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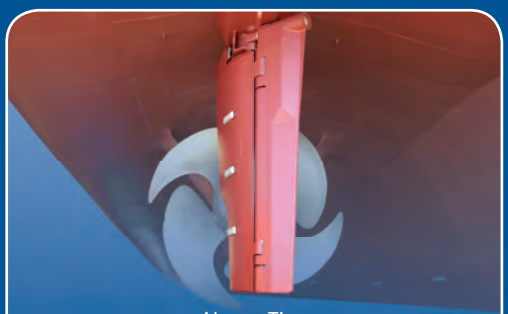

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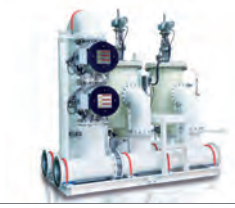

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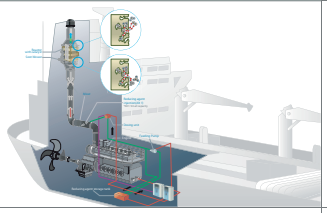

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Building a future

Innovation and green regulation are key strands in the battle for global shipbuilding supremacy and NYK's prototype model of its *Super Eco Ship 2030* (patent and design applied for) is an example of that invention

In Olympic year, particularly here in London where the Olympiad is drawing to a close as we go to press, it is tempting to trot out classic metaphors depicting an epic struggle between shipyards for a heroic gold, silver or bronze medal.

Clichéd as the metaphor may be, the truth is that the analogy simply does not do justice to the battle for survival now being played out between the medium sized shipbuilders of China, South Korea and Japan.

In a three-way battle for their very existence the yards in these three Asian neighbours are using every means at their disposal to gain an advantage over their competitors.

Unlike the Olympics, in this titanic struggle the rules of engagement are being set by regulatory bodies or are evolving through the uncertainties of an ailing global economy that seems to staggers from one crisis to another as the teams compete.

Traditionally, that is in the past, the more economically developed nation has suffered as the new emerging economy, fuelled by cheap labour, has replaced the dominance of the established competitors.

Twenty-first century competition has seen the battle-lines re-drawn through the recognition by the maritime industry that the status quo simply will not do and the changes to environmental regulation are driving innovation to unprecedented levels.

Such is the ferocity of the competition that many yards have already succumbed to the inevitable. In China, the pre-crisis favourites to take the shipbuilding lead, the industry has been hit particularly hard. The country's reliance on basic ship designs, such as bulk carriers and tankers, where some 65% of last years deliveries were bulkers, has meant that many yards that were ready to establish themselves in a booming market are now lying fallow, put out to grass.

In Korea, famous yards such as Sungdong and ShinaSB have already felt the grip of the current economic reality. Others, such as SPP, have made attempts to switch production to more sophisticated ships, such as LNG carriers or container ships.

Major Korean yards have also switched production and are also looking at technological knowhow to offer to their diminishing client base. However, the larger yards are also able to move their production from traditional shipbuilding to the offshore sector, which is experiencing growth as new wells in deepwater locations are sought.

This change by the larger Korean yards has forced Korean equipment manufacturers to look for new markets in their own bid for survival. It is this struggle that provides the greatest twist to the story so far in that Korean equipment manufacturers are finding new markets, but these are in Japan, the traditional rivals of the Korean shipbuilding industry.

Anything from anchor chains to ladders and marine engines and steel plate has been exported to Japan where the yards prefer not to highlight this fact, but instead favour discussions about encouraging Japanese producers to improve innovation and productivity.

Tapping into Japan's undoubted expertise is how many of Japan's medium sized yards believe that they can engineer survival. Mitsubishi Heavy Industries (MHI), traditionally at the forefront of shipbuilding excellence, is looking to maintain its links with the maritime construction sector through innovation. Waste heat recovery systems, shaft generators, and air lubrication systems are among a host of energy saving advances that MHI is offering Japanese yards. The claim is that these systems will offer owners a competitive edge because the ships that they buy will be significantly more efficient than the competition's vessels.

Collaboration in Japanese yards is added to by a healthy demand from domestic owners, who have maintained orders. As much as 80%, and in some cases more, of orders in many Japanese yards are for Japanese owners. In Korea and China domestic demand is considerably lower.

Japanese yards are also looking to consolidation as a method of survival with IHI and Universal looking to tie the knot on 1 October.

If Japanese yards are to make a comeback in the battle for shipbuilding supremacy then there would have to be massive shifts in the economics of the industry. Such a sea-change is unlikely to unfold. However, the fact that Japan is hanging onto to its status as the world's third largest shipbuilder shows that it can remain a significant player in the future, in spite of the strength of the Yen.

That leaves Korea and China to effectively battle it out for top spot, a position that in the past has given the holder significant economic benefits for a considerable length of time.

China has already reaped some of those benefits, but the Koreans are battling hard to maintain their status. Whether China's ambitions in the shipbuilding sphere is to be realised, however, may depend on the recovery, when it comes, of the western economies. Until that recovery is realised the medals for first will be made of fool's gold. *NA*

Lubricants

New universal oils slip onto the market

Two more lube oil manufacturers, ExxonMobil and Shell, have launched their universal products with both companies claiming their products have passed rigorous tests completed by engine builders MAN, Wärtsilä and Mitsubishi Heavy Industries.

The launch of these two new universal lube oils onto the market would appear to end the debate initiated by Castrol on whether universal lubes are an effective oil in today's market where, at times, ships will need to use low sulphur fuels and will be slow steaming.

Castrol says that slow steaming along with a low BN lube oil could cause damage to engines. Castrol's remarks were aimed at Total Lubmarine's Talusia Universal, a 57BN lube and, up to now, the only universal lubricant on the market.

Both ExxonMobil's MobilGard 560 VS and Shell's Alexia S4 universal lubricants are 60BN oils, three higher than Talusia Universal.

Major marine engine manufacturer Mitsui Engineering Services (MES) of Japan, which has been building MAN Diesel and Turbo units for 100 years, has said it has seen "no negative feedback" on universal lubricants.

MES told *The Naval Architect*: "Talusia Universal is on our approved list, MES has not heard of any problems with lubes on the approved list. These oils [on the approved list] are widely used and we have no negative feedback on any of them."

Both ExxonMobil and Shell say their new lubricants offer significantly better wear protection for all ships and claim that the oils have been successfully tested under the full range of conditions and approved by original engine manufacturers.

The companies also claim that their oils can reduce the amount of lubricant used through the optimisation of feedrates. In fact Shell goes further: "With technical support and a switch to Alexia S4, one specific trial showed a 33% reduction in oil feedrate," claims the company.

ExxonMobil also claims low feedrates: "Several companies to operate with cylinder oil feed rates of nearly 25% below original equipment manufacturer [OEM] recommended levels, with extremely low wear rates," claims the company.

All three universal lubricant producers have said that their oil is safe to use with the full range of fuels, including bunkers with 3.5% sulphur content through to fuel with 0.1% sulphur content and with slow steaming vessels.

Design

Deltamarin signs ship design deal with Yangfan

The Finnish design company Deltamarin has entered into a new contract with a Chinese shipyard Yangfan Group, for the design of B.Delta37 Bulk Carriers. They are to be built for the Italian shipowners d'Amico Societa di Navigazione S.p.A. The company has ordered six ships with another six options.

The design of the ships is a standard B.Delta37 open hatch design. The vessels will be 179.99m long with a beam of 30m, a scantling draught of 10.5m and a deadweight of 38,500dwt with a cargo capacity of 49,500m^3. The ships will have a design speed of 14knots and the tested daily fuel consumption is 17.9tonnes including with a 15% sea-margin.

The B.Delta37 open hatch design will be built by Yangfan Group

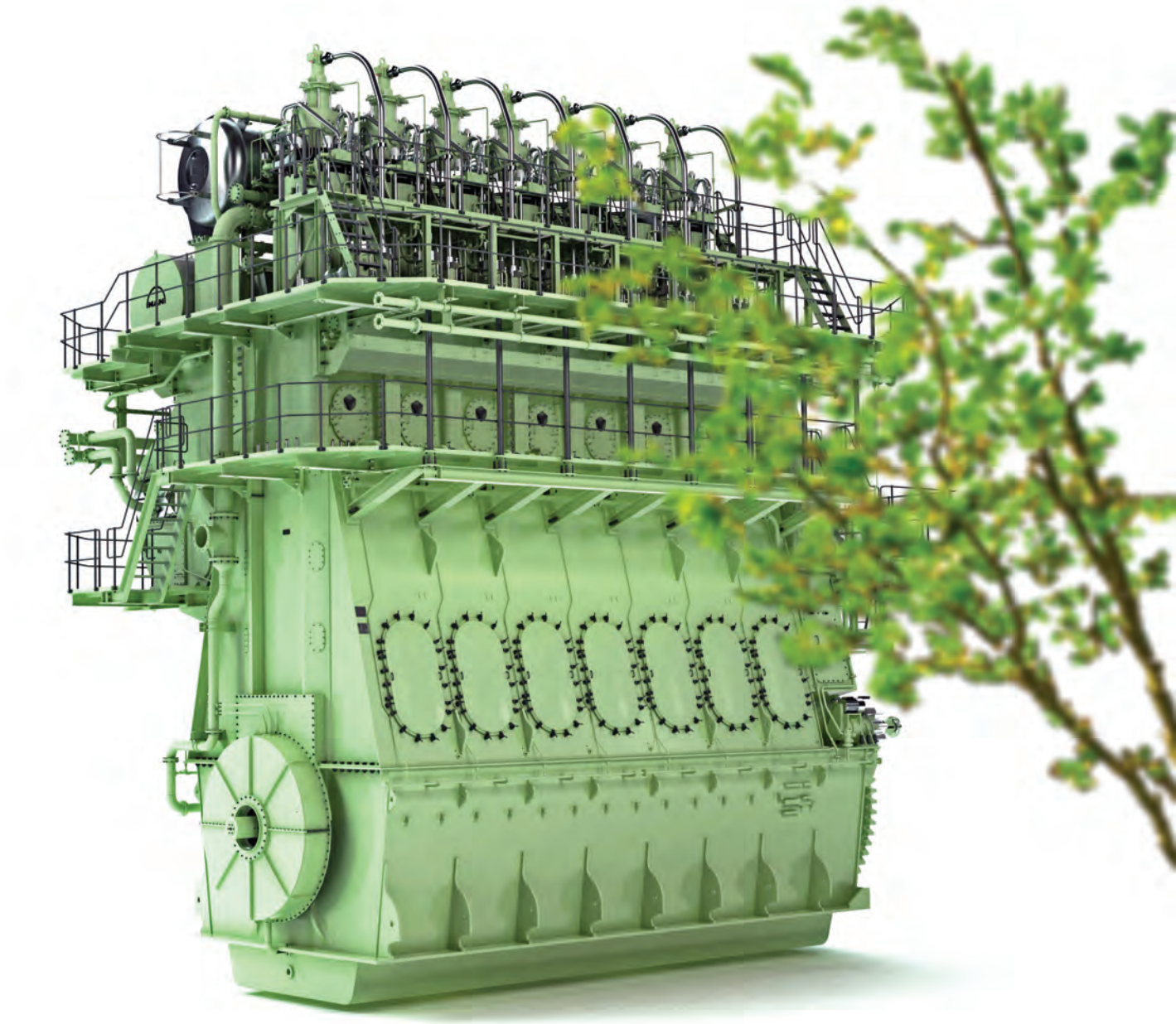
Energy Efficiency Design Index (EEDI) rating was tested to be 21.6% below the required IMO standard. The tested and proven solutions, which enable such improvements to former ships, were a combination of hull form, propeller, rudder, and main engine solutions.

The low fuel consumption of the B.Delta37 was what interested of a lot of shipowners and shipbuilders. As a result the company has already secured a number of contracts for the B.Delta37 bulk carriers which are currently being built in CSIC / Tianjin Xingang and CSSC / Chengxi shipyards in China.

The B.Delta series has already attracted a total of nine owners and 35 ships are already on order. The d'Amico order for 12 ships for US$22.3 million each will be delivered from 2014.

Green MAN B&W G-Engine

New ultra-long-stroke optimises the efficiency



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Innovation

Turning the tide on ballast water

ClassNK believes that, in the future, ship designs will become Non-Ballast Water (NOBS) and Minimal Ballast (MIBS) Water Ship designs as an alternative solution to ballast water treatment.

The new designs would be attractive because they will significantly reduce shipowners' capital costs.

ClassNK has worked together with Japanese shipyards to develop NOBS and MIBS designs. "While our research has succeeded in showing that construction of a NOBS vessel is possible, MIBS is considered to be a much more practical solution". ClassNK think that the NOBS design has limitations as well as operational challenges such as its raked bottom design and lighter weight body form. "Thus, we think that the MIBS concept will enter use first on larger vessels, while the NOBS concept will initially be achieved on smaller sized ships".

Japanese shipbuilding is in a very tough situation right now partly due to the stagnant market but also because of the unbelievably strong Yen, says ClassNK. "Due to the solid supply pressure from the large capacity of newbuilding deliveries, we think that this present severe market will last at least for the time being."

Ship overcapacity is being exacerbated by a slump in demand adds the classification society. "Financial crisis in Europe is limiting requests for enlarged volumes, so we imagine it will be tough for the market to turn up in the near term. Alternatively, the supply pressure related to newbuildings will weaken from 2013 and, if the crisis in Europe can be resolved at an early stage, then an upsurge in the market may be possible."

Up until last year, shipowners were mainly focused on "cheaper ships". Though, due to high bunker prices and new greenhouse gas rules, along with the stagnant market, owners are now very much interested in new "Eco-Ship" projects. With the price of fuel predicted to rise even further in the future, we expect this to become a bigger feature in the future.

The Konecranes Goliath gantry crane en route to Brazil

Water Treatment

New age sewage

Detegasa, the Spanish company that manufactures environmental pollution control systems for the maritime sector, has launched an innovative trouble-shooting service, RCS Remote Control and Monitoring System.

Designed for the rapid identification of problems the system allows for the remote management of Detegasa equipment and processes via an online connection. This offers significant advantages, says the company, including

- remote diagnosis and troubleshooting in real time
- cost-effective quick response, saving time and money of an eventual technical assistance
- keeps historical data records, enabling preventive and corrective maintenance if desired

According to the company a "user-friendly interactive programme provides the operator interface to the system, for monitoring, controlling, operating and detecting alarms. The installation of this interactive whiteboard, equipped with special software, allows operators to manage locally and remotely different aspects of great importance both for operation and for maintenance tasks."

Data is sent through a common router and is transmitted by encrypted security codes over the internet.

"Detegasa receives the signal emitted by the equipment and can access the control panel immediately by secure protocol of access. Technicians will virtually travel instantly to provide specialised technical support," says the company. An IP camera assists the company in diagnosis and maintenance.

The RCS system can be operated both locally and remotely and can be installed in any Detegasa equipment.

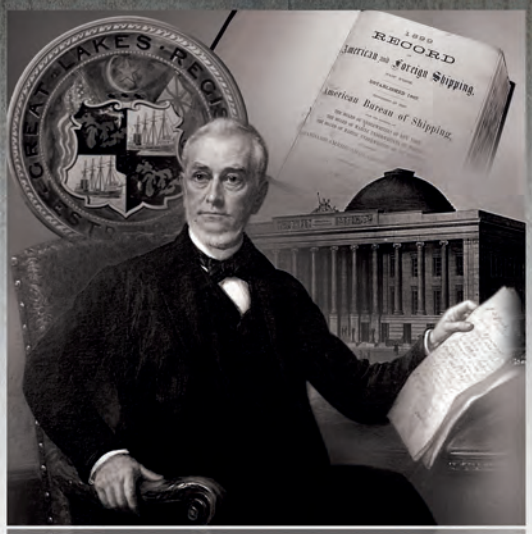
Cranes

Brazil gets a lift

The world's largest gantry crane will be erected at the Engevix-Ecovix shipyard in Rio Grande do Sul , Brazil.

Konecranes Goliath gantry crane is 210m wide and 117m high and will be capable of lifting 2,000tonnes and will be used in the construction of Floating Production Storage and Offloading (FPSO) ships that will be used by Petrobas for offshore oil production.

Installation of the crane, which is reportedly set to feature in the next issue of the Guiness Book of Records, will be completed by the end of 2012. Construction of the crane started in October 2011 in both Finland and South Korea. Konecranes says it will also offer the yard a local maintenance service for the crane.



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Figures show deliveries defying global crisis

If the size of the shipping orderbook has been continuing to cause concern, this has not stopped yards continuing to expand their output, *writes Sandra Speares.*

According to Martin Stopford, managing director of Clarkson Research Services, yards have still been expanding output in the last two years, with each year expected to be the peak.

Last year deliveries went up to 162 million dwt, compared to 151 million dwt the year before. "That is pretty well double what it was seven years before that. We assumed that was definitely going to be the peak but at the moment we have so many deliveries coming through this year, we are now projecting 163 million dwt in 2012."

The Chinese are now the biggest builders and in terms of compensated gross tonnage did 19.4 million cgt, compared to 16.1 million for South Korea, and 9 million cgt for Japan last year. While China is the biggest, there are very big differences from the product perspective, Dr Stopford explains. China is very heavily focused on bulk carriers, which accounted for 60% of production last year and this year. China does not build a lot of container or gas ships at the moment. The Koreans have a more even product range spread across bulkers, tankers and container ships.

The Koreans are the world leaders in tanker and container ship production by a very big margin, Dr Stopford says and they are also the world leaders in gas production and offshore production. "The way the cookie has crumbled is that the Chinese and Japanese are very heavily focused on bulk carriers, which are the lion's share of deliveries this year, and the Koreans are much more diversified."

While China remains the biggest producer it will have to get over the hurdle of changing product range as orders for bulk carriers and tankers have fallen off dramatically so far this year, Dr Stopford says. In the first half of 2012, there were 6 million dwt of orders for tankers, 9 million dwt of orders for bulkers and in value terms in the first half of 2012 there was US$3 billion worth of tankers, US$3.9 billion worth of bulk carriers, US$15.7 billion worth of offshore and US$4.5 billion of gas, with less than US$1 billion of container ships.

"The traditional markets have completely fizzled out," Dr Stopford says. " We are getting right to the point where shipyards are getting ready to fall off a cliff and they are continuing to deliver to the last minute, probably because the contracts say so and if you miss your penalty date, the owner will walk".

The Koreans are looking well placed because of their diversified product range, including offshore, while the Japanese and Chinese have to do a certain amount of adaptation. Dr Stopford says it will be very difficult for some yards to change. The problem they have is that gas and containers – which are big potential growth markets – are both quite specialised, and it is tougher for a newcomer to enter the market.

Dr Stopford assumes that China will turn to the domestic market for orders. State yards are well established and can expect government support, but private yards are very varied with varying sizes and levels of capital expenditure. Dr Stopford expects deliveries will fall away sharply from the peak. Once the existing ships have been delivered – the current order book is at 20% of the fleet – orders will fall off.

Mark Williams, head of the research department at Braemar, says that a lot of the Chinese yards have been feeling the effects of the slowdown in buying activity and many have not placed an order for some time. The president of the Chinese Shipbuilding Association is on record as saying that as many as one third of Chinese shipyards may go bust by the end of 2013.

Having said that, he says that while a shipbuilding company may go bust it doesn't mean that the yard itself disappears and it can always be brought back into service. "I think the Chinese would like to diversify away from straight forward commodity ships, but it is about the technology. A number of them are doing their best" Some of the yards that have got overseas investments are developing technology to build more sophisticated vessels than bulk carriers and simple commodity ships, Williams says.

"I think the Chinese will get there in time, they've proved it in other industries. Whether they can do it quickly enough to turn a profit and retain employment and maintain market share, it is on a case by case basis". He expects the two big shipbuilding groups CSSC and CSIC to remain stable. "The shipyards that might struggle are the ones that have majority private ownership that are concentrating on smaller, simpler vessels".

While it doesn't seem likely that Chinese yards can build up a facility in a short space of time stranger things have happened, and the Chinese have a reputation for building experience faster than most.

A good example is the deal between Nantong Mingde Heavy Industry in July to build 21 LNG ships for Bermuda-based Cambridge Energy Group. The deal has been much discussed, not least because of China's position as relative new kid on the block when it comes to building specialist LNG ships.

As far as banking on LNG as the fuel of the future is concerned, is this where the ship yards are pinning

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their hopes? Korean yards rely on a proportion of their income from LNG. "It all depends on what you think is going to happen with gas consumption, Williams says. "If you take the minimum and maximum increase in LNG production over the next 10 years, it could be anywhere. If every million tonnes need one ship per annum to move it, the requirement for LNG carriers could vary widely. It's a matter of where you put your bets."

At the moment Williams says it is a question of what new production comes on stream and whether there is a market for it. If the Americans start exporting the price arbitrage between America and Japan for LNG will be considerable. How big the potential will be is the gamble.

Chart 1 shows LNG historical production and forecast production based on proposed projects and only those where a final investment decision has been made. LNG production increases significantly, if all projects go ahead, but some, for example in Iran – are less likely than others to be completed on time if at all, Williams explains.

If as a rough rule of thumb, each LNG carrier can ship 1 million tonnes of LNG per year at current vessel efficiency operating rates. If only the FID approved projects go ahead, about 78 million tonnes extra LNG comes out by 2020, which would pretty much all be covered by the current orderbook.

"If all new projects come on stream, another 339 million tonnes LNG production would require a massive LNG newbuilding programme, to the delight of shipyards. Probably we will come out in the middle. If we were to have about 450 million tonnes LNG production by 2020, it would require approximately another 90 to 100 LNGCs by 2020 to ship the gas."

While the Koreans are better placed at the moment in terms of the diversification of the business, Williams points out that Korean yards have already gone through their own shipbuilding restructuring process a few years ago and a number of yards were put into liquidation. "At the moment it looks like the combination of offshore, container shipping and gas will keep the big Korean yards, the highly technological Korean yards, in comfortable amounts of business for a few years to come".

Big yards should weather the storm, but "Shipbuilding has been proved to be as fairly risky business over the last thirty or forty years and it is not so long ago that the Koreans and the EU were taking each other to the World Trade Organisation about possible transactions."

