrating their commitment early-on by building AMP capability into *NYK Atlas*.'

The ship is a post-Panamax container vessel, and can carry 6200TEU. It is 299.9m long, 40m wide, with a displacement of 75,519gt.

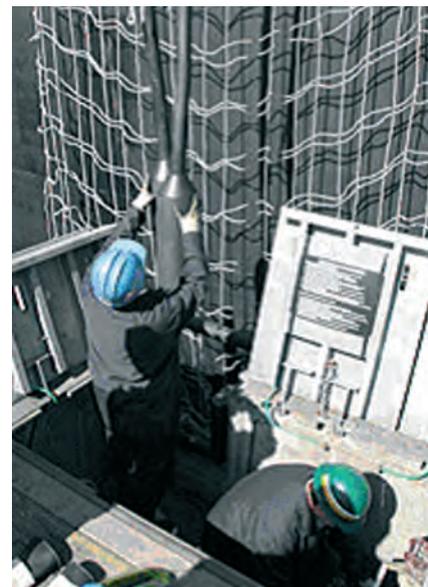
NYK Atlas is the first of 38 NYK-flagged vessels that will be equipped to utilise shoreside electric power. This follows another successful test of a shoreside electric power unit onboard an 8600TEU NYK containership delivered by IHI Marine United's Aoio Shipyard.

The unit on *NYK Atlas* differs from the one being placed on new ships and those currently in service, as the new units will be modified containers set in a rear corner cargo space, thus allowing the cold ironing modification to take place quickly on ships currently in service, without the need for any major renovation.

Depending on the size of the ship, estimates are that AMP will reduce NOx



NYK Atlas docked at the port of Los Angeles in November 2007 and utilised shoreside power for three days.



The AMP connection for NYK Line vessel, *NYK Atlas*.

emissions by one tonne per day and take more than half a tonne of SOx out of the air each day the ship is at berth and plugged in.

However, cold ironing by no means

been without its critics. The UK government and industry leaders have appealed to UK ports and their shipping line customers to unite in persuading the European Commission to move away

from favouring shoreside electricity for ships in port. While leading to a reduction in direct emissions from ships, the solution will not necessarily reduce power consumption overall, they say.

The UK would prefer to work through the IMO on ways to lower ship emissions, UK shipping minister Jim Fitzpatrick told an industry forum. However, if the IMO does not make rapid progress, pressure for regional regulation will increase, he warned.

Mr Fitzpatrick reported that the government was determined to achieve a level playing field and not permit anything that would place UK ports and shipping at a competitive disadvantage.

Richard Bennett, head of ports at

the UK Department for Transport, said the government was looking for a response from industry about what can and cannot be done to reduce emissions from ships and ports.

Already, it is becoming clear that not all shipping lines are in favour of cold ironing. Maersk Line director of operations and planning for the UK and Ireland, Soren Friis, said that he did not think cold ironing was the answer. He reckoned that it would not be possible to find a single solution, such as shoreside power, that would be suitable for all ships on a global basis.

Studies made by partners of Pacific LA Marine Terminal also indicate that there is no trend in the tanker industry

to retrofit currently operating tankers to accommodate AMP, especially as a retrofit of this kind would require a costly complete rebuilding of the tanker's machinery system.

However, Pacific LA Marine Terminal has also said that two major oil companies have built, or are currently constructing, a total of nine diesel-electric powered tankers which are readily adaptive to AMP. This is due to the fact that the vessels operate in closed loop services, calling at the same ports, although it is to be noted that, if they were going to use AMP, terminals will require retrofitting and some of the tankers would have to install additional equipment. *NA*

Siemens warms to shore electricity

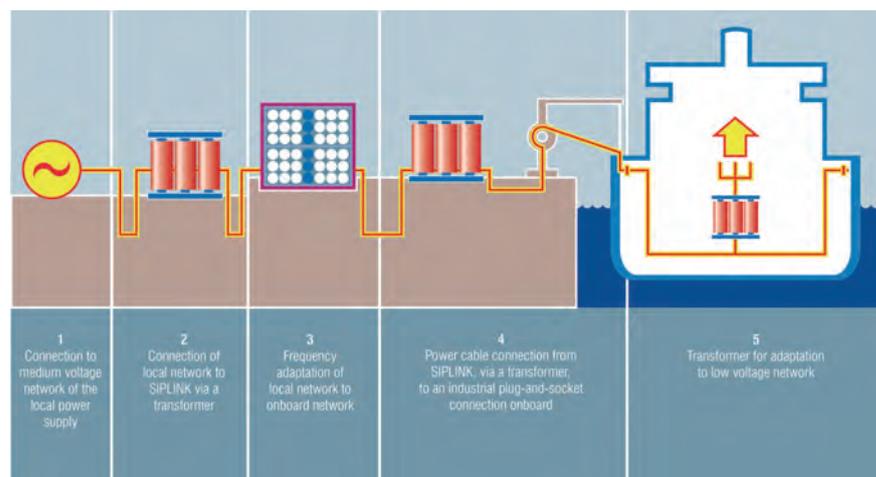
Siemens Power Transmission and Distribution has launched a new ship-to-shore cold ironing solution to enable ships in port to be connected to the medium voltage network of the local power supply company.

Siemens Power Transmission and Distribution has launched a new ship-to-shore cold ironing solution to enable ships in port to be connected to the medium voltage network of the local power supply company.

Siplink, a new cold ironing solution from Siemens, enables ships to shut down their diesel generating sets while in port, reducing exhaust gases, soot, fine dust, and noise, and also offering potential energy savings of between 25%-30%, the supplier says.

Siplink works by individually adapting the frequency and voltage of the power obtained from the medium voltage public utility grid to the ship's onboard power supply system, ensuring a reliable connection to the ship by means of a shoreside supply system with tidal range compensation.

After connecting the plug-in connector with the ship, Siplink synchronises itself with the power supply onboard ship and takes over within a few minutes, following which, the ship's diesel generators can be shut down. The system can also be equipped



The new Siplink cold ironing system from Siemens.

with an archiving system which records data relevant to the ship and a software module that not only records power consumption data but forwards the total power consumption of the ship to the shipping company, via long distance data transmission for the settling of electricity costs.

The shoreside connection system can be utilised by port operators,

shipping companies, and shipyards, and can be used on various types of vessel from passenger ships through to containerships and ferries. In order to use the Siemens solution, both the harbour and the ship must be equipped to use the shoreside electricity supply via a plug-in connection system which can easily be retrofitted onto all types of shipping. *NA*

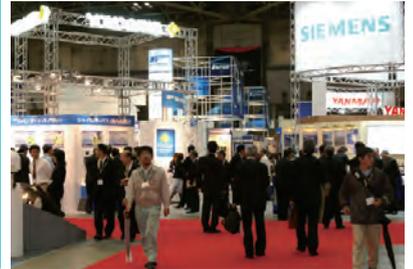
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Shipping emissions remain burning issue

The emissions from shipping debate rolls on, with IMO set to accelerate work on greenhouse gases and investigate the environmental effects of different fuel types, against the backdrop of a controversial study on deaths attributable to particulate matter, writes Clare Nicholls.