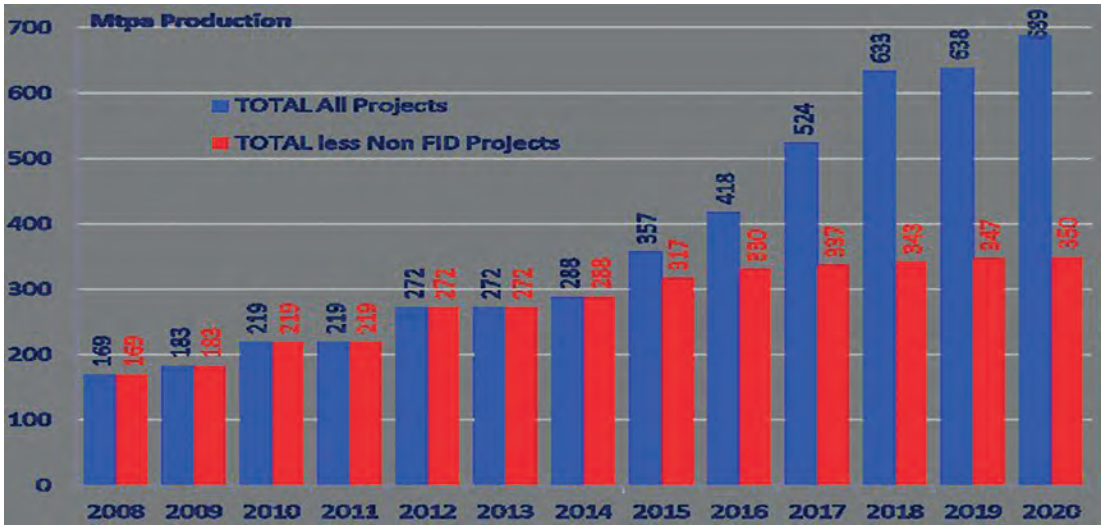
Globally there is over-capacity in shipbuilding, so the question is how yards, wherever they are based, protect market share, but at the same time maintain profitability? "Those are the core issues facing every manufacturer in every sector in the world at the minute".

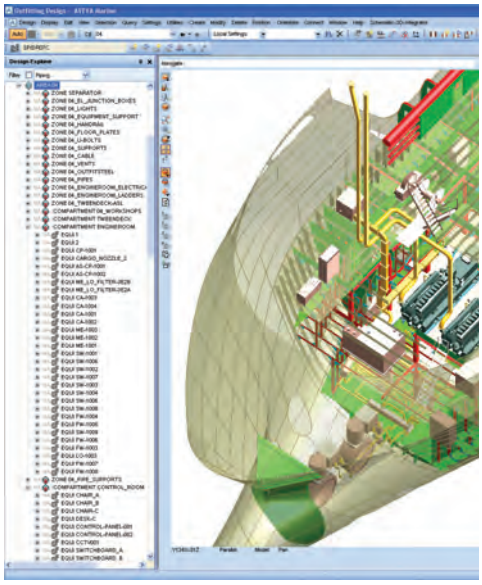
While some concerns have been raised by European yards, that Far Eastern ones might try to get into a specialised area like the cruise industry, cruise shipping is as much about the hotel side of the equation than it is about hull and machinery. Williams believes that the European shipyards involved in cruise shipping will be able to maintain their lead in the area, provided they continue to give the cruise lines what they want.

As far as other geographical locations are concerned he doesn't see many up and coming new prospects, as with the current over-capacity it is difficult to set up a yard and compete. India and Vietnam are two countries that can compete, but he says the Brazilians are basically only building for themselves, and European shipbuilding is going through a "sticky patch".

Unless a Jones Act newbuilding scheme comes into force with the expansion of the Panama Canal, he doesn't see a lot of new yards opening up. "The forthcoming theme will be how the Chinese develop the quality outside bulk carriers to entice shipowners to come back to come back to the newbuilding market. That is a combination of quality, design and good relationships with supervisors and designers." *NA*

Chart 1





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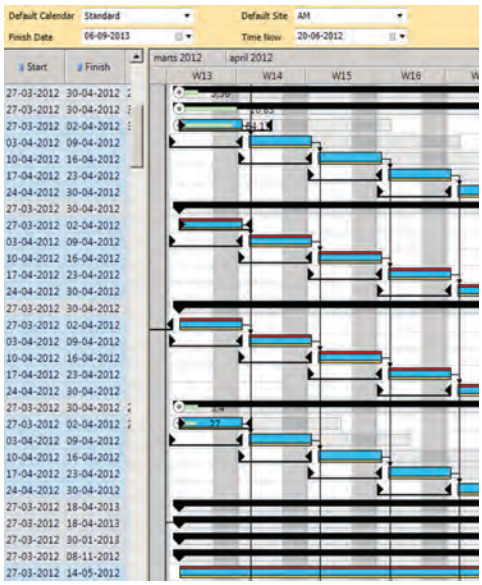

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Water works

A number of organisations have outlined their concerns regarding the ratification and implementation of the ballast water treatment regulations to the IMO's Marine Environment Protection Committee.

The flag states of Liberia, the Marshall Islands and Panama are concerned about a number of possible difficulties following the ratification of the BWTS regulations. Included in their list of possible problems is the:

- need for revision of the *Guidelines for approval of ballast water management systems (G8)* to improve transparency and ensure appropriate robustness of ballast water treatment systems (BWTS)
- availability of BWMS and sufficient facilities to install BWTS
- survey and certification requirements for ships constructed prior to entry into force of the BWM Convention and,
- sampling and analysis procedures for port state control purposes.

And their concerns are shared by a number of industry organisations, including: BIMCO, the oil tanker owners' association Intertanko, the Cruise Lines International Association (CLIA), the cargo owners' association Intercargo, the ship managers' association InterManager, the International Product Tankers Association (IPTA), the corrosion foundation NACE and liner shipping representatives the World Shipping Council (WSC).

The co-sponsors of the MEPC submission say that as of June 2012 there 23 type approved BWTS on the market. However, the group says: "In many cases it is apparent that the Type Approval Certificate and its enclosures are insufficient in detail to provide a clear picture of whether a system may be adequate to meet the needs of the vessel being considered and its particular trade routes. The problem stems from the lack of limits provided in the Type Approval Certificate and its enclosures even though this is an aspect specified within the "Guidelines (G8)". In some examples the approval documentation may imply that the BWTS has no practical and operational limitations. However, the fact that no limitations are provided does not mean limitations do not exist."

According to the group type approval certificates have been "provided based on theoretical extrapolation of the system's maximum treatment rated capacity [TRC] as opposed to actual physical testes."

In addition the co-sponsors believe that electro-chlorination and electrolysis systems may not meet the standards in certain conditions, that is brackish or freshwater, while UV systems could fail to meet the standards in turbid or high sediment conditions while filtration systems may find that their efficiency is reduced in sediment-rich and muddy waters.

"It is clear that an owner is not able to make a decision based purely on the Type Approval Certification and its enclosures. However, resolution MEPC.174(58) states that the Type Approval Certificate should specify any limiting conditions of the BWTS usage necessary to ensure its proper performance. The co-sponsors propose that the form of the Type Approval Certificate as well as its enclosures should be revised and standardised with the aim of improving the transparency and detail of information being provided to ensure the overall veracity of the certification and the certification process," say the co-sponsors.

According to the flag states and owner's organisations a number of issues are emerging that show that the approval process is failing to ensure that the ballast water treatment equipment is fit for purpose. That is that the equipment is "robust enough for ship board installation and operation".

In effect the co-sponsors say that resolution MEPC.174(58) will approve a system that meets the D-2 standards, but it does not approve a system that is operating in an "actual maritime environment".

The proposals set out in their paper "are seen as a first step in assessing BWTS in a more credible and effective manner. If the MEPC should decide that there is a need to revise the "Guidelines (G8)", which the co-sponsors believe is the case, then the Committee would also need to discuss what to do about systems that have already been approved under the current Guidelines (G8)".

Owners also have other concerns, including the problems surrounding the fitting of BWTS to all ships within 12 months of the regulation becoming live. In addition sample testing methods are considered to be a potential problem where, the co-sponsors say, some properly maintained and type approved systems could fail during sample testing.

"The manner in which the sampling and port state control procedures are being interpreted at present would suggest that there is also a lack of confidence by some administrations in the original approval process. This would indicate uncertainty in the ability of the approval process using "Guidelines (G8)" to fulfil its obligations in ensuring compliant systems are installed and operated on board ships."

As a result of the continued uncertainties surrounding compliance and enforcement the co-sponsors claim there are "significant barriers to implementation" of the ballast water regulations.

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The following are proposals from the co-sponsors for strengthening the "Guidelines (G8)"

"**Coatings**; Resolution MSC.215(82) provides details on the Performance Standard for Protective Coatings (PSPC). While proposals for standard tests on the impacts of BWMS on corrosion and coatings have been put forward by GESAMP-BWWG, the current corrosion and coating impact tests undertaken by BWMS manufacturers frequently fall well short of the standards established in the PSPC.

This is of concern for particular types of BWTS. For example, coating industry specialists have observed that in situations where oxidising species are used in the BWTS there is an increased risk of corrosion within the ballast water tank and piping system. Other observations have been made with regard to the impact on epoxy coatings from the Active Substances used in the BWTS. Tests undertaken thus far have been limited in their scope. This limitation includes the doses that the coatings are subjected to, i.e. it does not take into account the probability of increases in doses due to more nutrient rich conditions, user error or dosage equipment failure. Another limitation is that of the time periods that the coatings are subjected to. Some coatings have only been subjected to the Active Substance doses over short (6 to 8 weeks) periods as opposed to a more thorough period of more than six months.

The coating industry representatives, IPPIC, in their submission MEPC 63/INF.9 also commented that the BWTS manufacturers should perform appropriate testing during the development phase of their equipment. IPPIC points out that the MEPC has only given general guidelines to the BWTS manufacturers for compatibility tests with coatings. The co-sponsors fully concur with IPPIC's view that, in order to give more clarity on potential effects, it is imperative that test protocols are standardised, described and thoroughly verified.

Filters; As a pre-treatment measure some BWTS use filters to remove larger organisms and particles. Some of the key challenges presented by the use of filters include but are not limited to: Suboptimal operation at either end of the pressure range. Some Type Approval Certificates specify a minimum and maximum pressure. This indicates that at certain pressures the filters may not operate effectively. This is especially so at low pressures, such as during the last period of de-ballasting (tank stripping) when minimal volumes of ballast water will be pumped through the BWTS or simply when topping up the ballast tanks.

Back flush times may be extended in high sediment ballast uptake areas. This will result in increased back flushing being required and a consequential decrease in the capacity of the system overall. Such a variation in sediment or particle loading is rarely assessed during the type approval stage and as such actual treatment volumes in real-life situations may be greatly reduced. This will result in delaying vessels at certain ports with high sediment waters.

The physical nature of certain organisms also presents problems for filters. In areas of rich phytoplankton experience shows that plankton grasses can easily disrupt and quickly limit the flow of water through filters. Such limitations are difficult to overcome as the backflushing is not always effective in removing the flora in their entirety, unlike say sediment or mud which is particulate in nature.

The co-sponsors would propose that any review of the "Guidelines (G8)" assesses the need to ensure that the BWTS which rely on filters are tested in situations where ballast water flow may not be linear nor consistent. The results of the testing should then be provided on the Type Approval Certificates to indicate within which ranges the filters will operate effectively, which pumping rates the tests were undertaken and under what circumstances limitations in the filter's effectiveness may occur.

HAZID assessment; At least two Type Approved systems create hydrogen gas during the treatment phase, both of which have built in systems to keep the hydrogen levels below the 4% lower explosive limit. However, there is concern that the introduction of such systems counters the ongoing efforts of the shipping industry to eliminate all such safety and environmental risks. Due to space limitations on tankers with deep-well pumps, retrofitting BWTS requires the installation of the equipment on deck. SOLAS allows equipment to be installed on tanker decks only after a safety assessment has been undertaken and is approved by the Administration. Noting the above examples of increasing safety risks aboard, the co-sponsors propose that the "Guidelines (G8)" should require the BWTS manufacturers to include the submission of HAZID assessments and mitigation measures.". *NA*

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www.cargotec.com

Ballast water treatment systems

Moss Hydro engineers unique solution

Recently established Moss Hydro is set to address a ballast water challenge that is causing concern in the shipping industry, that of reliable filtration.

Stein Foss, the former CEO and co-founder of ballast water treatment (BWT) business OceanSaver, has set up the independent company with three partners, and engineering, marketing and manufacturing experts. The company aims to create filters designed specifically for ballast water treatment.

Single screen filter, inside view

"Our filters are unique," comments Moss Hydro CEO Foss. "There is nothing else on the market that offers the same quality of materials, precision manufacturing standards, self-cleaning capability and extremely short delivery times in one all-round package. This gives us a huge competitive advantage."

Moss Hydro filters have been created for optimised self-cleaning and minimal maintenance. Crafted from super-duplex stainless steel, they are corrosion free and 50-70% lighter than conventional filters. The filters are manufactured in a robotised facility in Norway, enabling extraordinary precision. This achieves high accuracy, meeting strict requirements to tolerances, alongside high welding quality and total product uniformity.
www.mosshydro.com

Navigation

Thomas Gunn launches Generation Voyager

The Voyager 4 is the latest incarnation of the automated chart management system from Thomas Gunn Navigation Services.

Voyager 4 will offer users a database of navigational data displayed using an interactive map interface with Admiralty information overlay which can be customised to individual voyage requirements.

Voyager 4, the next generation in chart management

"We have incorporated a number of industry firsts into the new Voyager," explains Thomas Gunn, founder and managing director of Thomas Gunn Navigation Services. "The new Route Planning functionality will enable the Mariner to plot an optimum route and then automatically receive a tailored list of corrections for that route alone. Our Digital Loose Leaf application delivers digitised loose leaf updates straight to the vessel.

As part of the service provided by Thomas Gunn, subscribers to the Voyager system will automatically receive the new Voyager 4 software. The Voyager service does not require any additional communication equipment thereby eliminating any hardware, installation and on-going maintenance costs. Voyager software is installed on a Windows PC and can be updated via email or web service.
www.thomasgunn.com

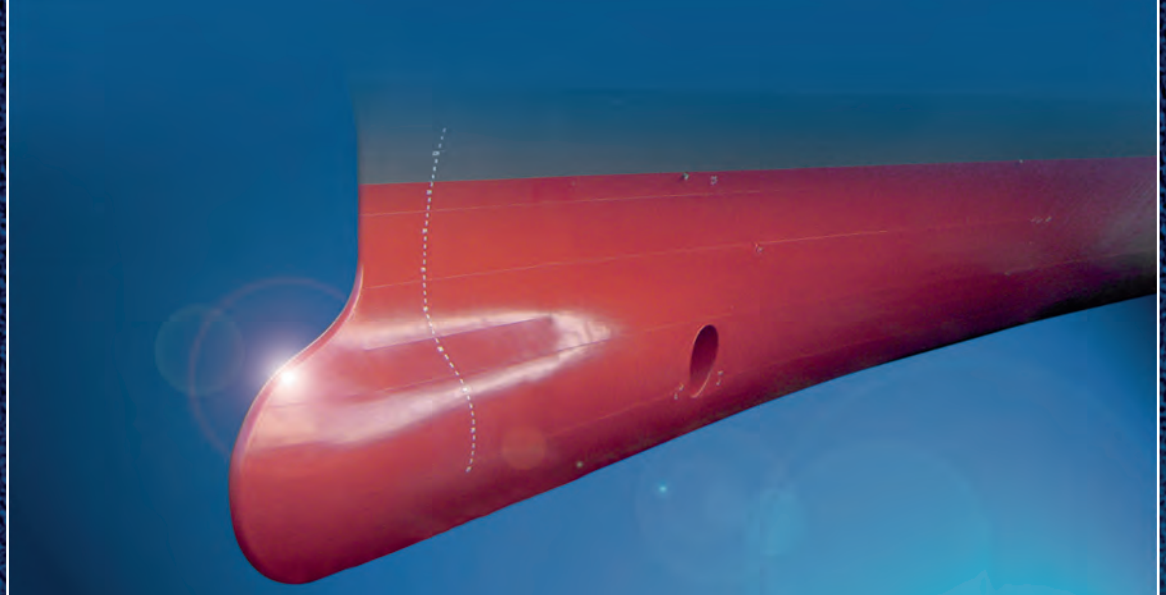
CAD/CAM

Creaform releases version 1.1 of Pipecheck

Creaform has announced the release of version 1.1 of its Pipecheck software module for pipeline external corrosion analysis. With this new release, Creaform will give users better quality and ease-of-use when it comes to pipeline inspection and non-destructive testing (NDT).

Pipecheck's pipeline external corrosion module offers very fast, efficient and streamlined data processing that can generate instant, on-site results. Data is presented in a complete Excel report, and has increased accuracy and repeatability compared to traditional measurement methods such as pit gauge, ultrasonic (UT) probes and single-line lasers.

New features of the software include: interaction rule that increases the number of corrosion cases that can be processed ("Fit to Shape", Perfect rule



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for "L" shape defect, feature limits that follow the shape of the defect). Interaction criteria match the feature shape. Also, merge of scan files which will make it possible to use two scanners working in a same positioning model and merge scan data so that the complete part can be analysed. This will increase productivity by reducing acquisition and calculation times and also increases accuracy over long pipe segments, says the company.

Adding to the new features is force to corroded area. This functionality provides high flexibility to define corrosion pattern. In a few clicks, an experienced user can actually prevent the virtual pit gauge functionality from using some particular points; and virtual pit gauge that has been enhanced with interactive operation messages providing instant feedback to operator about the software configurations. Critical areas are automatically identified in the 2D view.

www.creaform3d.com

Ancillary equipment

Cargotec gets repeat business from China

In a bid to build the most efficient bulk carriers on the market, China Navigation has returned to Cargotec for 16 electrically-driven bulk versions of its variable frequency drive MacGregor cranes. The order was received in the second quarter 2012 order intake, for its new series of four 39,500dwt handy sized bulk carriers, Bdelta37 type. The China Navigation Company Pte Co Ltd (CNCo) has specified electrically-driven variable frequency drive (VFD) versions of MacGregor bulk handling cranes from Cargotec. The Bdelta37 vessels will be constructed at Chengxi Shipyard in China and are scheduled for delivery in 2013 and 2014. Each will be equipped with four GLBE 3026-2 MacGregor cranes. There are options open for a further six vessels.

www.macgregor-group.com

CAD/CAM

Dassault Systèmes unveils latest SolidWorks

Dassault Systèmes has introduced its SolidWorks Electrical applications. These latest offerings include a system level 2D schematic design tool and a powerful 3D electrical modelling add-in to SolidWorks design application that are linked in real time.

SolidWorks Electrical applications allow engineers and designers to plan electrical systems and integrate those electrical aspects into the overall 3D mechanical models. This will allow electrical engineering teams to collaborate during product development, streamline the design phase, and reduce product delays, resulting in more consistent and standardised designs, lower costs, and faster time-to-market, says the company.

SolidWorks Electrical provides new capabilities with a 2D schematic design tool for electrical system architecture and planning that simplifies electrical design with a dynamic, context-sensitive user interface, providing the ability to quickly turn concepts into detailed designs. It identifies problems immediately with real time error detection which prevents costly scrap and rework. It also allows for easier and more accurate creation of schematics with a library of more than 500,000 standard electrical parts and enables multiple people to work on the same project at the same time.

www.3ds.com

Ancillary equipment

Stena uses Solasolv

Stena Transit is the final vessel for Stena's North Sea major investment programme. The project involved the investment of approximately €1 billion over a five year period and consisted of several new vessel orders and modifications to vessels in the existing Stena fleet.

Solar Solve Marine was chosen to supply their Solasolv SOLASAFE product to both *Stena Transporter* and *Stena Transit*.

The vessels are RoRo cargo and passenger vessels with an overall length of 212m at a beam of 26.7m and a draught of 6.3m. With five cargo decks the vessels' freight capacity is 30% larger when compared to existing vessels. Both vessels were built at Samsung Heavy Industries in South Korea at a cost of approximately €110 million (US $135million) each and were delivered with 33 SOLASAFE sunscreens installed at the navigation bridge windows.

www.solasolv.com

Communications

Thrane & Thrane deliver to Hansa

In partnership with PRO NAUTAS and Vizada, Thrane & Thrane has completed delivery of its sophisticated SAILOR 900 VSAT and SAILOR 500 FleetBroadband systems as part of a total communications solution for Hansa Heavy Lift's entire fleet of 21 multipurpose heavy-lift vessels.

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Find out more: **3DS.COM/MARINE**

Our customer: NEPTUNE Canada Transforming Ocean Science

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Thrane & Thrane supply Hansa Heavy Lift

Installation and commissioning is expected to be completed on all vessels in July 2012.

Based on the Vizada XChange platform with project implementation by PRO-NAUTAS, the SAILOR 900 VSAT and SAILOR 500 FleetBroadband together ensure fully redundant global broadband connectivity and voice services. The solution platform provides automatic selection of connectivity technology – Ku-band or L-band – based on the current coverage, system performance and available airtime rates.

www.thrane.com

Ballast water treatment

Wärtsilä does BWTS

Wärtsilä has signed an agreement with Canada-based Trojan Technologies to offer the Marinex ballast water treatment system (BWTS), alongside the Wärtsilä Hamworthy AQUARIUS range, which was introduced to the market last year. Wärtsilä now offers the widest range of BWTS and associated services in the market, the company claims.

"We recognise that no one solution will be suitable across all ship types, sizes and environmental conditions," says Dr Joe Thomas, director, Ballast Water Systems, Wärtsilä Environmental Solutions. "By having both the AQUARIUS and Marinex systems available, Wärtsilä is uniquely placed to deliver BWTS that meet the specific requirements of individual owners and their vessels."

In 2010, Wärtsilä Corporation and Trojan Technologies signed an exclusive agreement to jointly develop, market and distribute a BWTS for the marine market. During the past two years the companies have worked together on a new ultra-violet (UV) technology-based system and the collaboration has made good progress.

Ship board trials are expected to be completed in September along with Environmental Technology Verification (ETV) land-based testing which will be in line with US validation requirements.

www.wartsila.com

Ancillary equipment

Seagull training gets NMA approval

Computer-based training (CBT) specialist Seagull has been awarded Norwegian Maritime Authority (NMA) approval for a comprehensive ship security training package that is in full compliance with the Manila amendments to the STCW Convention and Code. These new security training courses will be available during September of this year.

The revised STCW, which came into force in January this year, introduces more stringent requirements for onboard security training, with particular provisions designed to ensure seafarers are properly trained in case their ship comes under attack by pirates.

The new courses have also been certified by classification society DNV through the SeaSkill programme. "This was a challenging process, which effectively required us to start again from basics and produce security training which has been fully checked by DNV against the revised STCW," adds Anders Brunvoll, Seagull senior course instructor.

Under the Manila amendments to STCW, all seafarers need approved ship security training, varying according to the level of responsibility of the seafarer. All seafarers must receive generic security awareness and familiarisation training, while those with specific security related roles need appropriate training for their role.

To ensure compliance, Seagull has developed two new CBT training levels - Level 1, covering security-related familiarisation and awareness, for all seafarers and Level 2 for seafarers with designated security duties. It has also updated its existing Ship Security Officer (SSO) course, which is the designated Level 3 of the Seagull Security On Board training system, in line with the Manila amendments.

The new NMA-approved Security On Board training courses will be released in the third quarter of 2012. In the meantime Seagull's existing SSO course remains valid and any certificates issued based on this course will be internationally accepted until January 2017.

www.seagull.no

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Ancillary equipment

Navis launches STCS 4000

Navis Engineering Oy has launched the STCS 4000, its latest multipurpose integrated steering and thruster control system.

STCS4000, based on digital technology, has already been delivered to two AHTS hulls for the MMC 974 project at Grandweld Shipyard in Dubai under the supervision of Lloyd's Register and to a pilot boat for the PI-22 project at Pella Shipyard in St Petersburg.

The system is designed to control the engine start and stop functions, to indicate the status of drive and power supplies and provide visual and audio alarms on supply failures, oil levels, drive overloads and other emergency situations.

STCS4000 offers an absolutely new approach to information display in 'lower level' control systems and, with flexible configuration, simple network architecture, it is the most compact and functional of its type in the industry. All the system devices are interconnected by CAN.

Based on the priority display of alarms and information, the system makes it possible to fit more than 20 messages within the boundaries of the main panel screen, thereby making it multipurpose while keeping its dimensions to a minimum.

STCS4000 has a colour display with a 130degs viewing angle and anti-glare surface and uses a radical new type of combined indicator for the required/true rudder position display. The indicator incorporates a unique system of emergency transfer of pointers to an unseen dial area, in case acceptance limits are exceeded or indicator power failure occurs.

www.navis.com

Ancillary equipment

Elcometer 224 sets new standards

Elcometer has announced the launch of its Elcometer 224 digital surface profile measurement gauge, available with either an integral or separate probe.

The latest gauge is fast, tough and accurate, says the company and is available in a range of models with either integral or separate probe options to suit the user's application. Each probe is supplied with a hard wearing tungsten carbide, user replaceable, tip which can be used for up to 20,000 readings.

Features include; impact, dust and waterproof equivalent to IP64 and the new Elcometer 224 is tough enough for the most rugged environments. A 2.4" colour display, easy to follow menu structure

Elcometer 244 measures more

in multiple languages makes the Elcometer 224 very user friendly, highlights Elcometer. The meter has a high-speed reading rate of 50+ per minute for measuring surface profiles, with live trend graph and readings batch graph for instant analysis. Temperature stable measurements gives you repeatable and reproducible results, all backed by Elcometer's two-year gauge warranty. Memory capacity of up to 150,000 readings in 2,500 batches, measuring profiles up to 500µm (20 mils) and output to ElcoMaster 2.0 software and ElcoMaster for Android, the new Elcometer 224 is exceptionally powerful.

www.elecometer.com

Navigation

Transas adds Ukrainian chart folios

Transas' TX-97 non-official chart collection now includes Ukrainian chart folios. The agreement was signed between Transas Marine Ltd and the State Hydrographic Service of Ukraine earlier this year allowing Transas to use official ENCs and Inland ENCs to create TX-97 folios.

New charts will be available for the users of Transas ECDIS and ECS. The uniqueness of this project is that it is the first time when Inland ENCs were used to produce TX-97 folios.

State Hydrographic Service of Ukraine provided 158 Inland ENCs and 114 ENC's covering territorial waters of Ukraine in the Black Sea and Sea of Azov. The TX-97 folios cover the Black Sea, the Danube River (Ukrainian territory), and Dnieper River and provide the possibility to discover the coastal and inland waters. Ukrainian chart folios are also available through iSailor application for iPhone and iPad users.

www.transas.com

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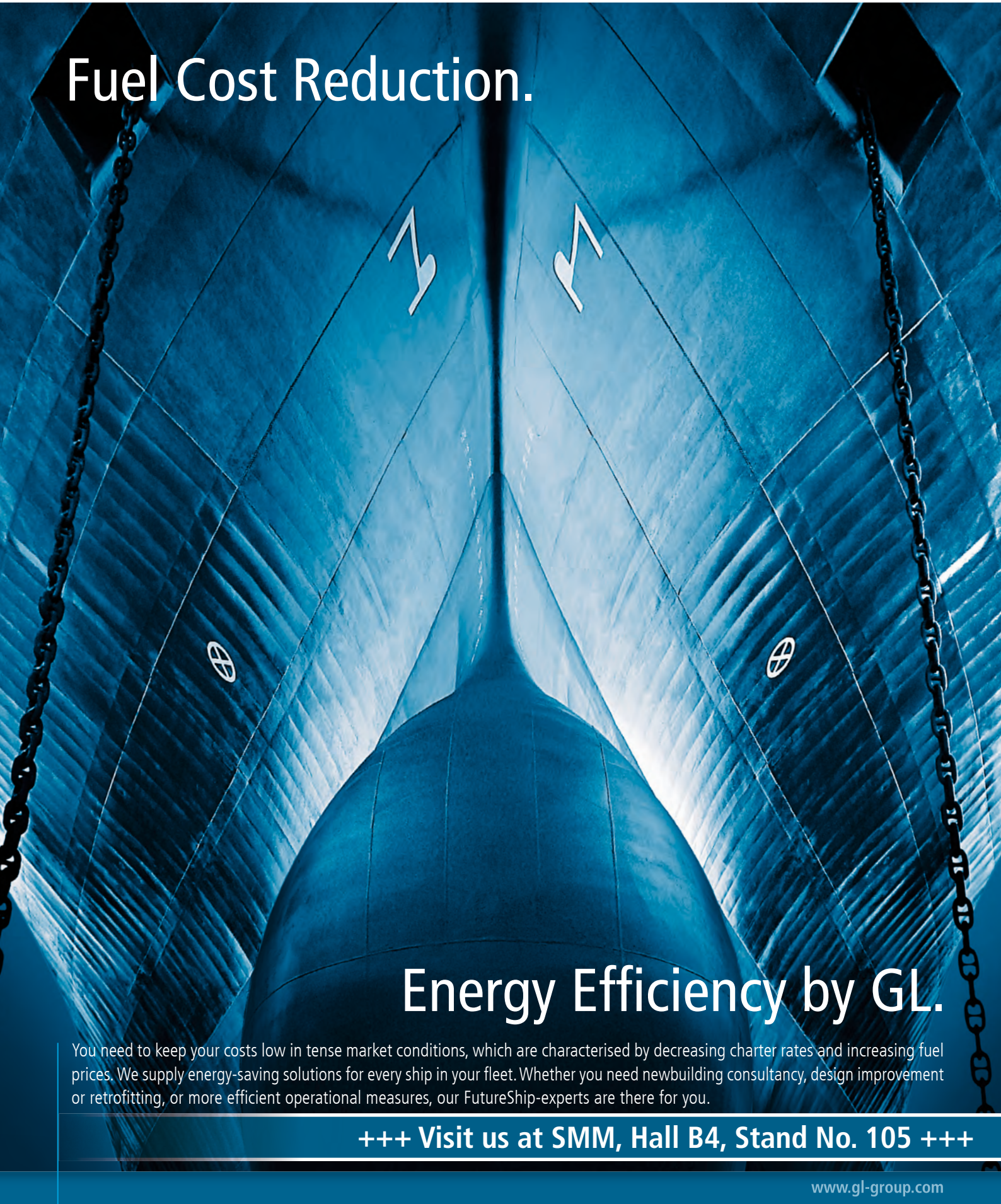

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On the vapour trail

JOWA AB's sister company warns shipowners of the potential dangers from chemicals used in Ballast Water Treatment Systems (BWTS) and the need for better tank level gauging, write captain Michael Lloyd, MNM, Mines Rescue Marine and Michael Haraldsson, JOWA USA

Many methods of BWT now exist to choose from and more are likely to emerge in the coming years. The common thread in most of these systems is their requirement of expensive equipment and fitting as well as the space for the equipment. Moreover, questions still remain regarding their effectiveness and impact on operations.

Today's treatment methods use a variety of substances such as chemical/ozone, UV and magnetic solutions and inert gas and nitrogen. It is important to note that the reactions between biocides and sea water that could produce harmful by-products have not been extensively studied. More importantly, there is definite concern now being expressed regarding the release of gases in enclosed and confined spaces, by these agents, especially the oxidising agents of ozone and chlorine.

One of the dangers of using chemical solutions is that many ship operators today flood ballast tanks when filling and consider the tank "full" when the ballast water is coming out if the vent pipe.

If BWT solutions require or produce chemicals you can't flood the ballast tank or floodable cargo hold as this water is classified as poisonous. What will Port Authorities say if a vessel using one of these systems overflows the ballast tanks with the water draining into the port and it has not been neutralised?

This then raises the supplementary question; should owners or shipyards installing this type of ballast water management technology consider not only a standard level gauging system, but also an overfill alarm in ballast tanks as required in cargo tanks today?

As all bulk carriers are required by IMO to have a water ingress alarm in the holds, if a level gauging system was fitted this would show the water level in the coaming area and thus would prevent the overflow of potentially poisonous water.

If the water ingress alarm system had a continuous level sensor that measured up to the coaming area, it would be easy to add an additional high level alarm. Ideally a fixed level gauging system that can be maintained from the tank top should be selected, as this would eliminate the need to enter the tank.

Chlorine for ballast water treatment is generated on the ship, from seawater. It is commonly used to treat drinking water and has been used for such treatment for many years at sea, but recent studies suggest that it may not be as safe to humans as once thought. There is also a possibility that chlorine may react with seawater to form toxic chemicals.

The gas combines with nearly all elements and it is a respiratory irritant to the mucous membranes and lungs and causes cancer. Chlorinated liquids burn the skin and many fabrics. As little as 3.5ppm can be detected as an odour and 1000ppm is likely to be fatal after a few breaths.

Chlorine can be detected by its odour below the permissible limit; however, because of olfactory fatigue odour may not always provide adequate warning of the harmful concentrations of this substance.

Most chlorination systems apply a dose in the region of 2mg/l residual chlorine, which has proven to be effective.

Unfortunately, some ballast water solutions use sodium hypochlorite with a concentration of up to 10ppm, which can leave a potentially dangerous gas residue in the tanks after the water is pumped out. Not only that, but the water pumped out with this level of chemical can be harmful to sea life in the local area. This contamination can also occur when a ballast tank or ballast hold is overflowed. Using a ballast pump that can pump 2,000tonnes per hour, the overflow rate will be over 33,000litres per minute.

According to the International Convention for the Control and Management of Ships' Ballast Water and Sediments, regulation D2, vessels are prohibited from pumping out ballast water still containing an active substance and in November 2011, the US Environmental Protection Agency proposed a vessel general permit for discharges incidental to the normal operation of vessels permit that, for the first time would include numeric discharge limits of active ingredients for most vessels.

These limits are as follows:

Ozone is an oxidizing biocide that has been used to disinfect water supplies ashore for over one hundred years. It is the major component of smog and is a harmful pollutant. It is also often used as a biocide in water. Ozone is inherently unstable and dangerous to produce, but it is a very powerful oxidizing agent.

The system works by passing water through machinery that releases ozone bubbles into the water. The gas then dissolves in the water and reacts with other chemicals in the water to kill the organisms. As not all the gas dissolves in the water this must be destroyed before it enters the atmosphere, as it is toxic to humans. Further, reaction between the ozone and the components of sea water may also result in toxic chemicals.

Chlorine exposure rates:

The recommended exposure rates for chlorine gas are:
TIME-WEIGHTED AVERAGE (TLV-TWA): 0.5ppm - Carcinogenicity Designation A4
SHORT-TERM EXPOSURE LIMIT (TLV-STEL): 1ppm - Carcinogenicity Designation A4

It must also be mentioned that when ozone is used, if the treated ballast water is pumped out in fresh water, the ozone will remain active for up to 30 minutes, thus having the potential to harm aquatic life in the area.

There are also some potential problems with BWTS that operate with an inert gas/nitrogen blanket. This will present the same issues experienced with cargo tanks using an inert gas blanket. The tank gauging system must be capable of operating properly over the full range of inert gas pressures including the fault conditions of high pressure and under pressure. An incorrect level reading may cause an overflow when filling, the pumping of air (and possible pump damage) when discharging or the improper balance of a vessel during cargo loading / discharge operations.

As with cargo tanks, you have to monitor the tank pressure so you can monitor over and under pressure conditions. Even if the system works with very small pressures, the system is closed and when you discharge and a relief valve doesn't open, the tank can collapse.

You most likely can't use a standard air-purge system in this BWT solution.

Air purge systems typically pump in air (with oxygen) while inert gas / nitrogen BWT systems try to eliminate oxygen in the ballast water. Do you need to change your system on a retrofit or can you modify it to be suitable? Air-purge is mentioned, as it is currently the most commonly used solution for level gauging in ballast tanks.

Table: Maximum Ballast Water Effluent Limits for Residual Biocides

Biocide or Residual	**Limit (*instantaneous maximum*)**
Chlorine Dioxide	200 µg/l
Chlorine (expressed as Total Residual Oxidizers (TRO as TRC))	100 µg/l
Ozone (expressed as Total Residual Oxidizers (TRO as TRC))	100 µg/l
Peracetic Acid	500 µg/l
Hydrogen Peroxide (for systems using Peracetic Acid)	1,000 µg/l

Can some ballast water treatment systems create more problems than they solve?

You will have to make the tanks gas free to add oxygen if you need to perform service in the tank. Obviously, it will be best if all service can be performed from outside the tank.

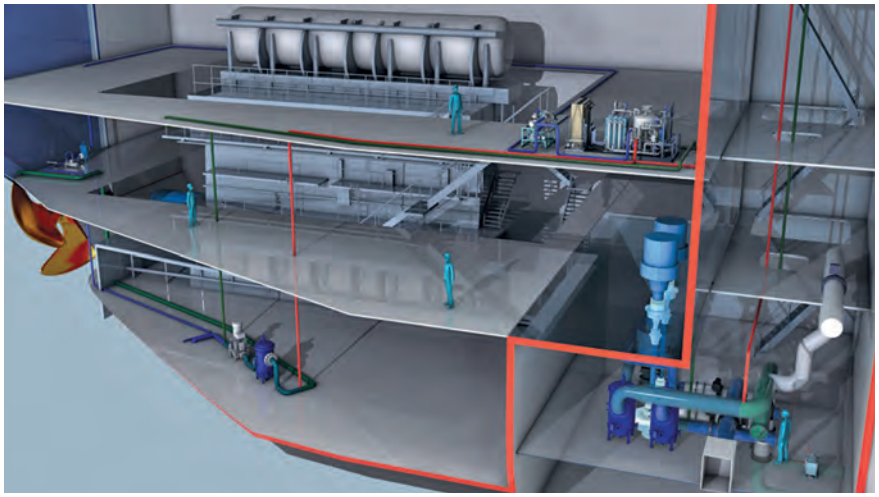
Haraldsson highlights that you can have an approved BWM solution and an approved tank level gauging system, but they may not work together. These two systems are connected and must be viewed together. What will happen if a vessel comes to a port and is told that it can't discharge its ballast water due to too many live organisms in the water, while at the same time, the owner can prove that he has approved BWT equipment and that it is working?

Both chlorine and ozone are heavier than air gases and this means that any ballast tank or hold that has been treated with these chemicals should be uprated, in the ship enclosed space management plans, to dangerous until they are completely ventilated and tested. Natural ventilation will be inadequate for these spaces and forced ventilation that reaches to the bottom of these tanks will be necessary for complete ventilation.

No one should enter tanks that have contained chlorine-or ozone-treated ballast water until the tanks can be verified as being clear of the gases. This could be problematic for vessels that need to have tanks surveyed or examined in the port of discharge and without adequate forced ventilation equipment, delays could be experienced.

All ships that use chlorine or ozone treatments should carry ozone and chlorine gas detectors.

Where vessels are using ozone or chlorine ballast water treatment, mud or sediment build-up must be avoided and the bottoms of ballast tanks should be water-blasted periodically to clear the mud or sediment from the bottom. *NA*



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Euro debt crisis sees impact on China ship exports

The effect of the global economic crisis on China's trade in ships is increasing, and the Euro debt crisis has substantially weakened market demand, seriously hindering China's commodity exports including ships and marine equipment. Zhang Shou Chun and Zhang Su Ping report*

Since the outbreak of the international financial crisis, the recovery of the world's major developed countries has been slow and a relatively large amount of uncertainties still exist.

With the slowing of global economic growth and the Euro crisis worsening, a new round of economic depression is highly likely.

The impact of the global economic crisis on China's imports and exports is increasing and the crises in Europe and the US have weakened market demand and hit the exports of China's ships and ship accessories hard.

The development of an import-export trade in ships and ship accessories is closely related to the development of the international shipping and shipbuilding markets. In 2011, the global shipping market demonstrated a declining trend.

Serious problems such as overcapacity and low rates widely existed in the container, dry bulk and oil transport sectors of the global shipping market. It will be difficult to overcome these unfavourable factors including the problems in the shipping sector and the worsening of the world's economy in the short run.

Rongsheng Shipyard along with other Chinese yards is facing severe challenges in the face of a deepening economic crisis

Impact gradually revealed

In 2011, China's ship exports maintained a low growth rate; the total export value reached US$48.11 billion, up 6.6% from the previous year. In the first 11 months in 2011, China's ship and ship accessories export amounted to US$42.11 billion, of which US$39.775 billion came from ship exports and US$2.333 billion came from ship accessories exports.

The 11-month values of ship and ship accessories exports grew year-on-year by 8% and 20.3% respectively in 2011.

Bulk vessels, oil tankers and containerships are the major exported ship types. The value of bulk ship exports is the largest among all ship types, making up more than 55% of the total ship export value.

Asia and Russia are the major export markets of China's ship products. More than 50% of China's ship products flowed to Asian markets, a majority of which were done in the mode of processing trade and the second most popular export mode was general trade.

The volumes of both export modes have grown slightly. In 2011, the slowing of the growth of China's ship and ship accessories exports has on the one hand reflected the weakening demand in the global shipping market, while on the other hand reflected the pressure of rising integrated costs faced by China's ship and ship accessories exports.

Factors that reflect rising integrated costs include increasing labour costs, the appreciation of the Yuan, and rising prices of equipment and raw materials.

Europe is one of the major markets of China's import-export trade, including the trading of ship products. Despite its dreadful economic situation right now, Europe is still an important market for China's ship products. The worsening of the Euro crisis will surely have a serious impact on China's exports and severely damage the bilateral trade between China and Europe.

Europe is the most developed shipping market with the world's major shipowners concentrated on the continent. Hamburg is the largest shipping centre in the world; countries such as Greece and The Netherlands still possess apparent advantages over ship design, shipbuilding technologies, and the technologies and production of ship equipment such as marine diesel engines.

According to the 110th (Autumn) sessions of Canton Fair in 2011, the actual trading volumes of buyers from Europe

Country		Export value	% of total export value	Year-on-year change
Global		3570552.5	-	7.84
Europe		797606.3	22.34	-10.95
European Union		773375.0	21.66	-11.81
15 EU countries		613409.7	17.18	-10.2
12 countries of EU eastwards expansion		159965.3		
1	Liberia	318210.8	8.91	5.94
2	Panama	227804.2	6.38	-17.57
3	Germany	209128.8	5.86	-22.97
4	Republic of the Marshall Islands	146998.0	4.12	-0.48
5	Malta	101398.2	2.84	-14.81
6	Italy	87827.8	2.46	-28.51
7	The Netherlands	82081.1	2.3	41.08
8	Greece	78509.4	2.2	-28.9
9	UK	60476.3	1.69	7.07
10	Norway	59318.6	1.66	26.72
11	Cyprus	54257.4	1.52	-18.74
12	Antigua and Barbuda	53407.5	1.5	-5.41
13	France	37055.9	1.04	-9.34
14	Switzerland	8737.3	0.24	-28.75
15	Bahamas	29069.9	0.81	-37.08
16	Bermuda	17071.8	0.48	156.86
17	Denmark	14783.1	0.41	25.81
18	British Virgin Islands	14493.1	0.41	27.53
19	Portugal	14450.4	0.4	89314.19
20	Belgium	12098.5	0.34	32.96
21	Finland	11935.8	0.33	5258.25
22	Poland	4000.9	0.11	-49.32

Source: General Administration of Customs, China

Table 1: Statistics of ship product exports from China to the EU in January – October 2011 (Unit: US$0,000)

and the US fell 19% and 24% respectively. According to a survey conducted by the China Chamber of Commerce for Import & Export of Machinery & Electronic Products in November 2011, nearly all enterprises that were engaged in the import-export trade of ship and ship accessories said they had felt the impact of the Euro crisis; 37% of the enterprises said they had felt an apparent impact; 60% said they had felt a certain level of impact; 68% said exports to Europe had fallen since the beginning of 2011, of which 21.4% said exports to Europe had fallen by 10-20%.

Since 2011, the Euro crisis has caused the global shipbuilding industry to decline again from a short-term recovery. At present, European shipowners have found it difficult to get finance for shipbuilding from banks. Europe used to place the largest volume of newbuilding orders, however, the decrease in newbuilding orders has affected the recovery of the ship building market and the survival of some shipyards.