The International Maritime Organization (IMO) is to consider accelerating its work programme on greenhouse gas (GHG) emissions from ships, in order that the March 2008 session of the Marine Environment Protection Committee (MEPC) can bring forward decision-making on measures to control and reduce such emissions.

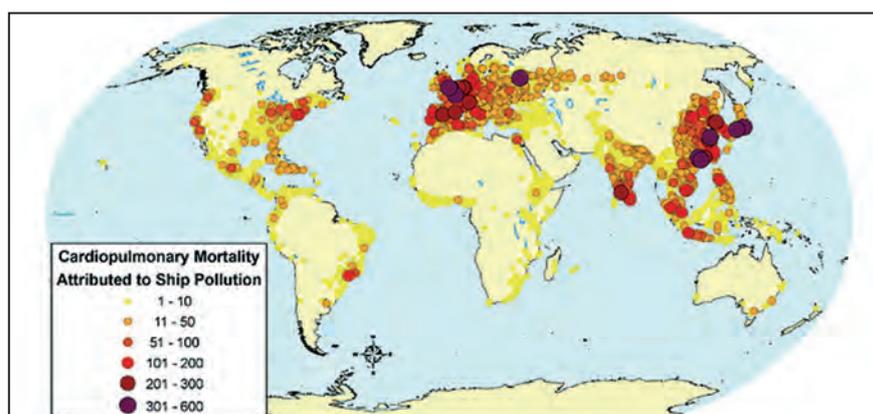
Speaking to the IMO Council in November, 2007, IMO Secretary-General Efthimios E Mitropoulos said he wished to expedite this work and that he intended to present MEPC with a proposal through which this might be sought.

It is expected that certain key elements of IMO's revised greenhouse gas study will be ready for MEPC to make decisions at its 58th session, in the autumn of 2008.

Mr Mitropoulos spoke of the increasing importance and urgency given by the international community to the control of greenhouse gas emissions worldwide and of the wish to act, and act now. He said that IMO and the international maritime community needed to demonstrate their determination to be in the front line of the global campaign to tackle the threat to the global climate without delay.

IMO has also commissioned a study to review the impact of various proposed fuel options to reduce SO_x and PM, resulting from possible amendments to MARPOL Annex VI. The study has been undertaken by an informal cross section of government and industry scientific experts, and has also investigated the impact such fuel options could have on other emissions, including CO₂ emissions from ships and refineries, taking into account the availability of CO₂ abatement technologies.

The study brief included analysing predicted fuel and emission trends leading to 2020, based on current MARPOL Annex VI regulations, and considering the implications arising from various proposed legislation



Cardiopulmonary mortality attributable to ship particulate matter emissions worldwide, according to the 'Mortality from Ship Emissions: A Global Assessment' study. Copyright 2007 American Chemical Society.

implementation dates.

Chaired by Mike Hunter, deputy director, international liaison, at the UK's Maritime and Coastguard Agency, the group was aiming to submit a report by mid-December 2007, the results of which will be presented to IMO's sub-committee on bulk liquids and gases in February 2008, before moving on to MEPC in March/April 2008.

The project coincides with the publication of a peer-reviewed, but none the less controversial study entitled, 'Mortality from Ship Emissions: A Global Assessment' in American Chemical Society journal *Environmental Science and Technology*.

This study cites shipping-related PM as being responsible for approximately 60,000 cardiopulmonary and lung cancer deaths annually, particularly in coastal areas near shipping lanes in Europe, East Asia, and South Asia. It also postulates that these mortalities could increase 40% by 2012, due to continually increasing global shipping traffic.

The paper's lead authors are Dr James Corbett of the University of Delaware, and Dr James Winebrake of the Rochester Institute of Technology, both in the USA. They

arrived at their figure based upon data from the International Comprehensive Ocean-Atmosphere Data Set by Corbett et al, and the Automated Mutual-assistance Vessel Rescue system by Endresen et al. These two data sets combined detailed information about vessel characteristics with vessel traffic densities to determine emissions geospatially.

However, not everyone is convinced by the findings of the study. Dr Hermann J Klein, member of the executive board at Germanischer Lloyd, commented that its conclusions were arrived at through applying a simple mathematical model, taking the proportion of produced emissions and dividing it by the proportion of shipping traffic compared to other forms of transport. He said that the 60,000 figure was therefore groundless.

Others have championed the study, however. Eelco Leemans, coordinator of the marine campaign at the North Sea Foundation, part of Friends of the Earth International, said there was no reason to disagree with these results, whose authors he described as well-respected scientists who had done a lot of research to support their findings. [NA](#)

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Sulphur solutions put to the test

In the effort to comply with environmental legislation, SOx scrubbing systems are gaining industry attention, but are they the most efficient emissions reduction option, in comparison with the use of low sulphur fuels? Clare Nicholls reports.

With the recent introduction of sulphur emission control areas (SECAs), both in the Baltic Sea and (from 22 November 2007) covering the North Sea, ship operators have been attempting to employ new technology to meet new SOx emission requirements.

In a SECA, the sulphur content of fuel oil used onboard ships must not exceed 1.5%*m/m*. Alternatively, ships can fit an exhaust gas cleaning system.

This can be achieved using low sulphur fuel, or by cleaning exhaust gases using SOx scrubbers, or by a combination of both.

Holland America Line has been a leading light in investigating scrubber solutions, having installed a Krystallon seawater scrubber aboard the cruiseship *Zaandam*. The equipment is fitted to one of the five diesel generators aboard the 61,396gt, 1432-passenger vessel. The scrubber has reportedly been working well since its installation in April 2007, and an evaluation report on both the unit and vessel performance will be made available in the near future.

However, with a price of US\$2 million attached to the installation, the cost of scrubber systems might be seen as a stumbling block for anyone considering the technology. Set against this, fuel prices have been rising continuously, and still more expensive low sulphur fuel may prompt owners to consider the scrubbing option in numbers.

Krystallon is certainly preparing for growth, by expanding its distribution capabilities. It has signed an agreement with Wilhelmsen Maritime Services to globally distribute its SOx and PM reduction technology.

Krystallon managing director Chris Leigh Jones said of the deal: 'This agreement will enable Krystallon to market its leading emissions abatement technology in a more progressive manner. This partnership will rightly take scrubbing to the next level of market understanding and acceptance.'



Photograph by Reg Natarajan.

Holland America Line vessel *Zaandam* has had a scrubber installed aboard since April 2007.

Another producer of scrubbing systems also claims to have garnered a high level of customer interest. Robert Clarke from Marine Exhaust Solutions noted that the company is currently waiting for the final approval for its technology by IMO, which should take place at MEPC57 in March 2008, where IMO's wash water guidelines should be defined.

Debate over by-products

To remove SOx and PM, sea water is pumped into scrubbers, where the calcium carbonate in the water absorbs the SOx from the exhaust gas to produce calcium sulphate and CO₂. The reaction neutralises the acidity of SOx and consumes some of the buffering capacity of the sea water. Adding scrubbed sulphur to the sea does change its acidity, although there is evidence to suggest that, in sea water, the change is virtually undetectable.

However, GL member of the executive board, Dr Hermann J Klein does not agree with this assessment. 'When sulphur dioxide reacts with sea water, toxic substances emerge,'

he said. 'That doesn't really help. What also emerges is carbon dioxide, which again adds to the pollution bill what was subtracted before.' It was for this technical reason that Dr Klein added his voice to the lobby gathering around tanker industry association Intertanko, saying he preferred to advocate sulphur removal at the source, in the form of low sulphur fuel.

Such reservations were dismissed out of hand by Andy Osbourne, business development manager at Krystallon. Of the mooted changes in acidity, he said: 'No known environmental harm is caused by such small changes.' Supporting this point of view, it might be noted that the *Zaandam* project is supported by the US EPA, among others.

With SECAs requiring sulphur emissions of a maximum of 1.5%, and proposed regulations slated to reduce this amount even further, it is clear that the debate will continue, as sulphur reduction technology continues to play a part in making ships greener. **NA**

Owner with a heart of green

Self-starting, green-conscious shipowning partners Wallenius Wilhelmsen have been making significant advances in turning environmentally-friendly aspirations into shipping reality writes Hugh O'Mahony.

Wallenius Wilhelmsen Logistics vice president Lena Blomqvist, said the shipowning partners had been making good progress in securing contracts through 2007 for low sulphur content fuel oil to run car carrier services worldwide, as part of the far-reaching green strategy being pursued by the carriers.

'This year we feel we have done well to keep the sulphur content of our fuel down to low levels. The year to date figure for October 2007 was 1.3% - well below our self-imposed target of 1.5% globally,' she said.

'Currently, we have contracts for low sulphur fuel oil in Europe with Shell and Total, in Singapore with Petrobras, in USEC with Colonial Oil. Shell is still our primary supplier of bunker fuel with a sulphur content of 1% or less.

'The contract with Total expires at the end January 2008. After this we will endeavour to buy low sulphur fuel on the spot market for delivery in Zeebrugge since the availability of low sulphur fuel appears to be good in Europe. There is one company that can provide low sulphur fuel oil in Japan where we use spot fuel, but in South-East Asia we bunker more frequently, primarily in Singapore where supplies of low sulphur fuel are readily available.'

However, following the distribution tie up agreed between gas scrubber maker Krystallon and Wilhelmsen Maritime Services to distribute the Krystallon SOx and PM reduction technology globally (see p79), Mrs Blomqvist was keen to demonstrate that the partnership's thinking is pragmatic.

'The Wallenius Wilhelmsen Logistics' basic philosophy is still to work with preventive and upstream solutions, ie to attack the root cause of a problem and limit the formation of emissions,' she said. 'Therefore, we would first like



Size matters when calculating the trade-off between fuel consumption and speed: Faust can carry up to 8000 cars.

dioxide emissions in a six year period between 2001 and 2006 - a 33.6% reduction. This saving was more than the amount of sulphur dioxide that London emitted into the atmosphere over a similar period. WWL was the first shipping line to achieve such results.'

Efforts are also continuing to reduce NOx emissions. Vessels newly built for the Wallenius Wilhelmsen partnership all exhibit improved NOx emission figures for both the main engine and the auxiliary engine. A total of 22 vessels now have slide valves installed which have reduced NOx emissions by 20% to 30%, Mrs Blomqvist said. One ship, meanwhile, includes a scavenging air moisturisation system that produces the same effect.

Meanwhile, Yarwil, a joint venture between Yara of Norway and Wilhelmsen Marine Services, is set to provide a new NOx reduction solution. 'Today, this solution is only available on small ships, but it can reduce NOx by as much as 95%,' said Mrs Blomqvist. 'The system provides a urea solution to the hot exhausts of ships and then passes it through a catalytic converter. This is known as the 'downstream' solution, but it can provide a solution in special trades and where it is otherwise difficult to obtain an adequate reduction in NOx emissions.'

Where environmentally-friendly fuel cell technology remains a long-term objective for auxiliary engines, efforts are also being made to reduce emissions here on a more immediate basis. According to Mrs Blomqvist: 'A system developed by Wärstilä called WetPac (previously called CASS) is being installed [on] three [ships] by the

to use and see a steady flow of global availability low sulphur fuel oil. Indeed, we would like to see a global standard of 1.5% rather than the 4.5% of now.

'However, we are realists. If, in the interim and until such time that good quality 1% low sulphur fuel is readily available globally in the shipping industry, we do see a place for solutions like scrubbing, because we firmly believe that it is better to have some sort of treatment system than none at all.

'However, for scrubbing technologies to work they need to be acceptable to us. We would need to be convinced that, (1), the washed water from scrubbing does not cause additional negative effects to marine life, and, (2), and that the residues from scrubbing can be taken care of in a safer way. Scrubbing does provide a better way of dealing with the problem for special types of ships going on special trades (short sea, for example, or in the SECA areas).'

To date, Mrs Blomqvist asserted, the tough Wallenius Wilhelmsen Logistics environmental policy had 'saved the world from 75,550tonnes of sulphur

end of 2007 and an additional 14 during 2008. This will reduce NOx emissions by 25-30%.

Taking on the wider topic of greenhouse gases traceable to shipping, Mrs Blomqvist said: 'The only way to reduce greenhouse gases, and by that I mean CO₂, is to reduce fuel consumption. We have as our global [target] a reduction of fuel consumption of 10% by 2010. The measure is based on a gram/tonne per nautical mile. This will be achieved by a combination of measures, both operational and technical - (1) trim and ballast optimisation (2) improved use of weather routing tools (3) propeller polishing (4) improved use of auto-pilots (5) and, where possible, a reduction of speed.

'In my view, reducing emissions per unit transported is dependent upon the best utilisation of our ships - optimising the routes and trades they operate in, looking carefully at the port calls we make, ensuring good turnaround times, making best use of the cargo mix we carry, and ensuring that space onboard our vessels is used to best effect.

'Our elongated vessels (a total of five in Wallenius Wilhelmsen Logistics service) have an increased capacity of 20%, and two vessels delivered last year have an increased capacity of 800 cars, whilst keeping the same outer dimensions of the ships. This is achieved by a smarter deck design



Talisman - one of Wallenius Wilhelmsen Logistics' increasingly environmentally-friendly car carriers.

going from a two- to a one-pillar row system on the vehicle decks.

'Our two latest newbuildings, *Faust* and *Fidelio*, have a capacity of 8000 cars each and a total lengths of 228m - the length of two football pitches. So size matters. Speed is always a balance. If you speed up ships you naturally use more fuel per ocean leg but, and this is a big but, we get our customers' cargo to its destination on time and there is always the possibility to squeeze one more voyage out of the vessels.

'Balancing our customers' needs with the need to preserve the environment is

important to us. If we reduce the speed of our ships we may not be able to make our schedules and many of our customers work to fine deadlines. They require their cargoes to be at their destinations on a definitive day.