Europe is the second largest market of China's ship product exports. The value of ship products exported from China to Europe accounted for at least 20% of the total export value of China's ship products. In the first 10 months of 2011, China exported ship products amounting to US$7.97 billion to the EU market, accounting for 22.3% of the total ship product export value and representing a year-on-year decrease of 11%.

China's ship product exports to the EU that were affected by the debt crisis in that period amounted to US$7.73 billion, accounting for 21.7% of the total ship product export, representing an 11.8% drop.

European countries, including some non-EU states, such as Poland, Switzerland, Greece, Italy and Norway have recorded the largest year-on-year falls. In the first 10 months in 2010 ship exports from China to the EU amounted to US$8.95 billion, up 41.6% year-on-year and accounted for 27.1% of total exports.

In the first 10 months in 2011, ship product exports from China to the EU fell 11.8% overall compared to the same period in the previous year, basically forming a downward trend month by month. During that 10-month period, the biggest year-on-year increases -- 55.2% and 31.8% -- were recorded in March and September respectively; the biggest year-on-year falls – 52.5% and 31.5% -- were recorded in February and June respectively.

Ship export market in search of an exit

The world's economic outlook has been gloomy since the spreading of the Euro crisis. On 1 December 2011, The United Nations stated in an annual economic forecast report that because the Euro crisis may slow global economic development further, it lowered the global economic growth forecast for 2012 to 2.6%, compared to 2.8% in 2011.

The economic outlook in the mature economies will grow at a relatively low level for a longer period of time. The IMF forecasts that, when figures are released, the global economic growth will have slowed to 4% in 2012 from 5% in 2011.

In November 2011, the unemployment rate in the US fell to 8.6% from October's 9%. These figures showed that the US labour market has remained weak and the unemployment rate has been maintained at a relatively high level. If the US and European countries cannot solve their unemployment problems and prevent the financial and debt crisis from worsening further, there will be serious risks to the global economy.

This year is a critical year for the recovery or recession of the global economy. It is estimated that new economies such as China, Brazil and India etc. -- with an average growth rate of 5.4% (in 2011), lower than the 7.1% growth rate in 2010 -- will continue to drive actual economic development.

No.	Month	Export value	% of total export value	Year-on-year change
Total		**773352.2**	**100**	**-11.82**
1	January 2011	79413.2	10.27	-11.22
2	February 2011	44470.8	5.75	-52.19
3	March 2011	119031.4	15.39	55.19
4	April 2011	65673.4	8.49	-0.84
5	May 2011	82027.5	10.61	-30.6
6	June 2011	66571.9	8.61	-31.71
7	July 2011	99575.0	12.88	-12.13
8	August 2011	47204.1	6.1	-31.54
9	September 2011	100448.3	12.99	31.83
10	October 2011	68936.6	8.91	-11.04

Table 2: Statistics of ship product exports from China to the EU in January – October 2011 (Unit: US$0,000)

China, similar to other emerging economies, has been relying on exports to develop its economy in the past 30 years, producing cheap and high-quality necessities for the developed world, and turned itself into a world factory that is using enormous amounts of resources.

In recent years, the volume processing trade has made up more than 90% on average of China's ship product exports. At present, China is losing its competitive advantage because of rising costs.

The unchanging mode of processing trade has narrowed the profit margin of exports and limited the upgrading of product structures. The demand for China's exports has been rapidly shrinking and export growth has been falling quickly as the economies of the US and Europe have remained weak. Exports as a growth driver are losing their edge in China.

In 2012, China's macroeconomic policy has shown "steady development". The GDP growth is expected to be maintained at 8.5%, lower than that in 2009, a year that was affected the most by the international financial crisis.

Inflation is expected to ease. Hit by the Euro crisis, China's ship and ship accessories exports are expected to fall sharply again, the only way to develop steadily is to expand internal demand.

Furthermore, Europe and the US are the major trade partners of China, the continuous appreciation of the Yuan will weaken the competitiveness of Chinese products in the international market, and harm China's ship and ship accessories exports in the future.

The outlook for the global shipping market is not optimistic. As the global economic slowdown may become a long-term phenomenon, external demand shrinks, the development of sectors that rely on exports, including China's shipbuilding industry, will be affected significantly.

In the international shipping market, European shipowners are mostly observing and waiting at this stage. However, they have also shown interest in new ship models that can fulfil new international standards on energy saving, emissions reduction, low fuel consumption, environmental friendliness and new energy for the renewal of their fleets. While shipowners solicited and negotiated in the international ship markets, including China, they continued to suppress pricing. However, as the European banks are busy with their own problems, it has become difficult for shipowners to get financing, and difficult to strike new ship agreements.

Although, the Euro crisis has damaged China's ship product exports to Europe, Europe is still a major market for China. While expanding in other markets, China must still keep an eye on the development of the European market.

In 2012, the healthy growth of China's economy will rely on the stability of imports and exports. There will not be fundamental change to the demand from the US and Europe in 2012 and the pressure of rising production costs are likely to continue.

The situation for China ship and ship accessories exports is challenging. Further expansion in overseas markets will be a major strategy to stabilise exports. The focus in 2012 will be on boosting exports to developing countries, especially to new economies.

Looking forward, it will be difficult to change the internal and external factors affecting China's ship products exports. The outlook of the developed economies is gloomy and the international shipping market is expected to remain weak for a longer period of time. The export of ship products is expected to shrink further. Weak overseas demand is expected to negatively affect the survival of export enterprises.

Regarding the product structure, bulkships, oil tankers and containerships are the three major ship types among China's ship and ship accessories exports. In the first 11 months in 2011, the export value of the three ship types amounted to US$29.765 billion, making up 74.9% of the total value. The value of bulk ship exports amounted to US$22.065 billion, occupying 55.5% of the total.

It is estimated that China's ship export volumes will drop sharply in 2012. The product structure with bulk vessels, tankers and boxships being the major three will continue. The proportion of high-technology and high value-added products – such as large container vessels, ultra large crude carriers, offshore vessels and marine diesel engines etc. – as well as ship accessories and offshore equipment in China's ship product exports will increase gradually.

In terms of market structure, Asia and Europe will still be the major markets for China's ship product exports in 2012. Exports to the Asian market will continue to grow. However, a larger fall is expected to be seen in ship product exports to Europe – the second largest market for China – due to a higher base in 2011 and the continuous impact of the Euro crisis. *NA*

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Zhang Su Ping works at the Technology Research and Economy Development Institute, CSSC

Keeping it steady

The Superyacht Builders Association (SYBAss) has observer status at the IMO, enabling it to monitor and advise in the development of new regulations that may affect the large yacht industry. Chris van Hooren, technical and environmental director of SYBAss explains the latest developments

Significant changes in the design and operation of ships have occurred over recent decades. These changes, and their impact on the intact stability performance of ships, have motivated the development of the so-called second generation intact stability criteria by the IMO Subcommittee on Stability and Load Lines and Fishing Vessel Safety (SLF). The new criteria addresses failure modes not appropriately considered in existing intact stability criteria. Consolidation and testing of various proposed second generation intact stability criteria is now underway with a targeted completion date of 2014. Several SLF delegations have applied proposed requirements to a variety of ship types. All results are being evaluated by an Intersessional SLF Corresponding Group (ISCG) and the way forward will be discussed during the 55th SLF Subcommittee Meeting in February 2013.

This article introduces the agreed structure of the second generation intact stability requirements and briefly describes the vulnerability criteria as proposed at this time. Results of the application of the Level 1 criteria for Pure Loss of Stability and Parametric Roll on a sample of large motoryachts are presented and discussed.

It shall be noted that this article reflects a state of affairs in June 2012. The presented information may change as a result of ongoing developments.

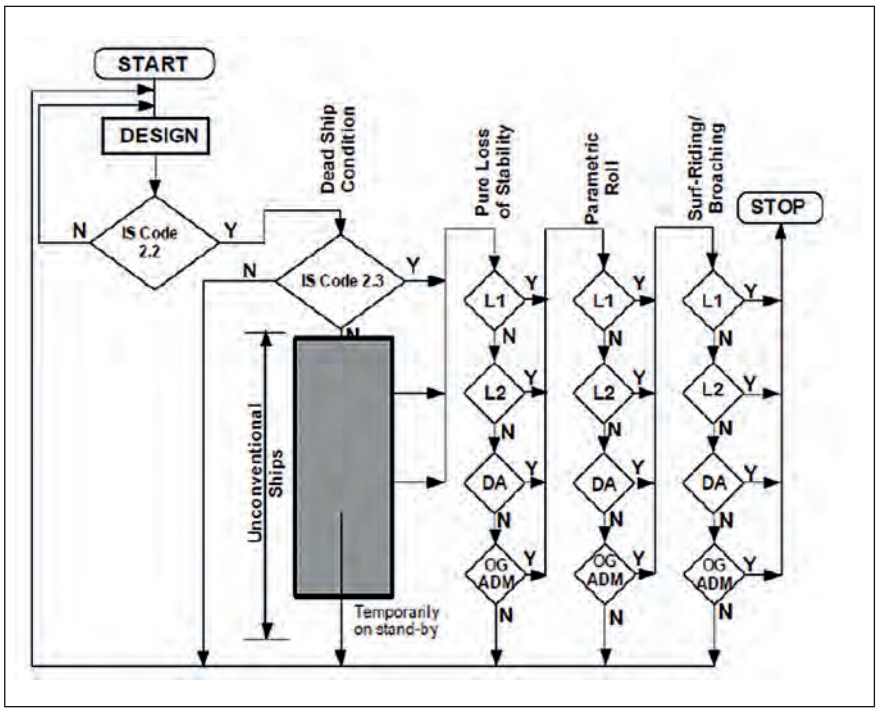

Figure 1: Structure of 2nd generation intact stability requirements, excessive stability not included (Courtesy SLF Delegation of the USA)

Structure of second generation intact stability criteria

Figure 1 describes the current view of the multi-tiered approach to the second generation intact stability criteria.

In this process, the current criteria contained in the International Code on Intact Stability 2008 (2008 IS Code) are applied to all ships covered under IMO instruments. Ships built after 1 July 2010 that also receive SOLAS or International Load Line certificates must meet criteria contained in part A of the 2008 IS Code.

In addition, each ship is also checked for vulnerability to pure loss of stability, parametricroll, surf-riding / broaching and excessive stability, using Level 1 vulnerability criteria (L1). If a possible vulnerability is detected, then the Level 2 criteria (L2) are used, followed by a direct stability assessment (DA), if necessary. For the most part, the Level 1 vulnerability criteria would merely identify ships that might be vulnerable because of hull form, speed, and/or loading condition characteristics. The Level 2 criteria would be more rigorous.

If the direct stability assessment (DA) shows an elevated level of risk for the respective mode of stability failure, then ship specific operational guidance (OG) may be developed, which is subject to the requirements of the flag administration (ADM).

When no vulnerability is detected to any mode of stability failure, or the risk of stability failure is not considered excessive, no additional requirements need be satisfied. The process is repeated for all stability failure modes.

Dead ship condition

The stability hazard posed to a ship when it loses power in heavy seas is referred to as dead ship condition. This was the first mode of stability failure addressed with a physically-based criterion, also known as the weather criterion.

A more detailed description of the weather criterion can be found in section 2.3 of the 2008 IS Code. The SLF Subcommittee has noted, however, that the weather criterion

should be revisited in the future, as it is almost 50 years old and less suitable for some more recent ship types. Recognising this fact, MSC.1/Circ.1200, "Interim guidelines for alternative assessment of the weather criterion", contains a specification of the limitations of applicability of the current weather criterion.

Pure loss of stability

The upper parts of a ship's bow and stern section are usually wide due to bow flare and wide transom. As a result, the submerged part of the hull varies when the ship is sailing through longitudinal waves and the resulting stability variation may result in stability failure caused by pure loss of stability. This is a single wave event.

A Level 1 criterion for pure loss of stability was accepted during the 54th SLF Subcommittee meeting in January 2012. However, some pending matters were to be resolved by the ISCG. Such matters are marked below by text in [square brackets].

The Level 1 vulnerability criterion for pure loss of stability should be applied only if the service speed Froude number exceeds [a standard determined, between 0.2~0.31].

For a given loading condition, a ship is considered vulnerable to pure loss of stability if:

$GM_{min} < [r]$

where:

GM_{min} is the minimum occurring value of the metacentric height when the ship is sailing through longitudinal waves, obtained by direct GM calculation;

[r=0.05 with allowance for heeling moment depending on Froude Number].

For ships without a tumblehome hull form, GM_{min} can be estimated using the following approximate formula:

$$GM_{min} = KB(d) + I_L/V(d) - KG \quad (1)$$

where:

d is the draught of the considered loading condition;

$KB(d)$ is centre of buoyancy above base;

I_L is a moment of inertia of the level water plane at a lower draft d_L;

d_L is determined as $d_L = d - \delta d_L$;

[δd_L is determined as δdL = Min(0.75d,L. S_W/2)];

[S_W is reference wave steepness determined as $S_W=f_1(L)$];

$V(d)$ is the displacement volume at draught d;

KG is height of centre of gravity above base.

Parametric roll

The variation of stability in waves, as described for pure loss of stability, is also the physical basis for another mode of stability failure: parametric roll. However, parametric roll is a multi-wave event and the resulting periodic stability variations may result in the development of parametric roll resonance.

A Level 1 criterion for parametric roll was accepted during the 54th SLF Subcommittee meeting. However, some pending matters were to be resolved by the ISCG. Such matters are marked below by text in [square brackets].

For a given loading condition, a ship is considered vulnerable to parametric roll if:

$\Delta GM / GM \geq$ [[0.5] or [0.34 with allowance for bilge keels]]

where:

ΔGM is the amplitude of occurring metacentric height variation when the ship is sailing through longitudinal waves, obtained by direct GM calculation;

GM is the metacentric height calculated in calm water.

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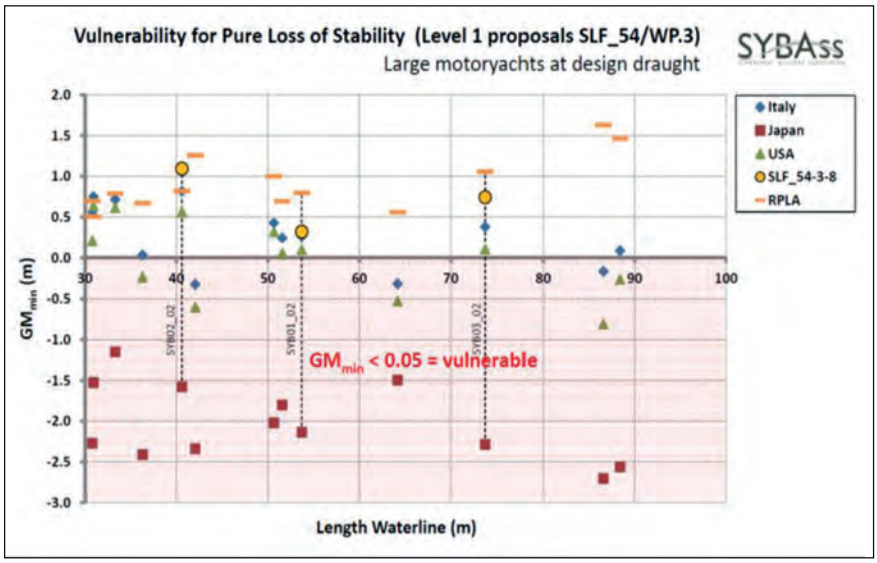

Figure 2

For ships without a tumblehome hull form, ΔGM can be estimated with the following approximate formula:

$\Delta GM = \{ I_U - I_L \} / \{ 2.V(d) \}$ (2) where:

I_U and I_L are the moments of inertia of the flat water plane at an upper draught (d_U) and a lower draught (d_L), where d_U and d_L are defined as:

$d_U = d + \delta d_U$ [δd_U is determined as $\delta d_U = Min(D-d, L.S_W/2)$];

$d_L = d - \delta d_L$ [δd_L is determined as $\delta d_L = Min(0.75d, L.S_W/2)$];

d is the draught of the considered loading condition;

D is the depth to the freeboard deck;

[S_W is reference wave steepness determined as $S_W = f_2(L)$];

$V(d)$ is the displacement volume of the considered loading condition.

Surf-riding / broaching

Broaching is a violent and uncontrollable turn that occurs despite maximum steering efforts to maintain course. It is accompanied with a large heel angle, which has the potential effect of causing partial or total stability failure. Broaching is usually preceded by surf-riding which occurs when a wave, approaching from the stern, "captures" a ship and accelerates the ship to the speed of the wave. Surf-riding is a single wave event in which the wave profile does not vary relative to the ship.

During the 53rd SLF Subcommittee meeting in January 2011, it was agreed that a ship is possibly vulnerable to surf-riding if its waterline length is less than 200m and the Froude number corresponding to design speed in calm water is more than 0.3. If a ship is found vulnerable to surf-riding according to the above conditions, the operational guidance relating to surf-riding contained in MSC.1/Circ.1228 would be invoked. If this is not practical, the Level 2 criterion for surf-riding must be evaluated.

Excessive stability

In Part B (recommendations) of the 2008 IS Code, IMO recognised the potential hazards caused by excessive stability: "It is advisable to avoid excessive values of metacentric height, as these might lead to acceleration forces which could be prejudicial to the ship, its complement, its equipment and to safe carriage of cargo". The second generation intact stability requirements will make criteria on excessive stability mandatory.

At this time China and Germany have proposed Level 1 criteria for excessive stability. A consolidated criterion probably will be established during the 55th SLF Subcommittee meeting.

Level 1 criteria applied to superyachts

Motoryachts with a length over all between approximately 40m and 100m, a gross tonnage of between 500 and 3,000GT, and carrying 12 or fewer passengers, are often referred to as superyachts. Yachts in this size bracket generally comply with the requirements of the SOLAS-equivalent legislation issued by the UK Maritime and Coastguard Agency (i.e. The Large Commercial Yacht Code).

Superyachts are generally characterised by fine hull lines, high breadth to draught ratio's, voluminous topsides with excess freeboard and relatively high design speeds. As such, their hull form differs considerably from most merchant vessels.

A total number of thirteen contemporary superyachts, designed and built by various SYBAss members, was selected for testing the draft vulnerability Level 1 criteria for

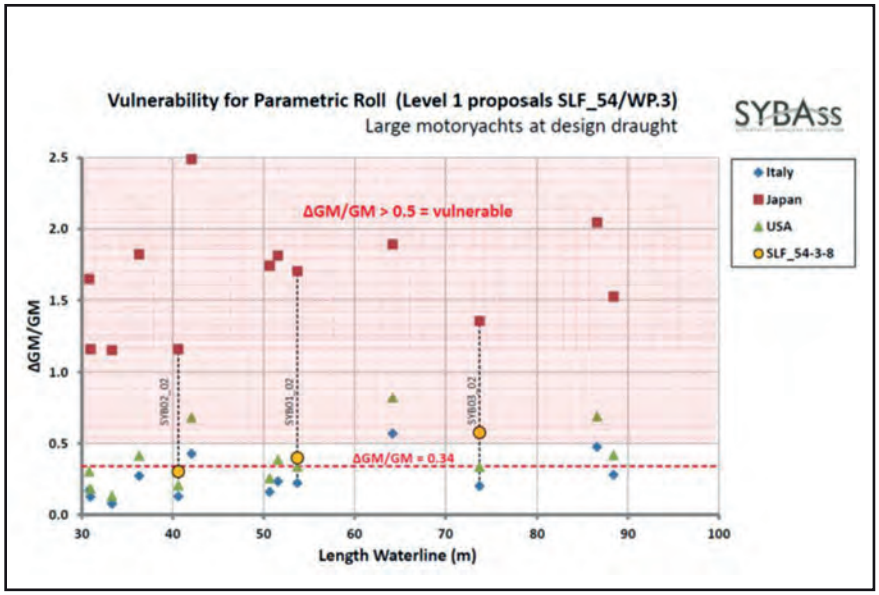

Figure 3

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pure loss of stability and parametric roll. None of the vessels has a tumblehome hull form. Calculations are performed for even keel design draught only and 'solid' GM values have been considered (no free surface corrections applied).

Results

Vulnerability for pure loss of stability is to be investigated for all vessels in the sample since their Froude numbers are in excess of 0.3. The results of the Level 1 analysis are presented graphically in figure 2 where GM_{min} values are plotted against the waterline length of the vessels.

The data series indicated by 'Italy', 'Japan' and 'USA' represent estimated values of GM_{min} according to equation (1) when applying the various wave steepnesses $S_W=f_1(L)$ as proposed to the ISCG by Italy, Japan and the USA. The three data points indicated by SLF_54-3-8 represent the GM_{min} values as derived by direct GM calculation.

The big difference in the estimated GM_{min} values based on the Italian and USA wave proposals on the one hand, and the Japanese wave proposal on the other hand is striking. The results derived by direct GM calculations seem to agree well with estimated GM_{min} values based on the wave steepnesses as proposed by Italy and the USA.

The area marked in red represents $GM_{min}<0.05$, the proposed vulnerability standard for Pure Loss of Stability without allowance for F_n dependent heeling moments. The data points indicated by RPLA represent for each vessel a vulnerability standard including allowance for F_n dependent heeling moments as proposed to the ISCG by Japan: [$GM_{min} < R_{PLA}$, where $R_{PLA} = 1.83*F_n^2*d$].

Based on the estimated GMmin values when tested for the vulnerability standard without allowance for F_n dependent heeling moments ($GM_{min}<0.05$), all vessels are found vulnerable when using the Japanese wave proposal, whilst the Italian wave proposal results in three out of 13 vessels, and the USA wave proposal in five out of 13 vessels being vulnerable for pure loss of stability.

Noteworthy is the high level of the required GM_{min} values according to the above proposed R_{PLA} standard. When tested against this standard, most vessels are to be considered vulnerable for pure loss of stability for all three proposed wave steepnesses.

Parametric roll - results

The results of the Level 1 analysis for parametric roll are presented graphically in figure 3 where ΔGM/GM values are plotted against the waterline length of the vessels.

The data series indicated by 'Italy', 'Japan' and 'USA' represent estimated values of ΔGM/GM according to equation (2) when applying the various wave steepness $S_W=f_2(L)$ as proposed to the ISCG by Italy, Japan and the USA. The three data points indicated by SLF_54-3-8 represent the ΔGM/GM values as derived by direct GM calculation.

Analogous to pure loss of stability, there is a big difference in the estimated ΔGM/GM values for parametric roll based on the Italian and USA wave proposals on the one hand, and the Japanese wave proposal on the other. Here too, results derived with direct GM calculations seem to agree well with the estimated ΔGM/GM values based on the wave steepnesses as proposed by Italy and the USA.

The area marked in red represents ΔGM/GM>0.5, the vulnerability standard proposed for parametric roll.

Japan has proposed to the ISCG an alternative standard not allowing a Level 1 assessment of parametric roll in case the relative area of bilge keels, $a_{bk} = 100*A_{BK}/(L.B)$, is less than a limit value depending on the midship section coefficient. The relative bilge keel area of all yachts of this sample largely exceed the bilge keel limit value, and in that case the Level 1 standard ΔGM/GM>0.34 should be applied. The red dotted line in figure 3 marks this standard.

Based on the estimated ΔGM/GM values when tested for the vulnerability standard ΔGM/GM>0.5, all vessels are found vulnerable for parametric roll when using the Japanese wave proposal. The Italian wave proposal results in one out of 13 vessels, and the USA wave proposal in three out of 13 vessels considered vulnerable for parametric roll. When applying the ΔGM/GM>0.34 standard, the number of vessels considered vulnerable increases by approximately 15%.

Observations

Following observations are of interest for the superyachts of the sample considered in this article, but perhaps also for merchant vessels with comparable characteristics.

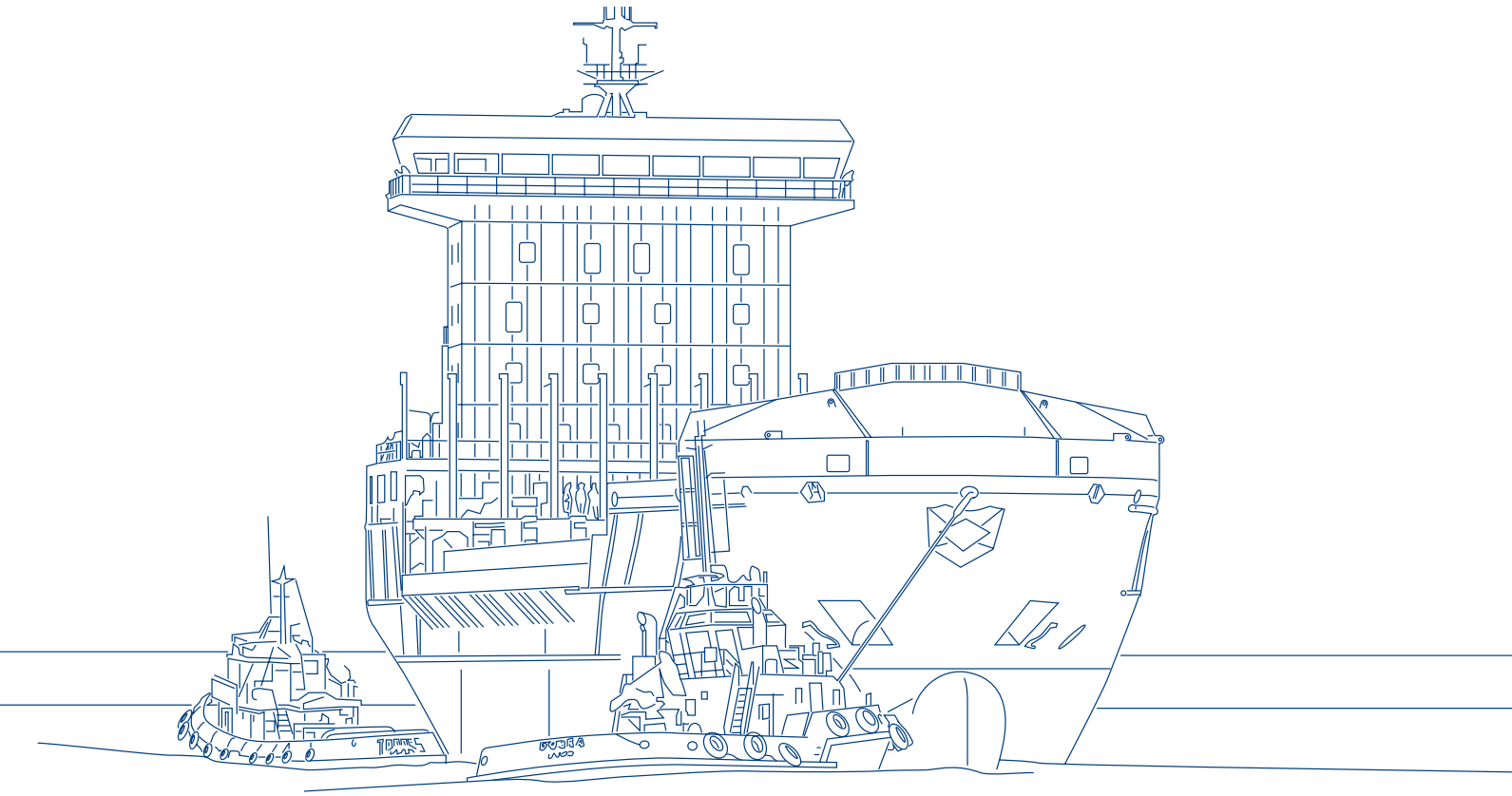
SYBAss believes that the Level 1 methodologies should be sufficiently simple for application in preliminary design optimisation by in-house naval architects using their standard naval architecture software. This is especially important in tender stages when time is limited and little design information is available. Commissioning work to expert institutes would then be impracticable in connection with confidentiality, availability, turnaround time and cost. The current Level 1 methodologies for pure loss of stability and parametric roll seem to meet a desired degree of simplicity.

However, the Level 1 results should also be sufficiently accurate to be consistent with existing operational experience, including known accidents, and to avoid too dramatic design changes in the detailed design stages. In addition, applying overly conservative methodologies in preliminary design optimisation could lead to designs with unrealistic high GM values, there by causing conflicts with other criteria such as excessive stability.

The results of pure loss of stability analysis based on the wave proposals by Italy and the USA seem to yield an acceptable degree of accuracy when testing the vulnerability on the basis of the proposed GM_{min} standard excluding an allowance for the F_n dependent heeling moment.

The results of parametric roll analysis based on the wave proposals by Italy and the USA also seem to yield an acceptable degree of accuracy when testing the vulnerability by applying the proposed ΔGM/GM standard without allowance for bilge keels. *NA*

SENER



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Innovation is better with international FORAN

SENER Ingenieria y Sistemas held their 7th FORAN Users Meeting (FORUM 2012) in Toledo in early June. These meetings, held every other year, up-date users on the latest, and planned, developments of FORAN, and provide an opportunity for users to exchange experiences, writes Eric Tupper.

Opening the FORAN conference Jorge Sendagorta, the president of SENER, assured those present of SENER's financial stability in spite of current global problems. 2011 saw an overall growth of about 9% which, although less than the previous year, was good in the circumstances.

In FORAN the strategy of combining innovation with international development and investment in the future, has been shown to be right.

The first technical presentation was by Jesus Panadero, dean of the Polytechnic University of Madrid, on geometry and the human mind. Geometry allows the human brain and the computer to work and create in new ways. It can identify shapes and their relationships to each other. The mind perceives then relates this to, and enhances, current knowledge.

The new knowledge becomes part of experience and this can be passed on to others. Geometry helps to provide graphical representation of functions aiding retention and communication.

Next, Alfonso Olmos (NAVANTIA) described the use of FVIEWER in a virtual reality environment. First he described the use made of FORAN in the design of the new S-80 AIP submarine of 2,400tonnes and a length of 71m. The main software used has been FORAN V60R3.0 but they will be using V70R1.0 by the end of the year.

Currently the 3D model is complete, fabrication drawings 98% and ship build 60% complete. To improve the passing of data on configuration to the workforce it was decided to upgrade the previous VR Room.

During the conference two virtual reality rooms demonstrated the outcome of collaboration between SENER and Ingevideo. One, holding up to 20 people, had a 6.5 by 3.9m rear projection screen, active 3D stereo and ultrasonic tracking system. The other used a helmet type projection device for individual use with optical tracking and gyroscope, creating a complete 3D model immersion sensation. The helmet used HD graphics and was rather heavy, but this is a matter of balance between weight and picture quality.

Jorge Sendagorta, president, Sener assured those gathered at the Foran conference of Sener's financial stability

Jim McLauchlan (BAE Systems Maritime Naval Ships) outlined the use of FORAN for the Queen Elizabeth Class (QEC) Aircraft Carrier, the Type 26 Frigate and Type 45 Destroyer. Whilst V60R3.0 will be used still for the carrier the Type 26 is likely to be using V70R1.0 by the end of the year.

The QEC project involves many sites in design and build and the multi-site capability of FORAN has been invaluable. Lessons learnt are being applied in the Type 26 and the FORAN 3D model is being used for the initial design phase and discussions with the naval users. The Type 45, defined with the legacy CAD tool CADDS5, has been used to test the practicability in FORAN to perform a data translation starting from the legacy geometric model.

Augusto Gomez (SENER) discussed the improvements to the design and generation of reports being built into V70R2.0 (due to be released November 2012). The existing reporting tools are being replaced by FREPD and FREPG. FREPD configures the report including graphic aspects. It is based on a third party tool, NCReports (by HELTA-NociSoft) which has been integrated into FORAN. No new licences will be needed by the users. FREPG provides report preview, print and export to PDF, SVG, FDS, MsOffice (docx), OpenDoc (odt). Outputs from naval architectural calculations will be able to use spreadsheets.

Mariusz Jakubiniec (Stogda Ship design and Engineering) explained that his company is a private Polish design office with 60 workstations. Activities include shipbuilding, and offshore. FORAN was first used in 1999; now use V70 for hydrostatics, hull and piping model, section and 3D drawings and nesting. The marine market is very competitive and using FORTRAN shortens the design period, enables an early start on assembly and lowers building costs.

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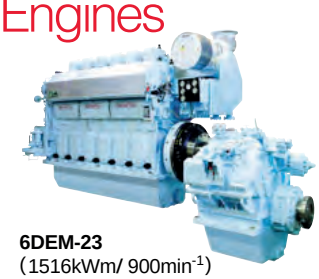

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Colin Sear and Paul Moscrop (BAE Systems Maritime Submarines) explained that BAESS is the design/technical authority for the 7 Astute Class submarines and the industry lead for the design of a new generation of submarines to carry the UK's nuclear deterrent. This Trident successor is to be on patrol by 2028 with a planned date for starting construction of 2016. The concept stage is complete and in May BAE Systems was awarded the design contract based on the selected option. FORAN's role in this project is to integrate the design process with Product Lifecycle Management (PLM) software, improve CAD/Visualisation, graphical data exchange and electrical cable management (auto-routeing of electrics is being investigated). There will be some 1.5 million components and some 2,000 users, in various locations, will need access to the data.

Rakesh Roy of the Vedam Design and Technology Consultancy, India, noted that due to the cyclical nature of ship design, more design work is being contracted out by shipyards. One project may involve several agencies and each agency may interact with several projects. Interacting with different shipyards and suppliers with different internal systems requires an Integrated Document Management Tool (IDMT) and Vedam have created this as a simplified version of PLM. IDMT is an intelligent tool to handle documents, data, information, notes and revisions, operating smoothly across the involved parties and integrated with the design tools used without burdening the design team. The FORAN 3D model will provide the base line design with production drawings as an output.

Carlos Gonzalez (SENER) said V70R2.0 is to include a new module FNEST including multi windows, automatic cutting sequence and fully customisable labelling. The new version removes all the previous limits on maximum number of parts, bridges, text and cutting path length. Whilst the initial release will cover plate nesting only, later versions will have profile, panel and strip nesting.

Norberto Fiorentino (SENER- Argentina) described how FORAN had been used in the repair (following a major fire in 2006/7) and modernisation of the icebreaker, *ARA Almirante Irizar*. This ship is nearly 15,000 tonnes displacement with a length overall of nearly 120m. It is an icon for the Argentinian people. Laser scanning of the existing ship was used with results exported to FORAN using a specially developed tool, keeping survey time to a minimum. The scanning provided the ship configuration with positions of pipes and cables etc. Other details on material and so on were input. The removal of damaged material and the rebuilding was carried out afloat. This required constant monitoring of strength and stability.

Virginia Marcos (SENER) explained the new features being built into FCABLE. Basically these are visual assistance, using colour coding, to aid cable routeing, virtual routeing to speed up the routeing process and automation of calculations on electrical balance and the sizing of generators.

Sergey Tolstoguzov (Design Group Ricochet, St. Petersburg) said that his company had completed 17 projects using FORAN since 2002. V70R1.0 is used on new work. He described the design of a replica of Peter the Great's battleship *Goto Predestinatzia* (1702) being built as a museum ship. LOA is 36m and beam 9.5m.

The ship is to be classed by the Russian River Registry and to meet modern requirements the hull will be in steel (superstructure and masts in wood) and steel ropes will be used. FORAN is being used for the hull and superstructure forms, 3D modelling of the hull's structure, special steel forced frames modelling, workshop drawings, together with nesting and cutting files. There was one problem, they could not create NC programs for an adze!

Jim McLauchlan spoke about the use of FORAN for warships

Guangwu Liu (SENER) described a new integrated module for naval architectural calculations (FBASIC) for use in early design stages. It will include hydrostatics, cross curves, tonnage and freeboard, loading conditions, longitudinal strength and intact stability, manoeuvring and seakeeping. In stability, for instance, user or standard (eg. IMO or naval) stability criteria can be used. Not all the advances planned will be available in V70R2.0 but will be incorporated later. Reports can be in various formats including EXCEL and WORD.

Antonio Valderrama (SENER) said that a new module FSYSD, available in a few months, will replace three older modules related to diagrams. FSYSD is completely new, working in a new 2D environment and with an intuitive use interface, but providing easy transition from existing legacy data. It will provide bi-directional information flow between 2D diagrams and the 3D model and be integrated with FDEFIN and FCABLE.

Anwarul Azeem (Drydocks World – Dubai) described how his company had customised FORAN's FREPORT to create a series of reports to meet their specific needs and for use in related systems.

Then Rafael de Gongora (SENER) reviewed the challenges facing FORAN and the way they are being tackled. Shipbuilding is increasingly competitive and globalised so that improvements in processes, in cost savings and overall productivity are very important. SENER must keep pace with the developments in ship design (the need for cleaner ships and changes in IMO regulations), ship construction (automation of processes and use of robotics) and in IT software and hardware. There is a need to foresee what the future holds – whilst some changes may not be economic today they may become so tomorrow. As a measure of SENER's commitment the investment in FORAN has doubled between 2006 and 2012. Many changes will be introduced in V70R2.0 due to be launched in November 2012 but improvement is a continuous feature of FORAN.

Luis Garcia (SENER) gave the closing speech. With fewer contracts from the domestic market, SENER is expanding internationally with new companies in the Far East. Over the next few years efforts in FORAN will concentrate on concept and initial design and on technologically complex ships.

He thanked those present for helping to make FORUM 2012 such a success. He felt heartened by the attendance in spite of the general economic environment. It was with some sadness that he announced his intention to retire in just over a year's time so that he could devote more time to his family.

Fourteen countries were represented by some 92 delegates and speakers. The meeting showed how FORAN is developing in response to the needs of its customers and the industry. *NA*

Brazil finds its niche

Brazil stated to be the next big thing in the industry has looked to tailor made designs for its come back to the shipbuilding industry

Despite the large amount of bulk cargoes exported by Brazil the return of the Brazilian shipbuilding to the bulk carrier market is still modest and the order book is composed of vessels mainly dedicated to the Brazilian cabotage market.

Today, the market for newbuildings in Brazil has started to improve following a long fallow period. Orders are now being the driven by the cabotage market which needs dedicated vessels. Two projects mentioned below have entered a specific Brazilian niche market for tailor made ships specially designed to fulfil requirements established to optimise sailing and port operations along the Brazilian coast and navigatable rivers that are part of the Brazilian trade routes.

The bulk carrier sector is one part in the niche market for tailor made ships that is growing, effectively surfing on the new economic wave generated by new demand in the market.

Currently, the order book is composed of two 80,100dwt bauxite carriers to be constructed at EISA shipyard and two 81,000dwt Kamsarmax bulk carriers at Rionave shipyard. PROJEMAR is responsible for the design of these two ships that will soon be on the market.

The first project will see the first in the series of two 80,100dwt bauxite carriers that is of a tailor made design for owner, LOG-IN, to operate on a fix trade between the Trombetas port and the port of Vila do Conde, where the aluminium factory is located. The route that these ships will take will start with the loading of them at the Trombetas port, located on the Trombetas River, north of the Amazon River. Operators sailing the narrow river know it as the 'monkey route' because of good manoeuvring characteristics have been a mandatory design premise for safe navigation of the route.

The first vessel is scheduled for delivery in the third quarter of 2012. The ship design concept includes many features specific to operational conditions and has been developed taking into account the characteristics of the Northern Brazilian ports, particularly with regard to length, draught and beam restrictions as with manoeuvrability in narrow rivers with sandbanks.

Due to the requirements of optimal performance at the ports, the cargo holds structure design and the ballast system design allows for optimised loading and unloading sequences in single-pour/single-pass operations. Intended to navigate in areas where the environment is very sensitive, the ship design also incorporates green aspects like the use of water lubricated stern tubes and double-hulled oil tanks.

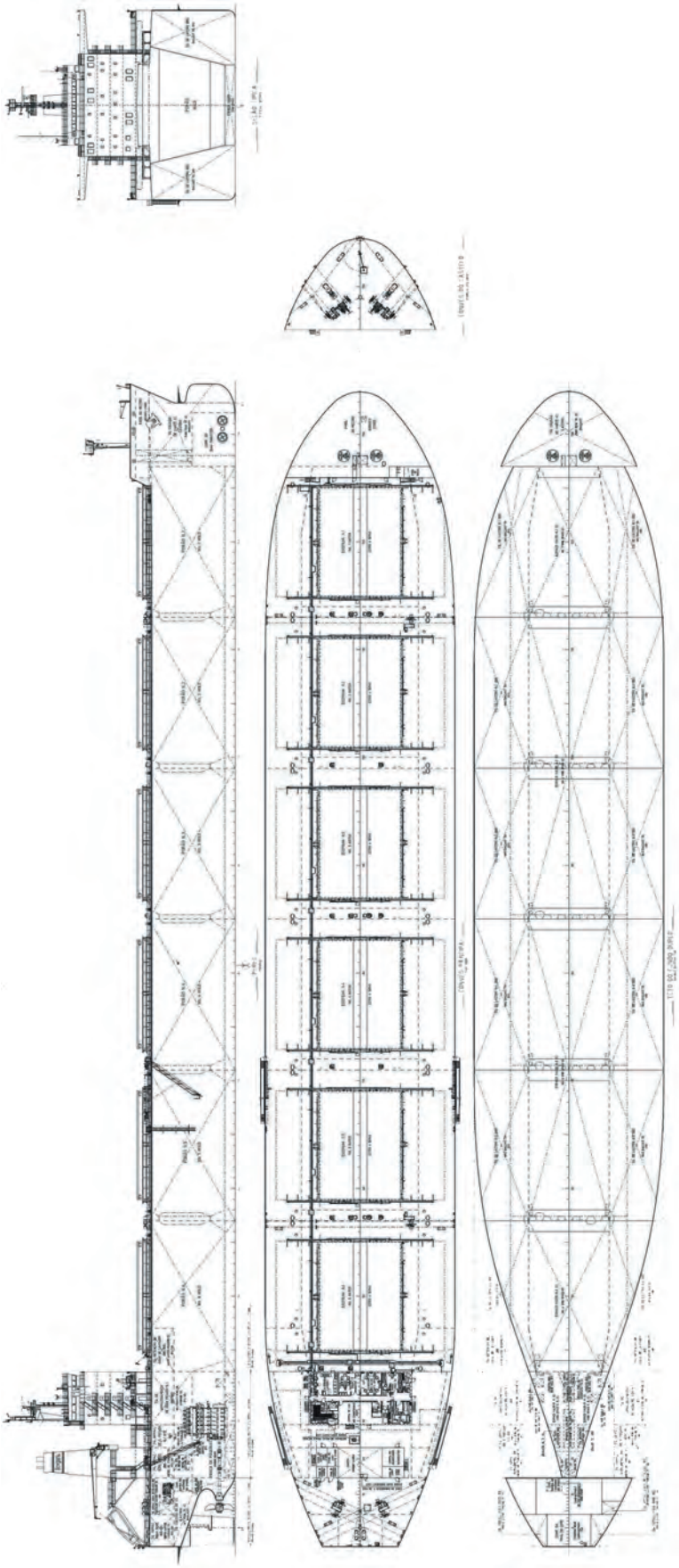
The ships are fitted with two inclined longitudinal bulkheads and five transverse corrugated bulkheads with upper and lower stools, dividing the cargo region in six cargo holds and six pairs of wing ballast tanks. The cargo holds are fitted with hydraulically operated side-rolling hatch covers of two panels each and strengthened for regular discharge by heavy grabs. The propulsion installed is arranged with a two stroke main engine of 9960kW x 124rpm direct coupled to a controllable pitch propeller, giving a service speed of 14knots at 90% MCR. In order to allow good manoeuvrability on the rivers and restricted manouevring basins, the vessels are equipped with a high lift rudder and two bow thrusters, with the electrical supply from four 520kW diesel generators.

The second project will see a series of two 81,000dwt Kamsarmax bulk carriers designed for the Brazilian owner ELCANO and constructed at Rionave Shipyard to operate on the cabotage market. Following a market strategy defined by the owner, this vessel has a concept of a typical Kamsarmax bulk carrier, where some additional features specific to the operational conditions of the Northern Brazilian ports have been incorporated, particularly those related to manoeuvrability in narrow rivers.