'At present there is an under capacity in the car and ro-ro carrying trades, ie too few ships for the cargoes that need to be carried. In a more balanced market we will be able to slow down and thereby also achieve lower bunker consumption. We anticipate achieving a better balance by the end 2008/ beginning of 2009 mainly through the delivery of additional newbuildings.' **NA**

MAN recirculation cuts emissions

Practical steps to produce emissions reduction technology are under development at MAN Diesel, as exhaust gas recirculation (EGR) has recently achieved up to 70% reductions in NOx emissions, tested on a 4T50ME-X low-speed test engine in Copenhagen, writes Clare Nicholls.

The EGR method is based on a reduction of the oxygen content in the cylinder charge and the recirculation of exhaust gas on the engine side of the turbocharger. During the process, an electrical, high-pressure blower forces the exhaust gas through a wet scrubber to a higher-pressure scavenge-air receiver. The scrubber cleans the exhaust gas by removing SOx and particulates, and also cools it through humidification, before reintroduction to the combustion chamber.

The NOx limiting effect is achieved by reducing the local maximum combustion temperatures in the combustion chamber, and reducing the concentration of oxygen by the addition of inert media with high specific heat: exhaust gas or water vapour. Judging by these results, MAN said it was confident that the method will be used in large, two-stroke marine engines in the future, and the company plans to demonstrate the system in service on an ocean-going vessel within the next three years.

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Victor separates the spoils

Strong uptake is reported for new generation oily water separators that meet the latest IMO strictures on protecting the environment.

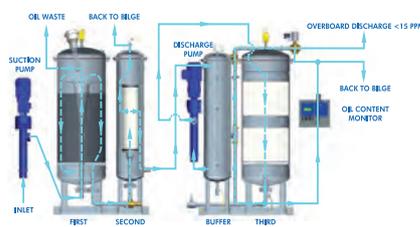
With over 130 million gallons of oil every year released into our oceans via bilge water, oily water separators have rightly been at the centre of recent industry discussion on pollution. After all, the amount is substantially more than the 37 million gallons per year traceable to oil spills and accidents.

Since 1983, discharge of untreated bilge water has been strictly prohibited by international law and subject to heavy fines. International legislation stipulates that separated or treated bilge water containing 15ppm or below oil in water can be discharged into international waters as written in MARPOL 73/78.

Most vessels currently in operation are fitted with MEPC 60(33) standard separators but the International Maritime Organization (IMO) issued a resolution for new ships in 2005, resolution MEPC 107(49), which specified a more stringent test procedure for bilge water separators capable of removing heavy fuel oils, marine diesels, and stable oily emulsions from bilge water. This change in regulation has been implemented to ensure that the separators could manage the modern problems that cause many failures to happen.

The separators certified to MEPC 60(33) regulation that are mostly in operation nowadays are only tested with diesel fuel. However, the newer regulation imposes two new challenges onto these old style gravity-based separators: heavy fuel oil and oily emulsions. Heavy fuel oils are now regularly used by ships as they have become cheaper. They are extremely viscous, which means they do not flow easily and their specific gravity is close to water, which makes traditional gravity separation extremely difficult.

Novel designs are needed to counter these physical properties. Bilge water can also contain countless tiny droplets of emulsified oil, which are not readily separated in conventional gravity separators where these droplets would normally coalesce and separate out. When combined with cleaning



The Victor MiniSep - VM Series, specifically designed for the marine environment.

chemicals and other onboard organic substances, they form stable droplets that no longer coalesce.

Victor Marine Ltd has been producing separators for over 80 years and Victor MiniSep MS Series oily water separators for 35 years. Development by the company of a new product to meet then impending regulations began in 2004 and, by working with the marine engineering department at the University of Plymouth, the team came up with a completely new separator for bilge water treatment. Taking the design principles from the gravity type Victor MiniSep MS Series, two specific design processes were developed: the Hi-VOR (High Viscosity Oil Removal) system to handle high density and viscosity oils and the AGM (Advanced Granular Media) filtration to remove oils from emulsified bilge water.

The Victor MiniSep VM Series was introduced to the marketplace in 2005. Fully type approved by Bureau Veritas and the US Coast Guard, the unit consists of three stages (four tanks) of separation. Each stage is designed to deal with the different types of fuels that may be encountered in the bilge tanks.

Since that time, the company reports rapid uptake of the new system, with a reference list now including The Indian Coast Guard, Acergy Group, Diamond Offshore, Mercator Lines, Lotus Shipping, the Omani Navy, Mercy Ships, and Tidewater Offshore, among others. China's Yangzhou Kejin Yard, for example, is reported to be taking two systems per month on an ongoing basis.

Using the system, suction is taken from the bilges through a pump strainer and foot-valve into an integral slow-revving positive displacement feed pump to minimise the mechanical emulsification of the bilge water. The oily bilge water is then fed into the first stage High Viscosity Oil Removal (Hi-VOR) system and initial oil separation takes place. Free oils are removed via a high matrix oleophilic coalescing mesh which draws oil to its surface, creating large globules of oil. These globules are allowed to lift to the top of the vessel for collection and discharge. The equipment is pre-set (via the pressure regulating water valve) to operate at 20psi (1.38bar) and can effectively operate in the region of 20psi-40psi with a pressure relief valve set at 50psi (3.45bar). When oil is detected at the oil capacitance probe, it activates the oil discharge valve for dumping of oils to the slop tank. This discharge causes the water valve to shut and the feed pump continuously runs to drive the fluid out to the oil outlet. The advantage of this is that the heavy fuel oil is pumped to dump, allowing the most viscous of oil to move easily. This oil dump continues until the probe senses clean water, and then waits for a preset time before shutting the dump valve. The pressure in the Hi-VOR increases back to 20psi (1.38bar) and the water valve then reopens and sends the effluent of the Hi-VOR unit to the second stage.

In the second stage, a coalescing cartridge at 20micron traps and coalesces any remaining fine oil droplets, which are also collected at the top of the vessel, due to their raised buoyancy, and discharged to the bilge tank to be retreated. The effluent at this stage would have been reduced of all its free oils and enters the emulsion treatment stage. This extra fine coalescer is important during normal shipboard operation, as it offers a simple protection against contaminants for the more expensive consumables downstream.

The third vessel acts as a buffer tank for the emulsion treatment unit. A three point

The Royal Institution of Naval Architects

Marine Heavy Transport & Lift II

27-28 February 2008, RINA HQ, London

Second Announcement



The marine heavy transport and lift sector is enjoying a buoyant and growing market due to the recent boom in offshore oil & gas and large project cargo work. Current oil & gas prices have led to an increase in the number of offshore projects requiring transportation, installation or removal of a wide range of structures and modules. The project cargo transport market has been growing by 8-10% per year, particularly power generation and refineries work in US, South America, Africa, India, Pakistan and China.