The ships will be fitted with six transverse corrugated bulk heads with upper and lower wing ballast tanks. Cargo holds are fitted with hydraulically operated side-rolling hatch covers of two panels each and strengthened for regular discharge by heavy grabs. The propulsion installation is arranged with two stroke main engine of 11100kW x 105rpm directly coupled to a high efficiency fixed pitch propeller, giving a service speed of 14knots at 85% MCR when considering 15% sea margin. In order to allow for good manoeuvrability on the rivers, the vessels will be equipped with a high lift rudder. Electrical supply is provided by three 550kW diesel generators. *NA*

Brazil's bulk carrier market boosts local yard demand

GA Plan of the 81,000dwt Kamsarmax bulk carriers constructed at Rionave Shipyard



Japanese yards bid to buck economic trend

Medium-sized Japanese yards are employing a variety of strategies to help them compete with cheaper foreign shipbuilders. The high value Yen and the EU crisis may offer a rip tide for the Japanese yards to swim against yet most believe they *can* compete. *The Naval Architec*t reviews their strategies

In the cold light of day the economic indicators for the Japanese shipbuilding industry are not favourable. All the yards that responded to questions from *The Naval Architect* agreed that the strong Yen meant that their vessels were too expensive to compete with Korean and Chinese shipbuilders.

Class society ClassNK outlined the problems facing Japanese yards and succinctly outlines the various strategies that yards are using to overcome the problems.

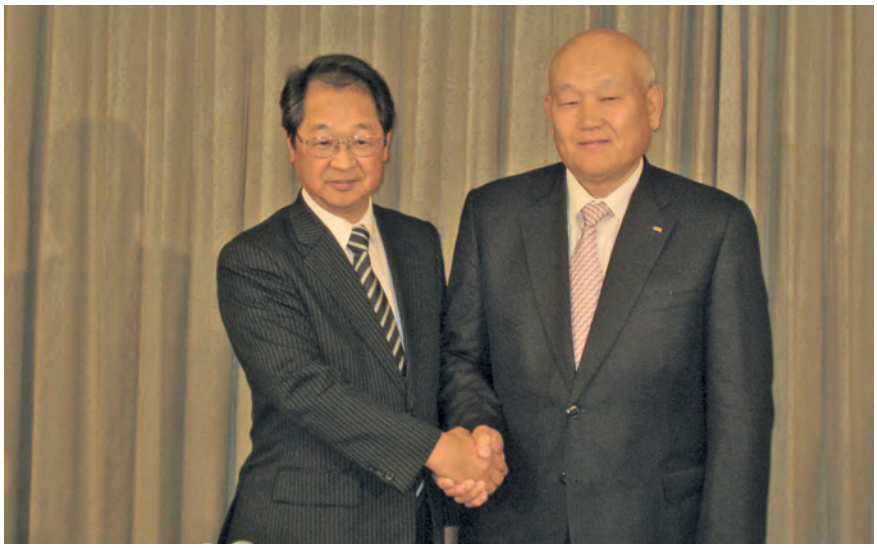
"Japanese shipbuilding is in a very difficult position right now, not only because of the stagnant market, but also because of the incredibly strong Yen. In order to survive the current crisis, Japanese shipbuilders are exploring a number of different strategies including both mergers and expansion overseas, and I think we will continue to see more such efforts in the medium term," says ClassNK executive vice president Shosuke Kakubari.

The class society, however, pointed out that, "While their strategies may differ, Japanese shipbuilders continue to place a great emphasis on developing and maintaining technical expertise, and as Japanese yards continue to produce revolutionary technology and ship designs, I think that Japan will continue to produce a large share of the world's ships for many years to come."

Effectively ClassNK reveal the three key strategies being employed by Japan's maritime industry that will see the country's industry challenge its far cheaper competitors; namely merger, overseas expansion and innovation.

One of the most high profile examples of the strategies outlined by ClassNK is the merger between IHI and Universal, which is due to take place in October.

According to a statement released in January this year the two shareholders of IHI and Universal believe the merger is necessary in order for yards in Japan to compete with Chinese and Korean shipbuilders.



Presidents Mishima (on the left) and Kurahara shake on a deal that will see the merger of their respective companies Universal Shipbuilding and IHI Marine United

The statement said: "During this examination, a review of the assumptions supporting the creation of the new company became increasingly needed because the business environment surrounding the shipbuilding business has changed considerably as a result of the financial crisis triggered by the Lehman Shock [*sic*]. Consequently, our examination took longer than initially expected."

As a result of the subsequent economic crisis the shipbuilding industry is experiencing, "a severe business environment". The statement said as a result a "large demand-supply gap on a global basis" existed and that "substantial capacity expansion of Chinese shipyards and a sharp decline in global demand for new ships, as well as the excessive appreciation of the Japanese Yen below 80 to the US dollar," had severely impacted on Japanese yards.

Consolidation of IHI and Universal is recognition that integration is "necessary for the shipbuilding industry in Japan to continue business under hard competition for orders with Korean and Chinese shipyards".

Merger terms are still being evaluated, although, much of the merger deal has been agreed already.

For example the senior positions in the new company, Japan Marine United (JMU) have been shared by IHI and Universal. IHI president Shigemi Kurahara will be JMU's Chairman, while the Universal president Shinjiro Mishima will be JMU's president. A further two auditor positions and four directorships of JMU will be shared between IHI and Universal.

Even though some of the details of the merger have yet to be finalised the date for the formal merger of the companies is 1 October 2012, if shareholders approve the deal at a meeting planned for 30 September.

Should the deal be approved JFE Holdings, parent of Universal, and IHI will each hold a 45.93% share in JMU, while Hitachi Zosen, which currently holds a 15.07% share of Universal, will hold 8.15% of the newly merged entity.

The IHI and Universal merger is a classic example of the strategies being employed by Japan's medium sized yards to see their way through the economic crisis. One yard, Oshima, however, is not adhering to the standard strategies available.

Oshima Shipyard, while looking at overseas expansion and innovation, has also taken the far riskier route of maintaining market share through the recession even if it means building ships at a loss. "Our strategy is to maintain our orderbook, but we will be producing at a loss," explained Shigehiro Mori, naval architect and general manager at Oshima.

Mori went on say: "Our biggest fear is no jobs. If we have jobs we can manage we believe."

In fact Oshima's strategy of maintaining its market share is only one element of a three-pronged strategy for the future, the other elements for moving forward include cutting costs and investing abroad. The yard has obtained a permit to operate a yard in Vietnam and "we expect to be in Vietnam within the next five years," explained Mori.

Shipbuilding prices are too low at the moment for Oshima to invest overseas, so the company will wait until the market sees an improvement, though Mori says that the yard will likely start with building bulk carriers in Vietnam, "though this is not yet decided", he says, adding that the "Vietnam yard is a very sensitive issue," due to the fears in Japan of job losses.

Mori, however, moved to allay these fears by saying: "The Japan yard is operating at capacity at the moment."

Cutting costs was the third element to the overall Oshima strategy and to achieve lower costs the yard is looking to buy maritime equipment at lower prices by importing it from South Korea. "We buy some equipment from Korea to compensate for our currency losses," explained Mori.

The strength of the Yen has proved to be a hindrance to Japanese yards and many have taken the politically sensitive step of buying some equipment from abroad. For Oshima this could mean buying generator engines, ladders and other equipment.

The Korean Marine Equipment Manufacturers Association (KOMEA) told *The Naval Architect* that with Korea's major yards switching up to 65% of its capacity to offshore projects its members had been looking for other markets and it was increasing its exports to Japan.

Although Japanese yards are reluctant to talk about the foreign sourcing of maritime equipment, they do tentatively admit to succumbing to the lure of cheaper imports, but usually add that they are encouraging Japanese suppliers to compete with the Korean and Chinese imports by reducing their costs.

Naoki Ueda, deputy general manager, ship & ocean engineering division at Mitsubishi Heavy Industries (MHI), conceded that this was a very politically sensitive and highly charged issue, but he did concede that MHI had "looked" at Korean and Chinese equipment imports. Though Ueda added: "We are looking to promote Japanese suppliers and we are encouraging them to move into markets that use higher technology such as cruise and LNG shipping."

Even so the dearth of orders in Japan has seen MHI switch production at its Kobe yard to nuclear power for example.

Imabari president Yukito Higaki holds a similar view to Ueda, but says that if the cost

of labour in Japan is higher, Japan can still compete through improved productivity. "If Japanese materials costs can be the same [as the Koreans'] then we will be alright," he says.

Higaki also admitted to buying some minor Korean materials, anchor chains and some steel, but says that Imabari's strategy is to maintain high quality and not to compete on price. "We do not intend to enter a battle for the lowest price," Higaki underscored Imabari's strategy.

Imabari has three years' worth of work on 250-260 ships currently on its orderbook with the majority of these vessels having been ordered prior to the collapse in prices in 2010. In 2011, the yard took 40 repeat orders, but in 2012 it has only had 15 new orders to date. Some 80% of Imabari's orders are from domestic owners, but 50% will be who will chartered by foreign owners.

In contrast Oshima, which says it delivers three ships per month and so needs around 40 orders a year to maintain its orderbook, which currently stands at 110 ships, with 20 new orders this year.

Oshima also suffers from limited space at its yard, building more complex ships would take longer and so the yard only produces its own designs of bulk carriers, including its latest design for the Wood Chip/Lite Bulk Carrier 70,000dwt design.

Imabari differs from Oshima in a number of other ways; the yard has 11 berths with eight factories within the group and these factories compete internally to offer the best prices for marine equipment.

Higaki's view is that it is important to use the technological advantages that Japan has established to compensate for the higher cost of production in Japan. "We have the technical staff to create new technology," he insisted.

Implying not only that Imabari can deliver superior technology, but that Japan's designers as a whole could deliver vessels that would be fuel efficient and affordable.

"Mitsui is developing the first low speed gas engine, Mitsubishi Heavy Industries [MHI] has developed a LNG system and new ship designs can reduce conventional fuel consumption from 120tonnes/day to 102tonnes/day," says Higaki.

He added that Imabari will start to produce new fuel efficient bulk carrier designs next year. "The trend is to run ships at a lower speed to save fuel, using electronic [injection] control, with slower speed comes the derating of engines and bigger propellers," he explained.

MHI and Imabari have also cooperated on the design of container ships and the companies are negotiating jointly for a 10-12 vessel container ship order, with the yards aiming to produce six of the ships each, though Higaki would not be drawn on which owner and the details of the order.

However, he did hint at some changes that would be made to the vessel designs: "When container ship speeds are changed, the shape [of the ship] also changes. The standard is changing to 18knots so the shape can be wider, increasing the stability which means the container stacks can be higher increasing the cargo load and producing an energy saving of 20%," says Higaki.

Imabari is also using MHI's air lubrication system, the Mitsubishi Air Lubrication System or MALS, for larger vessels. "We have our own air lubrication system, but this is better for shallow draught ships, small ships with a draught of around 10m, we have a certified net energy saving of 5% with our system," explains Higaki.

He went on to say that larger vessels, with a 14-15m draught built at Imabari will be fitted with MHI's MALS system, though he added "I am not sure of this system's efficiency."

Ueda, however, *is* certain about the MHI system's efficiency, claiming a 10% net energy saving on container ships and 7% for the slower bulk carriers. There was a proviso, however; "We can guarantee these levels of energy savings for ships built by MHI, if it is built by a third party we cannot guarantee the fuel savings," Ueda explained.

The technology being developed by MHI is a way for the company to remain involved in shipbuilding, but Ueda concedes that the newbuilding rates and also freight rates are too low for bulk carriers so the yard is concentrating on more sophisticated ships such as LNG carriers and container ships.

However, the market for these vessels is also slow and with the effective end of commercial shipbuilding at MHI's Kobe yard in July the design and sale of new technology could play a major role for company.

It is for this reason that MHI is launching a MALS research project on a new ferry, *Naminoue*, that Ueda says will show that the air lubrication system "can be applied to slender hulled vessels".

In addition MHI is offering other energy saving technologies such as its waste heat recovery system, which drives a steam turbine or gas turbine to produce electric power. From a shaft mounted generator.

In addition, MHI has produced its own high pressure LNG injection system for use on LNG powered vessels. The system will be produced under licence by Mitsui Engineering Systems, which produces MAN Diesel & Turbo engines under licence. "We hope to sell these systems to many other yards," says Ueda.

Other medium sized Japanese yards are using Japan's technological expertise to their advantage and often combining this strategy with cost cutting measures. Typical of this approach is Namura Shipbuilding which has designed an all new bulk carrier. The 34,000dwt vessel is an improvement on its 32,000dwt predecessor, but it is not only larger it is also 16% more fuel efficient. Syuzou Yoshioka, representative director and vice president at Namura, says: "We asked Nakashima Propellers to develop a new propeller and the new ship uses a derated, electronically controlled, MAN Diesel & Turbo engine."

Namura is also looking at reducing costs, "by using Japan's maritime cluster" to develop new materials and techniques and by sourcing some materials from abroad, such as steel plate from Korea.

Onomichi has made similar improvements to its tanker designs, but also includes a fin that improves the flow of water through the propeller, improving the efficiency of the screw.

Naikai Zosen Corporation has developed the Super Stream Duct, in collaboration with Universal, similar to the duct described by Onomichi. The yard has also improved the design of the bow of its vessels. "The X-Bow is more fuel efficient in rough seas," says Masakazu Omote, director of design at Naikai.

Through collaboration and innovation along with the cutting of costs, either by using cheap foreign imports of materials and equipment or by looking to invest abroad or through a combination of all these strategies Japan's medium sized yards are hoping to maintain their competitive edge against cheaper competition. Success for these yards may be determined by the length and intensity of the maritime industry's recession. *NA*

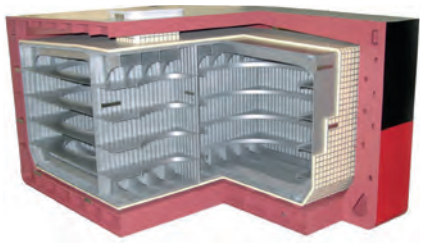
IHI develops LNG tank

The drive towards future green fuels such as LNG has kept the industry busy. Pushing the technology forward has seen Japanese shipbuilder IHI develop its self-supporting prismatic type B or SPB LNG fuel tank for mega container vessels

IHI developed three concept future vessels last year, where they also carried out cost diagrams between the use of HFO and LNG. Takenori Okazaki, manager of machinery system engineering group, IHI says: "The disadvantage of LNG is that it has twice the fuel volume [as HFO], you would need to increase fuel tank space, which would then mean a reduction in cargo space that has complex fuel handling requirements, and as yet the infrastructure for supporting it is undeveloped."

However, even with the draw backs to LNG as a fuel there is still interest in using the fuel in the future as Okazaki says: "If the infrastructure gets sorted out it will become more probable." Today's market for LNG fuel tanks has favoured the C-type pressurised tank such as the moss or spherical tanks. The B-type IHI SPB tank allows more flexibility in the design of the tank and also can be constructed to a given space.

The ITC code outlines three different tank types, the E-type for LPG, the C-type and the B-type. Where the C-type is the most popular tank type to be used at present development of the B-type, such as the SPB tank, are starting to increase.



IHI SPB LNG tank

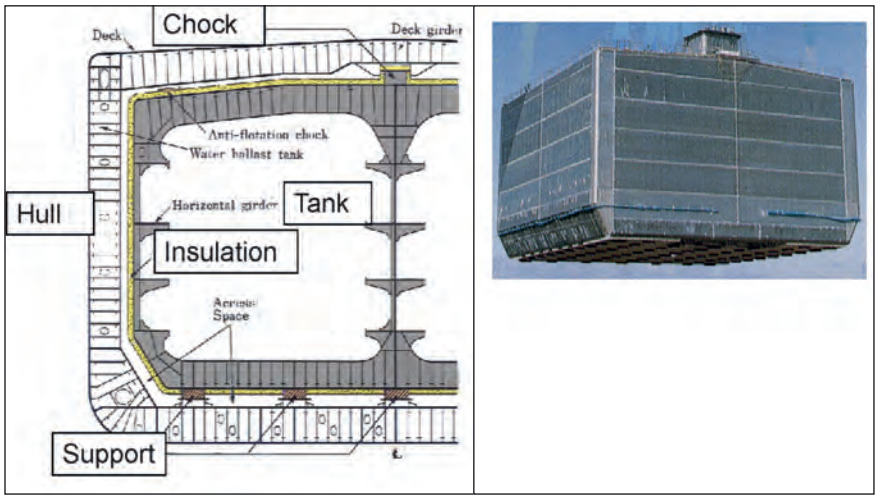
Magnus Lindgren, principal surveyor Tankers & Dry Cargo, DNV says that the advantage with the C-type tanks is that they can store LNG for a longer time without being used because of the pressure and temperature that the LNG is kept at. These tanks produce boil off, but this can then be recirculated back into the system.

However, he also notes that SPB which does not use high pressure utilises volume of space available better. "The SPB tank does not take high pressure, so you would need to treat the boil-off gas differently from that of a C-type. The handling of boil-off gas for larger vessels is not so much of a problem because of the fuel consumption. When you need to have large fuel tanks, especially in the case of smaller vessels, there isn't the additional space. The C-type which are spherical and so are more difficult to fit in," he adds.

Okazaki says that the SPB tank is strong, robust and best to fit a hull form. The tank can be designed to fit the shape of the space available because of this it can take up less room and also has the advantage of being lighter in weight. IHI carried out 3D fine mesh FEM analysis, fatigue analysis, crack propagation analysis, evaluation of construction tolerance and quantitative tolerance control.

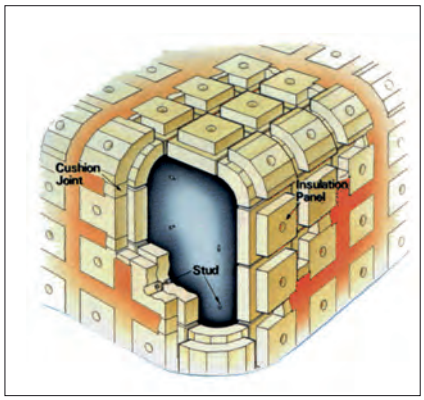
The tank in situ would be supported on reinforced plywood, on chock constructions located at the top and bottom of the tank. Further insulation is provided by pre-fabricated PUF panels and cushion joints surrounding the tank. IHI have also highlighted that as the tank is not fitted directly to the hull and that should any damage to the inner hull occur that it can be easily accessed to be repaired. Due to the tank not being pressurised submerged pumps would be installed to feed the fuel.

Lindgren says that both C and B-type tanks are fairly safe when it comes to sloshing, compared to the membrane type of tank. However, he adds that this is still relative of the size of tank compares to ship size. The safety requirements for B-type tanks are stricter than that of C-type, where there is a regulation for the possibility of leakage. Lingren notes that this type of tank has been fitted with an explosion safe area outside of the tank. Okazaki also adds: "The design of the tanks limits the liquid motion inside, reducing the chance of sloshing."



Hull and tank section

The insulation system of pre-fabricated rigid PUF panels and cushion joints



Currently, IHI have installed this type of tank on three vessels and believe that the tank design has potential in future for other LNG fuelled vessels, highlighting large container ships.

"I am quite sure that we see more of these tanks in the future," comments Lindgren. "With future ECA areas coming into play; LNG is politically driven with regulations pushing to develop this new technology."

IHI says openly that this technology will not be cheap and is more suited for larger vessels as for smaller vessels this option would be expensive. However, it believes that the advantages of the tank outweigh the disadvantages. *NA*

Torches extinguished

Sam Chambers looks at the dramatically changing shipbuilding landscape in China and warns that up to 50% of yards could fold by 2015

Beijing-based ship financier Li Deng Bai recounts a recent trip to Zhejiang province, the region hardest hit by the disappearance of ship orders this year. Memorably he describes much of what he saw – mothballed shipyards – as ideal film sets for a Stanley Kubrick movie. "Three years ago," he recalls, "these were all brand new sites boasting fantastic business plans, now they're dead – vast industrial wastelands."

Around 80% of shipyards in Zhejiang province have either suspended production or are operating at half their capacity.

"The grass is growing high in many yards that have closed due to a lack of orders," says Zhang Shouguo, secretary general of the China Shipowners' Association.

Chinese shipyards' preponderance to basic ship types meant it was also going to be hit hardest when a downturn came. The downturn was a double hit for yards in the People's Republic: just offshore gas ships remained popular purchase options for owners, something the Koreans have a strong lead in. Moreover, those owners willing to order are only willing to do so for fuel-efficient ships amid the seemingly never ending era of high bunker costs – here again China loses out to its neighbours Japan and Korea.

The majority of China's builders are still focused on basic bulkers and tankers. Around 65% of the tonnage delivered by China last year was bulk carriers.

China's lack of serious technological expertise has been discussed this year by the nation's very top shipbuilders. Tan Zuojun, for instance, the president of state-run China State Shipbuilding Corporation, reckons half of all shipyards in China will go to the wall through to 2015, with this year seeing the greatest consolidation.

While there are more than 1,500 shipyard members of the China Association of the National Shipbuilding Industry (CANSI) only roughly 370 of these build ocean-going vessels, down from 400 at the start of the year.

Shanghai shipbuilding consultant Ben Zhang says that number will probably dwindle to less than 50 by 2015, while Greek ship financier George Xiradakis tells *The Naval Architect* the eventual figure is likely to be no more than 30 as a massive period of mergers and acquisitions gets underway.

More than 30% of CANSI members failed to receive a ship order last year, and in the first five months of 2012 one in two shipyards have not received a single order – orderbooks are expiring, workers being laid off, welding torches extinguished – and banks are pulling the plug on countless yards.

Chen Peibin, an official from Zhejiang Jingang Shipbuilding, one of the bigger names to announce a suspension of business recently, tells *The Naval Architect*: "At that time of the absolute peak period for the shipbuilding industry in 2008 banks were falling over themselves to finance ships, but now shipyards have fallen into banks' blacklist."

Banks have switched their views on shipbuilding, defining it now as a "high-risk industry" and refund guarantees have become harder to clinch.

"The overcapacity in this industry means it's a high risk to a bank. It is natural for us to prefer large sized state-owned companies," an official from the credit department of a state-owned bank confides.

Ship orders in the first five months of the year declined 47.3% to 9.54 million dwt.

Moreover, the ship orders being taken are often coming in at prices that are not profitable – the yards are taking deals to keep docks ticking over, but at a loss. For instance, prices for capesizes have slipped to around US$47 million as we went to print, some US$8 million below what analysts believe is a breakeven price. Likewise, panamax bulkers have been sold for as little as US$23 million each, around US$7 million below the breakeven point.

"We believe that ship prices have yet to bottom out and there is still plenty of negotiating room for owners to squeeze prices downwards still through to the end of this year," says an analyst at a Beijing state-run bank.

The downturn has also given Chinese planners pause for thought about how they go about their shipbuilding business. Lowballing on price has always been China's ace card in competing with its East Asian rivals but the disparity in costs is narrowing as wages rise in China and Korea becomes ever more automated in its approach to shipbuilding.

"China's delivery per person, which represents yard productivity, only remains at 30% of those in South Korea and Japan. Also, its localisation of equipment lingers at 60%," researcher Bae Yong-Il from the Samsung Economic Research Institute of South Korea warned in a recent report.

Korea's output per man is about 4.5 million dwt, three times that of his Chinese counterpart. Worse still is that Korea's production value per man is around RMB3 million (US$470,000), far more than the RMB0.75 million (US$117,500) of the average Chinese worker. It takes Koreans around 12.5 hours to complete one compensated gross tonne of a ship, while China is targeting getting to 15 hours by 2015. China must become smarter with its manpower or else the margins over Korea that are its trump card will evaporate.

"We predict that in the next two or three years, for both the Chinese and international market, the shipbuilding industry will enter into a merger period. Our government will further optimise the shipbuilding industry structure, promote various kinds of merger and improve industry centralisation," Guo Yanyan, an official from the Ministry of Industry and Information Technology says.

Beijing is aware that it needs to up its game in LNG (see page 56) and offshore to ensure more orders, and by extension employment for urban workers.

China's builders secured 18 offshore units totalling US$5 billion, accounting for 10% of the global offshore order intake in 2011, according to CANSI.

Under a mid- to long-term plan Beijing announced this spring the goal is to boost earnings from offshore construction to RMB400 billion (US$62.8 billion) by 2020, 10 times last year's figure. By 2020 China should account for 50% of all offshore construction, again growing its share ten fold in the coming eight years. *NA*

The great LNG rush

At least three other yards are set to join Hudong-Zhonghua building gas ships in the near future reports Sam Chambers

China is radically altering its energy mix to be more environmentally friendly. Coal will still be king in the nation with the largest coal reserves in the world, but alternative sources of fuel are being sought – none more aggressively than liquefied natural gas (LNG). And with contracts being sealed across the world, especially in Australia, for big gas contracts, the People's Republic will need to build a vast fleet of LNG carriers in the coming eight years.

Natural gas consumption in China was 131.7 billion m^3 in 2011, more than five times greater than the 2000 figure of 24.5 billion m^3. However, consumption levels are predicted to leap even higher to reach 375 billion m^3 by 2020, according to a recent report by energy industry analysis firm GlobalData.

The International Energy Agency (IEA) states China will double its natural gas consumption over the next five years China has five LNG terminals already, with another nine under construction, and as many as 10 more planned further down the line.

Latest statistics show that as of the end of May there were 372 LNG ships afloat around the world with another 68 on order.

William Sember, vice president of global gas development for US classification society, ABS, reckons: "By 2020 there will need to be another 140 built with as many as 60 to be built in China."

Shanghai's Hudong-Zhonghua started researching LNG carrier design and manufacturing technology in 1997. In 2003, the yard, part of state-run China State Shipbuilding Corp (CSSC), received its first order to build LNG carriers from China Ocean Shipping (Cosco) and China Merchants Group for importing gas from Australia's North West Shelf to Dapeng Bay, China's first LNG receiving terminal, near Shenzhen, in southern Guangdong province.

Dapeng Sun was the first vessel to be delivered, in early April, 2008. It was delivered late and had a number of technical issues in its first months of operations.

Since then, however, the yard has become far better at building these technically demanding ships.

The yard has built and delivered five 147,000m^3 LNG carriers with GTT No.96 membrane containment systems to date and has a sixth vessel of similar size under construction for delivery later this year.

In July 2011 Hudong-Zhonghua signed deals worth US$880 million to build four LNG carriers for joint venture firms formed by Mitsui OSK Lines (MOL) and China Shipping Development.

Each of the 172,000m^3 LNG carriers will transport ExxonMobil LNG from Australia and Papua New Guinea to China.

MOL is sending 50 technicians to the yard and ExxonMobil another 30 to help the construction of these ships.

The four LNG carriers are expected to be delivered between 2015 and 2016.

George Wang, senior managing principal engineer at ABS, notes: "Hudong's first set of LNG ships was a collective effort for the design. This current series is developed mostly by themselves."

Steel cutting about to start for the first vessel

Both the first and second set of ships Hudong is involved in use the comparatively old propulsion technology of a low speed propulsion system with a reliquefaction plant. Koreans, the market leaders in LNG ship construction, increasingly use dual fuel diesel (DFD) engines.

Dapeng Sun was the first LNG vessel delivered from CSSC, but the ship was beset with technical issues

"The next batch of LNG ships in China will probably be DFD," says Wang.

Hudong-Zhonghua is set to be joined by at least three other Chinese shipyards in LNG construction soon.

Three Chinese shipbuilders have received pre-qualification documentation for at least two 170,000m^3 LNG carrier newbuildings, which will be built in China in partnership with BG Group.

Hudong-Zhonghua Shipbuilding, Dalian Shipbuilding Industry Corp (DSIC) and Nantong Cosco KHI Ship Engineering (NACKS) have been invited to bid for the work. No delivery schedule has been given at this stage.

The ships are expected to be owned jointly by UK-listed BG, CNOOC Energy Technology & Services and the Cosco-China Merchants joint venture China LNG Shipping (Holdings) Co (CLNG).

The Naval Architect understands DSIC has emerged as the favourite to win this contract.

China National Offshore Oil Corp (CNOOC) and joint-venture partner China Merchants are handling the tender for the BG ships.

Since 2002 DSIC has developed many different LNG ship designs. It has a range of vessels sizes that includes138,000, 150,000, 170,000, 210,000 and 279,000m^3 designs incorporating GTT No. 96 membrane containment systems as well as a 140,000m^3 Moss type design. The 294.5m long 170,000m^3 design incorporates dual-fuel diesel engines.

Going forward there is expected to be a huge build-up of smaller LNG ships to serve regional and coastal trades, and here too DSIC has plenty of designs on the table. It has a series of ships with cylindrical type tanks ranging in capacity from 2,500m^3 to 10,000m^3 with two to three cargo holds. On top of this it has also developed ships with bilobe tanks ranging in size from 8,000 to 30,000m^3 with two to four cargo holds.

Meanwhile, NACKS – a joint venture between Cosco and Japan's Kawasaki Heavy Industries is bucking the trend by offering just Moss type LNG carriers. Kawasaki Heavy in Japan has a long history of building mid-sized Moss type LNG carriers. Size offerings from NACKS include 145,000 and 170,000m^3.

In Jiangsu, Rongsheng Heavy Industries, the country's largest private shipbuilder there is a different approach.

"Rongsheng has its own ideas and designs. ABS started a joint development with them last year. They are focusing on GTT No. 96 membrane designs," says ABS' Wang. Dual fuel diesel engines are incorporated into Rongsheng's designs which include 170,000 and 200,000m^3 capacity blueprints.

Rongsheng in June submitted bids along with DSIC and ever-present Hudong-Zhonghua for a series of up to six 170,000m^3 ships for Sinopec and China Shipping Development Co (CSDC).

The only other shipyard with possible LNG intentions is STX Dalian, a subsidiary of Korea's STX Offshore & Shipbuilding. STX has a track record of building LNG ships at its home base in Jinhae, Korea. It has been linked to building LNG ships at its Dalian facility but top management in Korea have repeatedly said that Dalian will focus on ships with a less sophisticated technology. *NA*

Green tech to the fore

The Naval Architect scans through some of the most advanced environmentally friendly ship designs in China

China is playing a game of catch up when it comes to the world of green ship technology. Shipowners' demands these days are for lower fuel bills and China has been behind the curve compared to Asian rivals Korea and Japan in producing designs to meet this pent up need. However, this is changing.

Wang Jinlian, general secretary of the China National Shipbuilding Industry Association (CANSI) stresses: "We need to research and develop the technology which will be compliant with new regulations in the next five to 10 years or even longer. The market has higher requirements on energy saving, and many domestic brands cannot meet the higher standards and if they do not make design breakthroughs their market share will diminish."

Nevertheless, there are genuine signs of a green revolution across many yards in China.

Shanghai's cruise terminal is getting busier. The cruise market in China is the fastest growing in the world

For instance, Jiangsu Hantong Ship Heavy Industry and Germany's Jade Werk, GL, TECHNOLOGY and MAN Diesel & Turbo signed a contract for technical cooperation for China's first 50,000dwt hybrid LNG-fuelled ship on 16 May.

The newbuilding will meet the IMO's Energy Efficiency Design Index (EEDI) attestation. The hybrid vessel, scheduled to be delivered in April 2014, will reduce harmful substances by 33%, as well as cut CO_2 emissions by 5,500tonnes every year, bringing annual fuel savings of more than US$3 million.

In June a new handysize bulk carrier concept design was introduced - the Green Dolphin – which uses existing technologies to meet owners' needs for fuel efficiency and operational flexibility while also being ready for future environmental regulations.

It has been created by the Shanghai Merchant Ship Design & Research Institute (SDARI) and development partners DNV and Wärtsilä.

"The focus has been on reducing the fuel consumption while giving owners different options to meet the future expected environmental regulations," says Hu Jin-Tao, the president of SDARI. "The concept design is ready for the owners' preferred choice, whether that is to run on heavy fuel oil using emission treatment systems or to switch to low sulphur fuels or LNG.

The Green Dolphin concept design is a five-cargo-hold double-hull bulk carrier built to common structural rules (CSR) specifications and meets current and future expected air and water emissions regulations. The design aims to be fuel-efficient and maintenance–friendly, with high operational flexibility."

The Wärtsilä two-stroke low-speed RT-flex50 main engine is Tier II compliant and can easily be retrofitted to dual-fuel engine in the near future. Multiple fuel tanks allow for strategic purchasing of heavy fuel oil, low sulphur fuel and distillates.

"Design variants are available for fuel switching systems, installation of selective catalytic reduction and exhaust gas scrubbing systems and, in the near future, the use of LNG as fuel" says Giulio Tirelli, business development director of Wärtsilä – Ship Power. "The concept design also includes shaft torque and exhaust gas monitoring equipment to maximise the fuel consumption optimisation possibilities while constantly monitoring emissions."

Meanwhile, Lloyd's Register (LR) supervised the design appraisal, build and sea trials, verifying the performance of a new, modified 57,000dwt ship based on a SDARI design. *Aquila*, the first in a new series of supramax bulk carrier designs, optimised to burn less fuel oil was delivered in China on the eve of the Lunar New Year holidays. The efficiency improvements have been achieved by carrying out a number of straightforward – but effective – changes including: de-rating the main engine, a new propeller design which has been optimised for the de-rated engine, and fitting a mewis duct.

The daily main engine consumption at a speed of 14knots at ballast draft, which would have been about 29.4 tonnes, is now about 26tonnes and the daily main engine consumption at a speed of 13.5knots at design draft, which would have been about 29.8tonnes daily, is now about 26.30tonnes. The engine's output has been reduced by nearly 1,000kW to 8,500kW.

LR was also involved in another green ship design. The British classification society and Shanghai-based Bestway Marine Engineering Design have completed their joint-industry project to develop a

trend-setting environmental bulk carrier, with results far exceeding expectations.

According to the provisional data from the project, the new design for a 35,000dwt bulk carrier will achieve an 18% improvement in environmental efficiency over comparable previous versions when measured against the IMO's Energy Efficiency Design Index (EEDI), a method by which a ship's CO_2 efficiency is measured.

The new 'Emerald' design exceeded targets in a number of key areas: it reduced the handysize model's steel weight by 12%, making room for more revenue-generating cargo without increasing fuel consumption (the target was a 10% reduction); it also reduced fuel consumption by 19.5% (the target was 15%).

Final design of note comes from Deltamarin who recently entered into a new contract with Yangfan Group for the design of B.Delta37 Bulk Carriers to be built for d'Amico. The Italian owner placed a six plus six order with Yangfan, one of China's leading private yards this summer.

Deltamarin will procure the basic design, part of the detail design of the vessels and technical procurement handling and will also have a site team to ensure the continuity all along the design phases to the production.

The design is an amended version of the standard B.Delta37 design into an open hatch configuration.

The service speed at design draught will be 14knots with daily fuel consumption of 17.9tonnes. The ships boast an EEDI 21.6% less than the requirements stipulate. *NA*

China's Cruise ship drive

Cruise ships – the final hurdle in China's pursuit of global shipbuilding dominance – are now on the menu in the People's Republic.

In June China's Shanhaishu Group and Xiamen International Cruise signed a contract for China's first self-built cruise ship with Xiamen Shipbuilding Industry.

The 100,000gt *China Xiamen* ship will hit the water in October 2018 and will cost around US$488million. It will be constructed at Xiamen Shipbuilding, a subsidiary of state-run China State Shipbuilding Corporation.

The giant cruise ship will be designed in a Chinese style, making it the first of its kind in the world. Apart from Chinese-style decoration inside the cabins, Chinese food will be served in eight out of the nine dining rooms on the ship.

At around the same time Australian billionaire Clive Palmer signed a memorandum of understanding with CSC Jinling Shipyard to build a modern version of Titanic. It will have the same dimensions as its predecessor with 840 rooms and nine decks.

The vessel will be part of a planned fleet of luxury cruise ships to be built at CSC Jinling in Nanjing, Palmer said, and the plans would help China become a major player in the cruise ship market.

Finland's Deltamarin is carrying out a full review of the Titanic II project to ensure the vessel will be compliant with all current safety and construction regulations, as well as meeting the design criteria laid down by Blue Star Line, the company Palmer has resurrected to control Titanic II.

The work carried out by Deltamarin will enable China's CSC Jinling Shipyard to begin construction in time for the projected 2016 launch of the vessel.

"More than 20,000 people have registered on Blue Star Line's website expressing an interest in receiving regular updates from us or requesting information on how to secure bookings for Titanic II's maiden voyage," Palmer said.

China is the world's fastest growing cruise market by quite some margin, albeit from a low base.

While there were around 750,000 cruise visitors to Chinese ports last year the China Cruise and Yacht Industry Association (CCYIA) has identified 300million Chinese as potential cruise passengers.

Full reverse

China's engine scene has changed drastically in the downturn, but authorities are still determined to make the nation a leader in the field

The evolution of marine engine production in China is arguably symbiotic with the fortunes of the global shipbuilding industry over the past seven years.

During the great freight rally in the previous decade one of the greatest impediments to fleet growth was in limited engine manufacturing capability. As every shipowner clamoured for urgent ship deliveries, a period where quantity overrode quality, there simply were not enough engines to go around.

Fast forward to the present day and the situation is reversed. Beijing placed ship equipment manufacturing as a key tenet of two consecutive five year plans and encouraged foreign firms to set up shop. Engine factories sprung up everywhere. However, ship orders suddenly abated as the global financial crisis kicked in. All of a sudden the situation was dramatically different – from feast to famine.

Grand new factories are not operating at anywhere full capacity and have had to retool machines to churn out non-marine products.

"No one could have seen quite how bad things were going to get," one leading European executive at a Chinese joint venture marine engine manufacturer tells *The Naval Architect*. "We have had to turn our attention to other products to keep things ticking over. This includes bus engines and even machinery not related to engines at all. The real concern is that the overcapacity in the sector is likely to remain for years to come."

Unlike the shipbuilding sector there has yet to be mass layoffs or consolidation among the massed ranks of engine manufacturers in China yet. On the contrary consolidation is faltering. For instance this July China's largest private shipyard, Jiangsu Rongsheng Heavy Industries came under fire from investors for failing to complete a protracted takeover of engine maker Quanchai Power. Investors in Hong Kong where Rongsheng is listed demanded to know what is happening with the planned buy out, which has now dragged on for nearly a year.

The investors of Quanchai Power, Aegon-Industrial Fund Management and Orient Securities, have asked Rongsheng to coordinate with Quanchai and fulfil the tender offer obligations and protect the interests of the investors.

However, the real reason for the industry not contracting in size during the downturn is largely thanks to Beijing's dogged determination to raise its game when it comes to ship equipment.

According to the targets of the twelfth five year plan of the China shipbuilding industry not only are their goals set to be the number one shipbuilder, but also to reach a point by 2015 where the nation is producing 14.71million kW of marine low speed diesel production capacity, and importantly 85% of all vessels built in China will have Chinese made engines.

"To achieve these goals it is inevitable that a period of mergers and acquisitions will be needed," says a Beijing-based shipbuilding analyst. "A lot of weaker names will need to be weeded out."

Greater investment in domestic research and development is something deemed of paramount importance if China is to achieve its goals. *NA*

China's engine market is moving – but in which direction?

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Shipbuilding evolution

Korean investment in Chinese yards gives the shipbuilders a variety of options

Korea's biggest yards all have investments in China – to differing scales of success. Many started out as block builders, sending giant steel structures across the Yellow Sea for final assembly at home yards in Korea, making the most of the cheap labour costs on offer in the People's Republic.

Koreans were generally unwilling to upgrade their investments while an old law prohibiting foreign firms from majority stakes in shipbuilding yards in China remained in place. Once this law changed two and a half years ago there has been a sea change in the scope of investments.

Samsung Heavy Industries (Ningbo), a hatch cover and block manufacturer in China, this June entered the newbuilding market.

Samsung-Ningbo started construction of a 17,000dwt heavy-lift carrier, ordered by S&P Marine, due for delivery in mid-2013.

A spokesperson from Samsung said that Samsung-Ningbo is capable of constructing eight newbuildings a year, and will focus on 50,000dwt medium range product carriers, handymax bulkers, PSVs, and feeder boxships.

Samsung has two block building sites in China, one in Ningbo and the other in the Yangzte River delta. It made tentative steps to offer mid-sized bulkers and tankers around two years ago, but this June order marks a debut in the People's Republic for the Korean conglomerate.

The Ningbo yard will continue to manufacture hatch covers and blocks as well unless demand for newbuilds dramatically picks up.

Going in the other direction however is Samsung's rival Daewoo Shipbuilding & Marine Engineering (DSME). Yantai-based Daewoo Shipbuilding & Marine Engineering (Shandong), also known as DSSC, has come full circle. It started out as a block builder then, in March 2011, it announced it had won its first ship order, a pair of 58,000dwt bulkers.

However, this was as far as DSSC went for newbuilds as the market turned against them. This June it announced it would cease to market newbuilds and would henceforth focus on its original purpose – building blocks.

STX Dalian's Changxing Island site covers an area of over 5.5 million m^2, and can lay claim to being the largest shipyard in the world

Then there is Qingdao Hyundai Shipbuilding (QHS) which was founded as a joint venture involving Hyundai Corporation in 2005. When this company ran into financial difficulties a couple of years ago, Hyundai Heavy Industries (HHI), which confusingly is not related to Hyundai Corporation, stepped in to take over the yard in February 2010. The shipyard, minute in comparison to HHI's 10-dock facility in Ulsan, Korea, focuses on small multipurpose vessels and product carriers and has racked up a sizeable orderbook.

All these shipyards mentioned thus far are small in size, offering ship types that their bigger Korean parents would not deign to build on home soil as they are too small, yet provide an alternative, niche source of income. In the far north, however, is the biggest Korean investment by far.

Located on Changxing Island, and stretched over 5.5 million m^2 of space is STX Dalian, which by area alone can lay claim to being the largest shipyard in the world, also can boast one of the world's biggest drydocks and 5km of quayside. The yard, which started in 2008, builds bulkers, car carriers, product tankers and has latterly taken orders for small boxships too as well as furnishing STX's Korean yard with blocks and engines.

At the end of June STX Dalian won a bumper contract to build 10 containerships of 5,000TEU each for Zodiac Maritime Agencies.

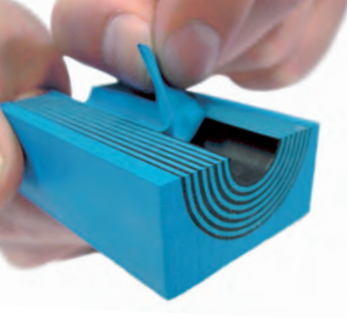
The European shipowner is paying US$45 million for each vessel and deliveries will be staggered through to the end of the third quarter of 2014.

"STX will continue to develop its yards with a policy of Korea taking the high-tech orders and Dalian producing greater numbers of more basic ship types," explains an STX employee in Seoul.

Finally, in a big reverse in how shipbuilding evolution has worked so far there is a strong possibility a Chinese firm will invest to build a shipyard in South Korea. China's Qin Long Group is looking at entering into a tourism business as well as shipbuilding in South Gyeongsang Province, South Korea.

South Gyeongsang governor Kim Doo-Kwan paid a visit to Beijing in June in order to draw investment. Governor Kim met with Qin Long's president Li Xiao Ming and asked him to invest in South Gyeongsang's tourism and shipbuilding industries.

Governor Kim also invited president Li to South Gyeongsang Province and President Li is scheduled to visit Korea soon to have a look around possible investment sites. Kim said that: "President Li seems to have a strong will to advance into investment in the shipbuilding industry in South Gyeongsang province." *NA*



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Yangzijiang secures the cost of success

Ship financing arrangements and a sideways shift into new business sectors have been key to the success of Yangzijiang Shipbuilding as the yard reports no cancellations, writes Sam Chambers

The wily folk at Singapore-listed Yangzijiang Shipbuilding prepared well for shipping's winter period, blanketing contracts with clauses such as 20 plus 20 payment methods, whereby owners had to sign up for an initial 20% down-payment and 20% bank guarantee, thus ensuring that the yard had not received a single order cancellation through to June this year.