As the structures and cargo become bigger and heavier and destinations seemingly more difficult to access the market is looking for more and better equipped vessels. There are also increasing safety and greater environmental concerns for all aspects of marine operations. Currently, there are about 450 heavy lift ships worldwide but of these about 40% are older than 25 years. The new generation of heavy lift vessels designs are responding to the demand for higher lifting capacity and larger outreach. There are also an increasing number of new design concepts aimed at servicing this increasing demand in the marine heavy transport and lift industry;



This conference aims to bring together naval architects, operators, project engineers, warranty surveyors and designers to examine the various design and operational issues associated with this industry. Papers will cover such topics as:

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level switch activates the emulsion pump and maintains a constant level within the system. The third stage (fourth vessel) is the Advanced Granular Media Filtration (AGMF) system. Here, an upper inlet feed from the recompression pump onto a distribution mesh allows the emulsified bilge water to filter through the media. The media has been designed to be highly oleophilic (attracts oils) and hydrophobic (repels water) to ensure high efficiencies in oil removal. Also, as an adsorption process, the media chemically binds the oils to its surface. Thus, once trapped, the oil will not be released back into the effluent. The AGMF unit has been engineered to enhance the adsorption process and can out-perform granular activated carbon life by over 100%. No

additional chemicals, cleaning cycles, or backwashing of systems are required. This means that the system is continuously pumping from the bilge tank with no dilution to the bilge water involved at any stage (a key IMO requirement).

The clarified effluent is then passed into an oil content monitor device, which is compliant to IMO MEPC 107(49). If the detector reads below 15ppm, then this effluent is allowed to be discharged overboard (except in special areas) and if the consent is not met, the effluent is re-circulated back to the bilge tank. The oil content detection monitor records and logs the effluent readings for 18 months including all alarms and operating/discharging times. This data can be downloaded at any time by the

relevant classification societies, coast guard authorities, and environmental authorities to ensure that the ship has complied with the international oil discharge regulations (MARPOL). The monitor can also be limited to anything down to 0ppm, which can be used for compliance in local areas. Using this comprehensive process, the VM Series gained <1ppm results in all the water samples taken during the official IMO tests.

Also launched in 2005 was the Victor MiniSep CS Series which uses the technology and principles of the VM Series but has been optimised for space and cost. Certified under LRS, CCS, and USCG, the unit achieved results of less than 5ppm in all IMO tests. *NA*

Monitoring optimises fuel usage

Fuel monitoring systems can assist shipowners in meeting environmental regulations by providing accurate emissions analysis.

For ship managers attempting to put into place environmental best practice policies, analysing ships' emissions can provide one reliable yardstick for their success or failure. The approach could also prove crucial, should emissions trading be adopted by the shipping world, as it provides an accurate record of emissions produced, which could then be correlated with any emissions 'credits' gained by fleets or individual vessels.

Transparent reporting of air emissions also assists in compliance to ISO14001 standards and MARPOL Annex VI Reg 13 and Reg 14 (4) (b). Whether or not a ship is meeting the 1.5% sulphur limit in the new sulphur emission control areas could also be closely monitored using these systems.

Pioneering the fuel monitoring approach since 2005 has been Martek, with its MariNOx fuel monitoring system. The continuous monitoring system comprises managing software, a cabinet housing a control unit installed in the engine room, and exhaust gas sample probes. It monitors engines for two 10-minute periods at different IMO-agreed settings. Pressures, temperature, humidity, and engine



The MariNOx system by Martek is said to assist vessels in saving 2% of fuel.

speeds are tracked to generate raw data for class inspection. CO₂, humidity in the charger, the cooler, and seawater reference temperatures are also monitored, with MariNOx software going through the

calculations in the NOx Code to derive emissions.

In independent trials onboard ships operated by Höegh Autoliners and Metrostar Management Corp last year, Martek said that monitoring fuel burn had resulted in a 2% fuel saving. For a large oil tanker, the company pointed out, the environmental impact would be equivalent to a saving in total emissions from 700 cars in a year.

A more recent market entrant has been Swedish company Consilium, which has launched the Salwico emissions measuring system. Salwico verifies a ship's exhaust contents after passing through cleaning equipment such as a scrubber or catalytic converter, enabling crew to fine-tune an engine's performance.

This system uses chemiluminescence to measure NOx and SO₂ content, with awareness and alarm criteria able to be set, should emissions limits be exceeded. Salwico also has a full scale interface to software for reports and data transfer, onboard ship or linked to shore, as well as capacity to interface to other systems such as pollution reporting. *NA*



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Green recycling first for Belfast

New venture partners Harland & Wolff with Golder Associates and V.Group to develop a fully certified ship recycling facility.

Harland and Wolff Heavy Industries and environmental management consultancy Golder Associates have joined forces with V.Navy, part of the world's biggest marine, energy, and financial services outsourcing firm V.Group, to provide full-service, environmentally sound, and socially responsible ship recovery and recycling.

The venture is reckoned to be the first to provide a stand-alone, fully certified, ecologically and socially responsible, end-to-end European ship dismantling solution. Services will be available to both military and commercial shipowners.

Harland and Wolff was recently awarded a waste management licence for the dismantling of marine vessels and marine structures, and is in the process of completing the decommissioning and recycling of MSC Napoli in cooperation with Golder Associates.



MSC Napoli entering the building dock at Harland and Wolff Heavy Industries.

Harland and Wolff chief executive, Robert J Cooper, said: 'We have utilised Harland and Wolff's vast experience

and comprehensive facilities to offer the marketplace an alternative to traditional ship breaking.' [NA](#)

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Wärtsilä's technology for the future

Commercial and research initiatives see, Wärtsilä developing environmentally sound propulsion technologies, writes Clare Nicholls.

Wärtsilä is unfolding a diversified programme of environmentally-friendly technologies.

Among its most forward-looking strands is the company's fuel cell programme, aimed at creating sustainable power generation that is operationally reliable. Research and development started in 2000, and current work is focusing on the development of a solid oxide fuel cell system (SOFC).

An international project, 'Validation of a Renewable Methanol Based Auxiliary Power System for Commercial Vessels' (METHAPU) began in 2006 and is due to run until 2009. Its objective is to develop SOFC technology running on methanol, including fuel bunkering and storage systems, and a further aim is to support the introduction of regulations to allow the use of methanol as a marine fuel.

METHAPU partners include Wallenius Marine, DNV, and Lloyd's Register, and Wärtsilä is also currently working with Topsøe Fuel Cell. The project is supported by EU funding, and validation tests regarding the performance and emissions of a 20kW SOFC test unit installed onboard a car carrier will take place over the course of a year.

According to Lena Blomqvist, Wallenius Wilhelmsen Logistics vice president, environment: 'An installation of a bigger unit will follow after the tests have been completed on the smaller unit. The aim is to find a fuel cell that will be able to provide power for the auxiliary engine. There is a consensus of opinion in the shipping industry that it is doubtful that a solution will be found for fuel cells providing the sole solution to main power engines.'

The prototype 20kW SOFC power unit itself, designated WFC20, is said to be highly efficient and has high exhaust gas temperature, which makes it suitable for combined heat and power (CHP) operation, providing clean power for marine applications, with low NO_x and no SO_x emissions. It can be used onboard ship as an auxiliary power unit, and is designed to be connected to a ship's AC bus-bar and automation system.



The Wärtsilä WFC20 solid oxide fuel cell.

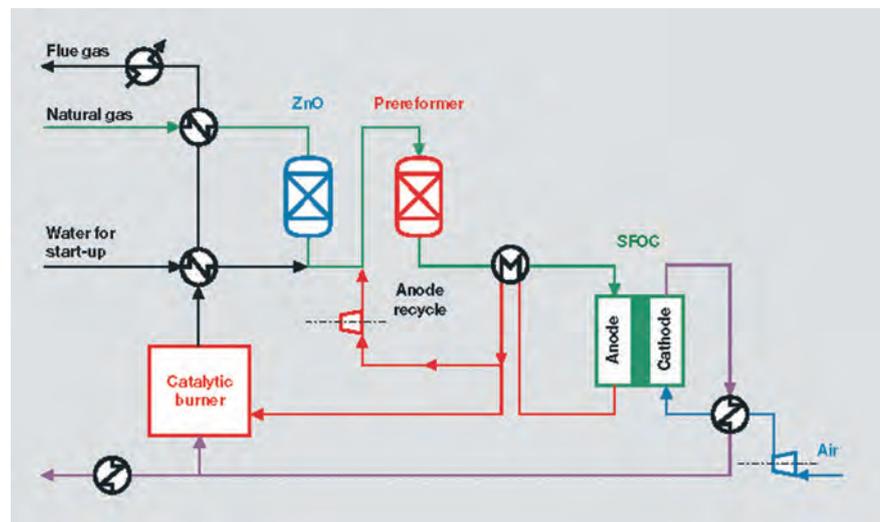


Diagram of a solid oxide fuel cell system.

WFC20 is claimed to have reliable operation, and is silent and vibration free. One of the advantages of using fuel cell technology is that the unit is modular, which allows large systems to be built, based on smaller units.

The cell is set up by three main building blocks - an anode, a cathode, and an electrolyte

placed between them. The anode is made out of a nickel-zirconia oxide cermet, the cathode is based on lanthanum manganate, and the electrolyte consists of yttria-stabilised zirconium oxide.

During operation, air is fed to the cathode, where its oxygen is reduced to form oxide

ions (O²). At the same time, a gaseous fuel is fed to the anode side of the fuel cell. The fuel has to be in a form that can be utilised by the cell; therefore any fuel has to be converted into hydrogen and carbon monoxide, either inside or outside the fuel cell.

The oxygen ions formed at the cathode migrate by ionic transport through the electrolyte to the anode, where they combine with hydrogen and carbon monoxide, oxidising the hydrogen into water, and the carbon monoxide into carbon dioxide. During the oxidation, two electrons are released to set up an electric current, and these electrons are transferred to the cathode through an external electric circuit.

The SOFCs can have different physical shapes, the most common being either planar or tubular. The operation temperature is usually in the range of 650°C-1000°C, which means that the heat can be used in various applications.

Wärtsilä plans to introduce WFC50 units in the 50kW range for commercial demonstration within a couple of years, looking into pre-commercial niche uses thereafter.

Natural gas and methanol are the fuels currently being focused on as having the

greatest potential for use with SOFCs, as methanol especially is suited to marine applications, due to its liquid form. However, there are a number of other options, including diesel, landfill gas, coal bed methane and waste gases, ethanol and other alcohols, as well as biogases formed during the gasification and fermentation processes.

Emission reduction

But bold plans to develop fuel cell technology are just one area of development. Wärtsilä has also been involved with ventures to reduce emissions of existing common fuel types.

NOx emission reductions have been sought by utilising 'wet' means: direct water injection (DWI), humidification, or water-fuel emulsions technologies. This Wetpac evaluation had to take into account a specific fuel oil consumption trade off, but results suggested that the potential for NOx reduction is as follows: up to a 20% reduction using water-fuel emulsions, with a 0.3% water to fuel ratio; a 40% reduction using humidification, but with a 1.3% water to fuel ratio; and a 50% reduction utilising DWI, with just over 0.6% water to fuel ratio.

NOx reduction can also be gained by applying common rail technology, due to its humidity without visible smoke. Smokeless operation is said to occur at all loads and in all operational sequences. Common rail is thought to provide increased flexibility in engine optimisation and improved combustion control, plus improved total fuel economy and the flexibility to use different fuels without hardware modifications.

Other projects which have been undertaken by Wärtsilä include the research of electro-hydraulically operated gas exchange valves of diesel engines, and two-stage turbocharging to further reduce emissions.

Scrubbing technology has also been tested, intended to remove sulphur oxides from exhaust gases. A programme initiated in 2006 is aimed at investigating the effect of scrubber design on engine performance, lifetime and economy, ecological impact, the risk of acid rain droplets, and white smoke. The results should be equally applicable to any two stroke or four stroke engine, and also to both newbuildings and retrofit installations. **NA**

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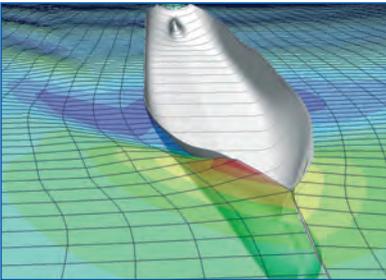
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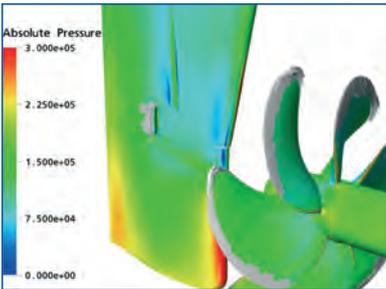
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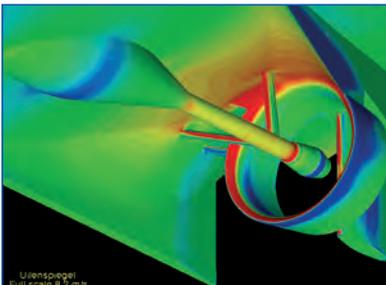


Computational Fluid Dynamics (CFD) is an increasingly important tool for analysing flows around ships and propulsors. It is used to solve a wide range of maritime applications from resistance prediction to slamming loads calculation. It can provide important insights into physical flow characteristics and can offer an economic way to investigate design options.

Generic CFD codes often lack some features and capabilities needed to address specific maritime applications. The presence of the free surface provides a major departure from conventional CFD applications. The need to represent this fluid interface accurately presents a considerable challenge, not least because its behaviour can vary considerably within the computational domain, and as a function of hull form and speed.



Advances in computer technologies over the past two decades are slowly turning the dream of the complete numerical towing tank or 'virtual basin' into a reality. However, today's methods still lack the accuracy to match results obtained in real-life experiments. While it is unlikely that a single CFD tool suitable for all applications will be developed, there are many synergies that could be better exploited. The three major requirements for practical engineering applications are computational speed, accuracy and integrated into the overall design process.



This International conference will offer delegates an opportunity to meet and discuss the latest developments and practical marine application of CFD. The programme will also include software workshops which will give delegates a chance to participate in and discuss demonstrations of the latest CFD software. Papers will cover such areas as:

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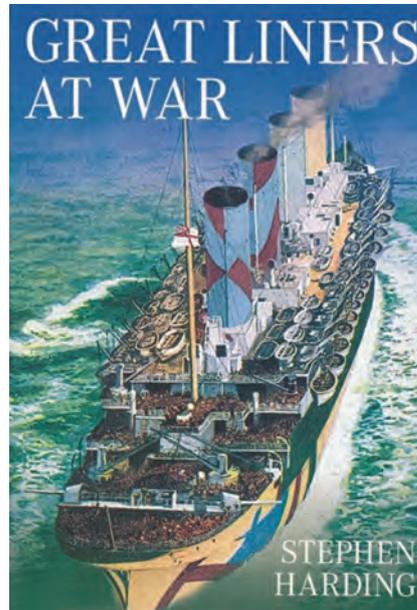
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Unsung liner troopers

Review by E C Tupper

Great Liners at War

by Stephen Harding,
published by Tempus Publishing
The Mill
Brimscombe Port
Stroud
Gloucestershire
GL5 2 QG
Paperback, 2007, 320 pp. ISBN 978
0 7524 4231 0, £17.99.



The author points out that most of the ships regarded as Great Liners, which he defines as ‘vessels whose size, performance, beauty, and style set them above lesser craft, have had important military roles. He feels that not enough has been written about this service – an omission this book sets out to remedy.

The general scene is set in an introduction and this is followed by 22 chapters, each dealing with an individual ship. At the end of each chapter is a summary of the ship’s main features, the service it rendered, and how it was finally disposed of. The book is very well illustrated with nearly 190 black and white photographs.

Apparently the first recorded use of a passenger steamship as a trooper is when the British sidewheel steamer *Enterprise* transported Indian Army troops from Calcutta to Rangoon in 1826 during the first Burmese War. In 1833, a large scale movement of troops, involving the British Peninsular & Orient Steam Navigation Co, occurred with the *Queen of Portugal* moving Royalist troops during the Portuguese Civil War. Two years later, ships of the same company carried British

and Spanish troops into action in the first Spanish Civil War. However, it was in 1851 with the outbreak of the Kaffir war in South Africa that the use of steamers for trooping really came of age. Readers will be well aware of the more recent example of the use of the liners *Queen Elizabeth 2* and *Canberra* in the Falklands campaign. Today even the wealthier nations cannot afford to maintain dedicated cargo and troop transports, so they rely on the conversion to military use of cruiseships, ro-ro ferries, and tankers.

The first ship the book deals with in detail is *Great Eastern*, Brunel’s great ship. It carried over 2600 troops and dependants to Canada in 1861 for the protection of that country during the American Civil War. Although successful, the ship was not used again because of the changing political situation.

Large liners came into their own during the two World Wars, carrying troops around the world, acting as hospital ships and armed merchant cruisers. Whilst the ships proved vulnerable in the last role, they nevertheless achieved some notable successes. For instance, *Carmania* successfully beat another converted liner, *Cap Trafalgar*. Two, *Britannic* and *Queen*

Elizabeth, did not experience life as liners before embarking on their wartime careers. The former acted as a hospital ship and sank in 1916 after striking a mine laid by a German submarine. Fortunately the latter went on to become a very popular trans-Atlantic liner.

Whilst most readers will be aware of the part played by liners whilst on military service, it is only when the information is gathered together like this that the true scale of their achievements becomes apparent. There are some fascinating stories to be told. *Olympic* took a damaged battleship in tow briefly; it sank an enemy submarine; after the war it was found to have been damaged by an unexploded torpedo. In WWII, *Queen Mary* became the first ship to transport an entire US military division in one crossing. On one occasion it embarked 16,500 persons, a record.

What are really interesting, however, are not the ‘special’ events but the remarkable ‘routine’ achievements. The very short times in which conversions from one role to another were achieved; the extent of the changes made; the use of impounded enemy liners; the steady increases in numbers carried; the great distances travelled – often in active war zones; the onboard arrangements for sleeping and feeding troops; the problems of providing fuel for coal burning vessels; the great variety of service provided. The liners carried troops to war; repatriated them after the war; carried wounded home; carried prisoners of war across the Atlantic; carried ‘war brides’ to the USA and Canada; carried important political figures; acted as hospital ships; became armed merchant ships.

Although they were not Great Liners by the author’s definition, it is a pity that no mention is made of the use of converted liners to act as repair ships in the fleet trains of the Second World War. This, however, is a minor criticism of a very informative and fascinating book. It will be read with great interest by most naval architects and naval historians. **NA**

Milling tests contradicted

Dear Sir,

ABB has delivered Azipod propulsion systems for 16 vessels currently in operation with ice class higher or equal to 1 A Super according to the Finnish Swedish ice rules. The cumulative operation hours since 1990 for the propulsion units for these vessels exceeds 550,000 hours.

We were surprised to see the article 'Optimising propulsor efficiency' (July/August 2007, *The Naval Architect*), on the cavitation phenomena related to propeller ice milling that was detected in the model scale tests, as we have not been able to verify this kind of cavitation erosion. We were also surprised that the model scale results were taken as a fact for the full scale phenomena, even if there is no indication of such cavitation.

One could say that propeller ice milling is extremely rare, if the vessel and the propulsion system are correctly designed. The ship designer's aim is to have the tip clearance larger than the ice thickness, where the vessel operates. Propeller-ice interaction typically occurs when operating in ridges and ice channels, but these are not the type of ice milling that was simulated in the model scale tests.

There might be several reasons why reality does not imitate the results from the model scale tests. I will mention only a few, as I am not too familiar with the actual test arrangements.

1) Tip clearance is rather large in DA-mode. In the case of *Mastera/Tempora*, which were the tested vessels in the cavitation tests, the tip clearance is roughly 1.6m (eg in the Gulf of Finland the level ice thickness is typically max about 0.5m). This means that level ice sheet does not actually produce propeller ice interaction at all (see attached images of actual model, compared to the cavitation test image)! Milling in the test conditions is very deep, which I have never experienced in a real situation.

2) Based on the full scale measurements we have made with the existing vessels, ice milling with the DA-vessels is not continuous and actually it is never as the arrangements in the test, where there is

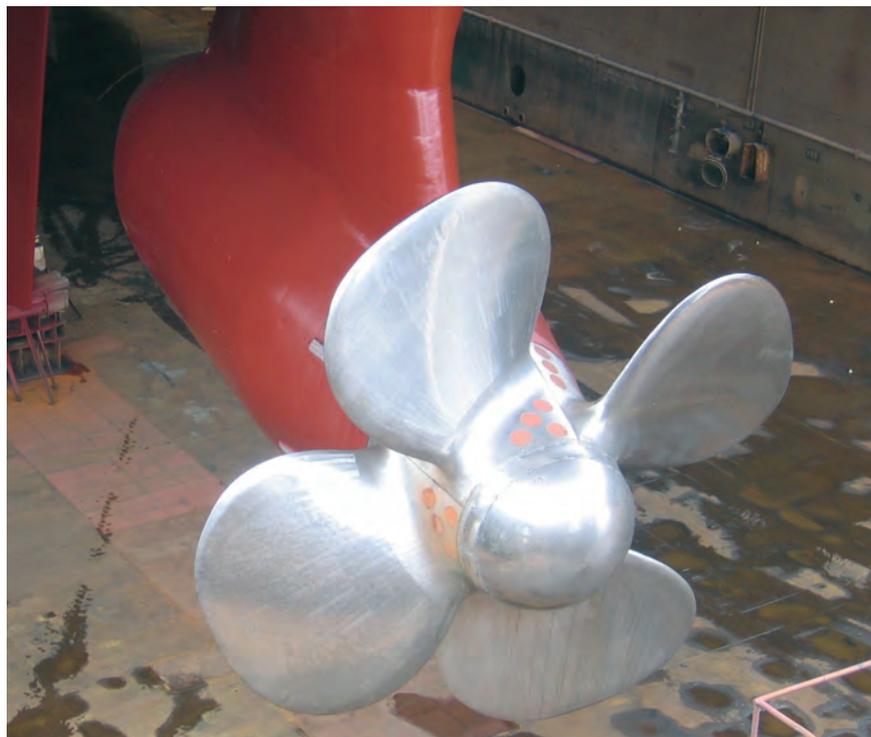


Image from the performance ice test of *Tempora*.

a fixed ice sheet coming continuously to the propeller. During dedicated ice trials of a double acting cargo ship, ice milling was not observed, even in over 1.5m thick level ice in ship stern first motion. Also, vessels operating already almost for 10 years in the Caspian Sea, with small draught and small tip clearance, have not experienced such cavitation phenomena. The type of milling that is indicated in the tests occurs only when driven into larger ice ridges, where most of the contact is not continuous ice milling, but random contacts between the propeller blades and ice blocks (not level ice). Therefore the test arrangement seems unrealistic to actual ice conditions.

3) It is very difficult to produce model scale ice that has the correct crushing strength. Also it is difficult to have correct inertia for the motor, propeller, and the propulsion system in model scale. We assume that the tests were run with a fixed pod unit. This is not the case in real life, where the pod unit can turn away from the load, thus reducing the crushing phenomena.

4) The stern form of the DA-vessel is made such that it will break the ice in a manner where there is no sheet ice coming to the propeller/Azipod, but there is a crack in that very position to reduce ice resistance and loads on the propeller and the Azipod unit strut.

As far as we have knowledge, there are no cavitation erosion marks in either the blades nor the Azipod structure. Continuous ice milling is a very random case, and also therefore it could be that there is no such cavitation erosion in real life as indicated in the model scale tests. See the attached photo from double acting cargo ship *Norilskiy Nickel's* propulsion unit after two winters of operation in liner traffic in the Russian arctic. The icebreaker's propeller is intentionally designed quite pessimistically towards cavitation and it is designed for the ballast condition, which is worst from the cavitation point of view.

With best regards,

Arto Uuskallio, sales manager, icebreaking vessels
ABB Oy, Marine
PO Box 185, Merenkulkijankatu 1
FI-00981 Helsinki, Finland

Case for gas turbines

Dear Editor,

I was very disappointed to read our President's prominent, adverse comments on gas turbines (Profile page 169, September 2007, *The Naval Architect*). Ten years ago he may have had some justification for saying so, but not today. Specific fuel consumption of the RR WR21 intercooled and recuper-

ated engines, for example, at about 20MW, compare very favourably with slow-speed heavy oil engines; particularly part load performance.

Perhaps his fitting LM2500 engines in QM2 was heavily influenced by the commercial deal offered by GE at the time, for which they are well known; buy two units and get

one free extra gas generator, etc. Did he do his through life costings?

Yours faithfully,

Bob Barnes

(R H Barnes CEng, FIMarEST, MRINA)
Director, Robert Barnes & Co, Consulting Engineers, Naval Architects & Surveyors

FPSO hull design mistaken

Reference is made to the special feature regarding Korean Shipbuilding and the article 'Offshore sector pays off for Samsung' (page 34, *The Naval Architect*, October 2007).

We (Aker Kværner Engineering and Technology AS/Norway) strongly react when SHI claims that the Skarv FPSO hull is of its design.

Quote: 'SHI developed the hull design at the FEED stage, as well as the overall concept

design.'

This is totally wrong.

The Skarv FPSO hull is of a Tentech 975 design developed by Aker Kværner Engineering and Technology AS (AKET), where we have been responsible for the FEED phase of the hull as well as the FEED and detail engineering of the topsides and overall concept design.

The FPSO solution department (previous

Maritime Tentech AS) in AKET has designed more than 60% of all purpose-built FPSOs in harsh environmental conditions for the North Sea, and has more than 15 years operational experiences in these areas.

Børre Knudsen

Aker Kværner Engineering and Technology
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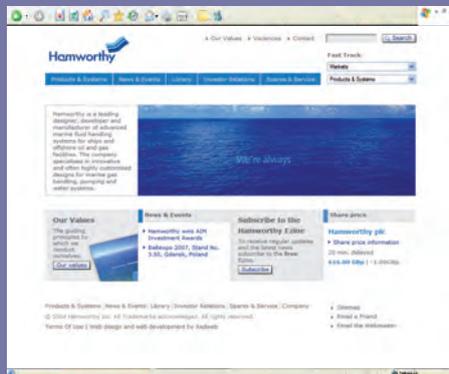
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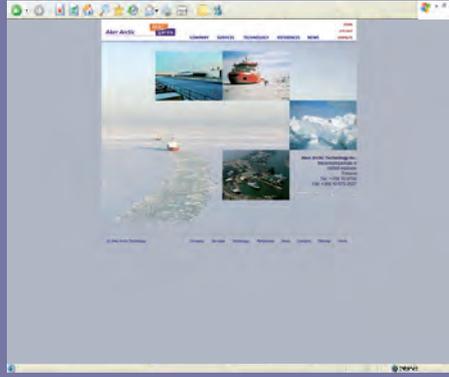
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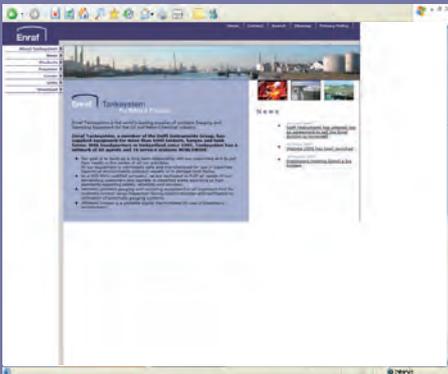
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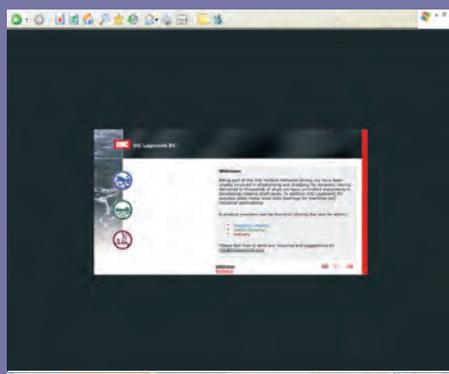
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