Among its most prestigious order intakes has been Seaspan's decision to invest US$700 million for seven 10,000TEU ships. The contract, signed on 8 June 2011, comes with an option for a further 18 vessels that would take the contract to a staggering US$2.5 billion.

The fuel efficient design is a collaboration between Seaspan, Yangzijiang, marine design and research institute MARIC and class society DNV.

The company said this year Yangzijiang will keep working on new types of ships and improve shipbuilding technology. In the first quarter, the yard received seven ship orders, worth US$206 million bringing its orderbook to a more than respectable 96 ships.

Yangzijiang's success has meant the yard was one of the chosen few selected from on high to survive the turmoil. Located in Jiangsu province, the region that along with Zhejiang province can claim the most amount of shipyard financial casualties during the downturn, Yangzijiang has been put on a list, that comprises just three names out of more than 100 private yards in the province, for central government support.

Ren Yuanlin, the boss of Yangzijiang says the company will take the opportunity during this period of industry consolidation to develop new business areas such as ship repairing and scrapping. "If we have shipbuilding, ship repairing and ship scrapping, we will have the complete industry chain." Ren says.

Yangzijiang is an old yard with over 50 years history. It has endured two crises very well in the past. In 1987 when the chips were down it transitioned from a domestic customer base to take in new clientele from Southeast Asia. Ten years later as the Asian financial crisis struck home Yangzijiang went further afield for business snaring its first European customers.

Looking long term Ren feels China is in a good position, with just the neighbours from across the Yellow Sea as genuine competition.

"China has all the necessary shipbuilding elements, Vietnam and India will never exceed China, Japan will also be defeated by China, but the technology of Korea is 20 years more advanced than us, it is difficult to surpass Korea," Ren admits.

In 2008, the yard boss invested RMB35 million (US$5.48 million) to buy a 60% holding of a ship design company in Shanghai, and then spent a further RMB100 million (US$15.67 million) to buy a building in Shanghai to provide a good environment for his new designers, thus becoming the first yard in China to purchase a design company.

For the yard, enhancing the ship design business will be a focus in the coming years; to develop ships with its own brand and rights will be a very important source of revenues.

The downtime caused by the downturn has also given the group time to focus on increasing productivity and this resulted in the decision this July to close its oldest yard in Jiangyin and shift that capacity to a more modern site in Jinjiang, also in Jiangsu province.

It is all part of the plan to survive the latest economic storm. *NA*

Yangzijiang has taken an order from Seaspan for 10 ships with an option for a further 10 vessels of 10,000TEU each

Carving out niches

Simon Liang from Sinopacific tells *The Naval Architect* the secrets to remaining profitable in the downturn

One of China's great success stories, shipbuilding-wise, Sinopacific Shipbuilding has tapped up Japan's Mitsubishi Heavy Industries (MHI) for help in ship design. The first collaborative design is an 82,000dwt bulk carrier which will become the flagship in Sinopacific's well-regarded Crown series of ships.

"The development programme will aim to exceed international standards in carrying efficiency, environmental protection, operability and controllability," Sinopacific said in a release.

The chairman and CEO of Sinopacific, Simon Liang, tells *The Naval Architect* how his company has pursued a niche path to prosper during the downturn.

"As a private shipbuilder, we are not chasing large scale business blindly, we mainly focus on niche markets, areas with high entry levels and technology barriers, to demonstrate our added value," says Liang.

Meanwhile Naoki Ueda, Mitsubishi's deputy general manager for the ship and ocean engineering division, says that the company is looking to make more deals with Korean and Chinese yards for MHI bulk carrier designs following the ending of shipbuilding at its Kobe yard in June this year. "Production at Kobe has now transferred to nuclear power generation and submarine building," he says.

According to Ueda MHI is looking to sell technology such as its Mitsubishi Air Lubrication System (MALS) along with its ship designs and the bulk carrier design can benefit with 7% net efficiency gains says Ueda.

Sinopacific's big orderbook allows it to be one of very few yards in China not being forced to slash prices to keep workers busy.

With close to 110 ships on order, worth nearly US$4 billion, almost all its drydocks are busy through to end-2013.

"In 2012, we don't need to worry about taking new orders as we have a good orderbook already," Liang says. "Nowadays, people who invest are mostly strategic owners. What they care about is merely three aspects: quality, brand and performance, especially operational costs, that is fuel consumption. These are exactly where our strengths lie."

China has cornered the OSV market and is now upping its technological capabilities including this series for Bourbon by Sinopacfic

Bulk carriers and offshore support vessels make up the majority of Sinopacific's offerings though the company is developing its own tanker design.

The Shanghai-based company, which employs over 20,000 people in its yards, is one of the fastest-growing companies in China's shipbuilding industry. The group has two shipyards - Zhejiang Shipbuilding and Yangzhou Dayang Shipbuilding.

In September last year, Sinopacific established a branch company in Fosnavaag Norway to assist the group company in further integrating its equipment supply chain, especially in the offshore field in an attempt to reduce the production cycle for high-end offshore support vessels in China. The Norwegian branch company provides technical support and production/management advice for the shipyard, serving as a contact between shipyard, shipowner and design company.

Going forward the plan is to continue to develop software, up marketing and spend more on research and development – all things that genuinely makes Sinopacific a stand out in China. Nearly 90% of Sinopacific's delivered products are developed in house via its R&D team in Shanghai.

This February saw the first sea trial of another exciting design by the yard, the Crown 63. DY4001, the first Crown 63, a 63,500dwt bulk carrier, completed all sea trials successfully on 18 February. The ship is one of 22 of this type set for delivery this year and, stacked with plenty of green technology giving it a 13% fuel saving, it has received classification society Bureau Veritas's first Energy Efficiency Design Index (EEDI) certificate in Asia.

Some of these new ships will end up being owned by Sinopacific's Hong Kong subsidiary, Crown Ship, a shipowning/trading vehicle.

"The position of Crown Ship is not to be an owner," stresses Liang.

The vehicle will be used to better understand the needs of owners, says Liang, as well as providing alternative financial solutions to clients.

Crown Ship can provide some additional pre-delivery funding, which will allow owners to make a payment before deliveries of less than 30%. Secondly, newbuildings can be directly owned by Crown Ship and owners will be given the opportunity to buy the ships on a resale basis. Thirdly, Crown Ship can arrange post-delivery loans for newbuildings and bareboat charter out the vessels to the buyer upon delivery on a medium to long-term basis, with an obligation to purchase the vessels when the contract expires. *NA*

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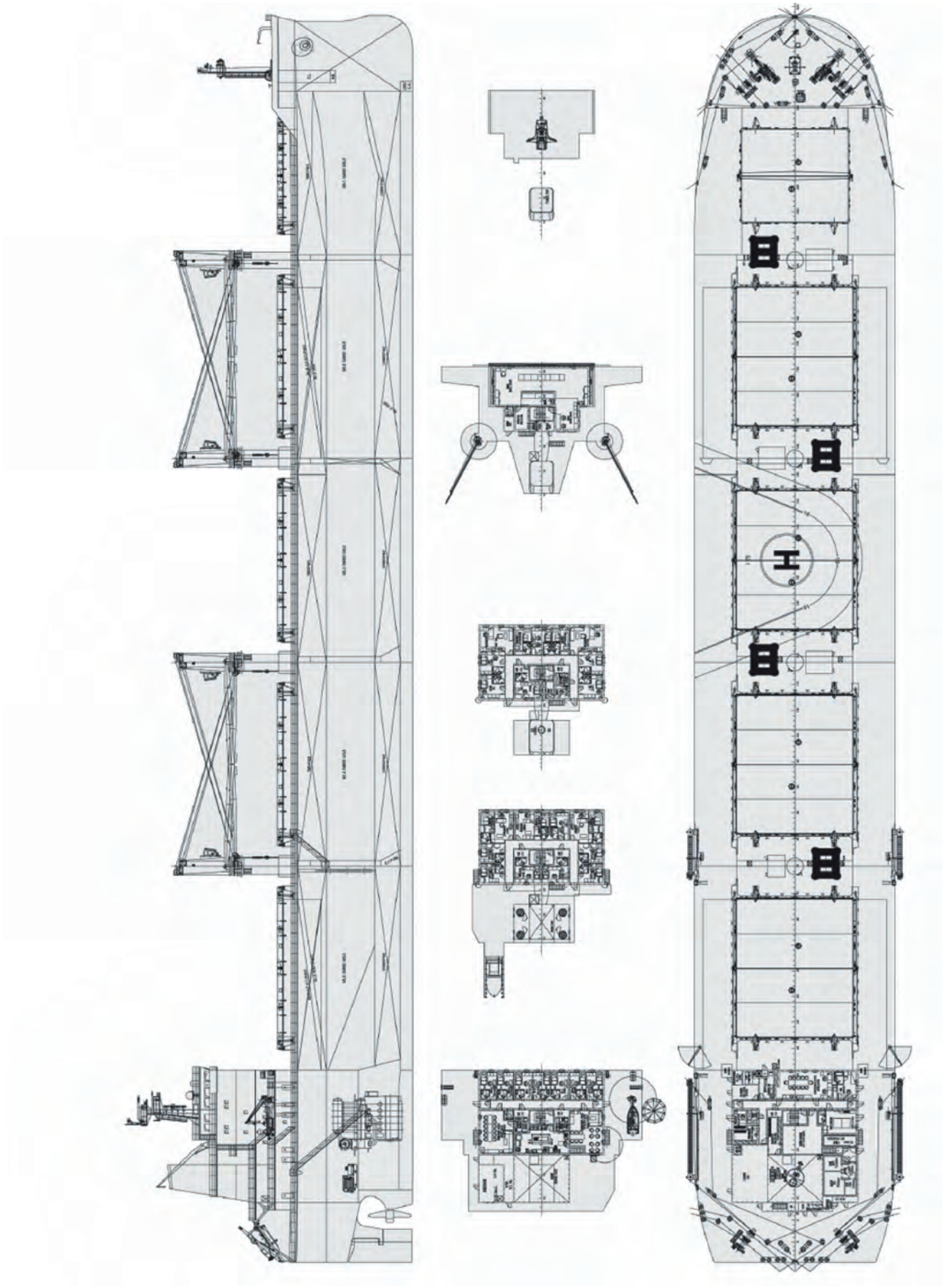
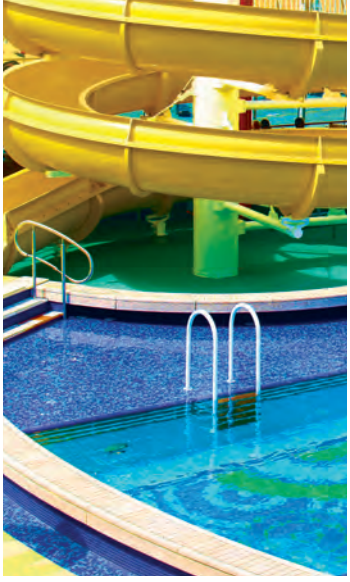
GA of Crown63 Bulk Carrier





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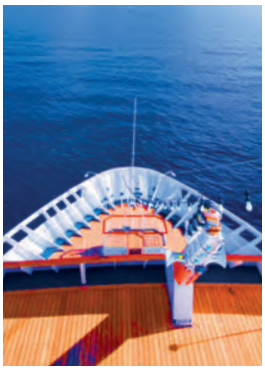

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Shanghai yard refocuses

Waigaoqiao focuses on marine engineering, writes Sam Chambers

With demand for commercial vessels falling, one of China's premier yards Shanghai Waigaoqiao Shipbuilding (SWS) is focusing more on marine engineering these days. SWS has founded a specific subsidiary just focusing on marine engineering with a first phase investment of RMB2.3 billion (US$360.5 million). SWS is part of state-run China State Shipbuilding Corp.

While acknowledging the market for bulkers and tankers is minimal this year SWS has spent much of the year developing more fuel efficient cargo ship types. This has resulted in a kamsarmax – an 82,000dwt bulker – that SWS maintains is among the most fuel efficient ships of its size in the world.

SWS has won more bulker orders than anyone else this year – U-Ming signing for up to eight Capesizes in February and Oldendorff coming in May for 16 plus 12 on option 208,000dwt Newcasltemaxes.

Offshore products are also very much to the fore at SWS. The yard has just started building a 400ft jack up drilling platform for CNOOC. *NA*

CSSC 708 Institute

China's institute is coming into its own through hard work

China's ship designers are gaining ever greater prominence on the world stage. Names such as Bestway Marine and Shanghai Merchant Ship Design & Research Institute (SDARI) are now commonplace.

Arguably, however, the hardest working design house this year has been a subsidiary of state-run China State Shipbuilding Corp (CSSC). CSSC 708 Institute is behind some of the most pioneering ship designs of the year.

In March, a 53,500dwt self-propelled semi-submersible engineering ship, designed by CSSC 708 Institute, was delivered. The vessel – a first of its kind for China - has a maximum dive depth of 26.8m, an all-electric propulsion system, and maximum design speed of 14knots. The vessel is equipped with variable frequency propulsion systems, scalable rotary paddle, bow and stern thrusters, and a DP2 dynamic positioning system plus a helicopter platform.

In April its 76,000dwt Panamax tanker and 163,000dwt Suezmax tanker designs both gained acceptance by Lloyd's Register and Det Norske Veritas respectively.

The following month China's first fully electric driven 2,000m^3 per hour self-propelled dredger, designed by CSSC 708 Institute, was delivered to the Yangtze Waterway Bureau. The 88.6m long dredger has a width of 15m, full load draft of 2.5m, and 16m maximum operational depth. The Yangtze is undergoing dramatic dredging whereby Nanjing, some 270km from the coast will be able to accept 50,000dwt ships in the next three years. *NA*

Green priorities for CCS

A raft of green technologies is expected from the China Classification Society (CCS) as the society's client tonnage continues to expand

China Classification Society is promoting green shipping in a big way as it sets out to become the sixth largest classification society by 2016. A source at the Beijing-headquartered society tells *The Naval Architect*: "A new green wave of technology is coming. The future competition for orders will focus on energy savings, and that is where we must be leaders."

The 2016 aim is to have a classed fleet of 80 million gt according to CCS president Sun Licheng. Earlier this year CCS's classed fleet broke through the 60 million gt mark for the first time.

The hard strapped bulker division of the nation's largest shipping line, COSCO, has teamed up with CCS for a complete ship efficiency management programme. This came as COSCO faced analysts' wrath for its comparatively old fleet as it posted record losses of US$1.8 billion last year.

CCS is also focused on developing its LNG knowledge. Along with ABS it has dual classed every LNG ship built in China so far – all at Shanghai's Hudong-Zhonghua. Now it is researching smaller gas ships – 30,000m^3 – as energy giant CNOOC plans to order a raft of this ship type for coastal trades.

CCS is also focused on gas as fuel for ships, something that is being promoted heavily along the Yangtze, China's longest river. *NA*

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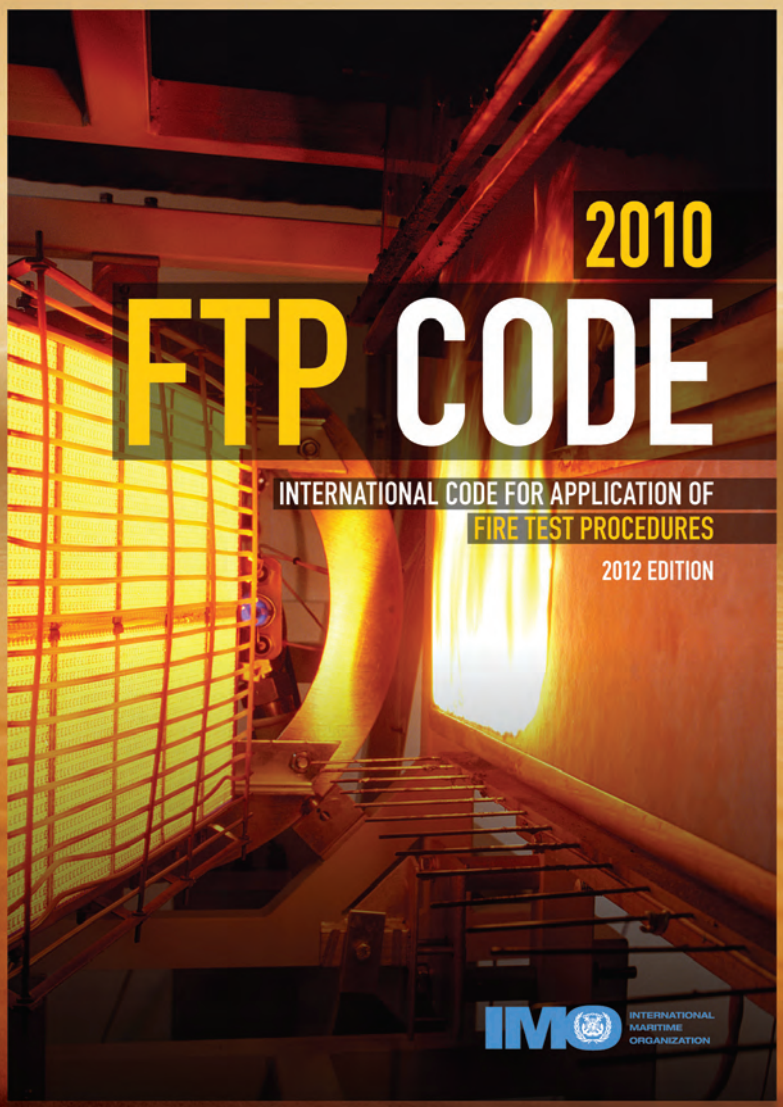

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Steady but not stellar

AVIC Dingheng Shipbuilding leads the way in LPG and ethylene tanker construction, Sam Chambers reports

AVIC Dingheng Shipbuilding is perhaps not such a famous name in the Chinese yard constellation and yet for those that have been there it receives nothing but praise and it can now lay claim to being among the world's largest LPG and ethylene carrier builders.

This year it added a further string to its bow, delivering a 7,850dwt multipurpose vessel to owners from Iraq – a ship type first for the yard, and something the yard managed to complete in just 18 months – from ship design, through construction to sea trials.

The company is located at a ship industrial park in Jiangdu Economic zone, and is the nation's largest chemical and liquid gas ships' production base. The first phase costing RMB1.2billion (US$188 million), currently has constructed 30,000dwt and 50,000dwt docks and a production workshop. The annual capacity could reach 100,000dwt of stainless steel chemical tankers. When the full project is completed, the project will have an output capacity of up to 200,000dwt annually.

Dingheng owns chemical carriers as well as builds them

The yard delivered the world's first 12,000m^3 multi-purpose liquid gas vessel in June this year. Its Shanghai technology centre partly completed some detailed designs and all production designs. The ship has been classified by Germanisher Lloyd.

The product orientation of the yard is focused on 30,000dwt and below high-end chemical and liquid gas tankers. 2015 goals calls for revenues of RMB4billion (US$626.97 million) and a total of 16 ships delivered. *NA*

DACOS eyes offshore

Strength of the Yen pushes Japanese into joint venture with Chinese as new company looks set to enter the offshore market, reports Sam Chambers

Nantong COSCO KHI Ship Engineering (NACKS) is rightly regarded as one of the finest shipyards in China – no one can beat it, for instance, when it comes to churning out very large crude carriers, an art it has whittled down to a seven and a half month process. As the strength of the Yen continues to hit Japanese shipbuilders, Kawasaki Heavy Industries has, like many of its peers, to invest overseas. NACKS, in which it controls 50%, was its first overseas investment. It has since invested in Brazil and has recently upped its stake at a giant yard in Dalian in northeast China.

This May Kawasaki Heavy Industries decided to acquire a stake in Dalian COSCO Shipbuilding Industry (DACOS).

DACOS is a joint venture company established in the Lushun Economic Development Zone at the bottom of the Liaoning Peninsula to the south of Dalian. It was co-founded in 2007 by COSCO Shipbuilding Industry Company (COSIC)—a wholly-owned subsidiary of the COSCO Group and NACKS. Originally DACOS was 70% owned by COSIC and 30% by NACKS. Through the transaction, Kawasaki Heavy has taken a 34% stake in DACOS from COSIC, meaning that DACOS is now 36% owned by COSIC, 34% by Kawasaki and 30% by NACKS.

At its 1.8 million m^2 shipyard complete with two giant building docks, DACOS has so far focused on 205,000dwt Newcastlemaxes, with both Cosco and Japan's Nippon Yusen Kaisha among the earliest customers.

However, Kawasaki Heavy's intentions for investing in DACOS go far beyond mere bulker deliveries.

"Our intention with DACOS, as with our partner COSCO, is very much to move into the high end offshore field of construction. The shipyard facilities in Lushun are among the most high tech in China and now is the time for us to shift our knowledge from Japan to China to really make inroads into offshore," says a source at Kawasaki Heavy in Tokyo. *NA*

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Straddle carriers

Can't sell? Then export and own...yards venture over the line into owners' territory as their client base shrinks

Shipyards becoming shipowners is the second biggest trend in Chinese shipbuilding this year, after the on-going mass bankruptcies.

As new orders for ships become fewer and farther between in combination with a growing collection of non performing expensive contracts penned during the frenzied days of the previous cheap credit fuelled boom, a growing number of Chinese shipbuilders, both private and state owned are becoming shipowners. Their new owning companies are usually set up in Hong Kong, the one stop shop for legal and banking conveniently located on China's doorstep, but otherwise essentially offshore.

Major names like the privately held Sinopacific Group and Sainty Marine started the trend of setting up Hong Kong shipowning companies and are now being joined by state owned giants including the CSSC group (holding company for Shanghai Waigaoqiao, Jiangnan, Hudong Zhonghua, Chengxi, etc) who have just set up their own office in the Special Administrative Region of Hong Kong.

The name of the game for all these new shipowners is to 'export' their newbuildings from China and collect the VAT rebate, while still keeping control of the assets. This is where many so called distressed assets have disappeared into, only to be transformed into candidates for bareboat or time charter.

The setup is a winner for the yards who can remove the ships from their books, collect the VAT rebate and then play the market, often with more fresh finance from the banks they are already dealing with. *NA*

Customers tell China to up its game

IMC customer survey shows that China's shipyards lag their competitors in terms of quality

A survey conducted by Hong Kong/Singapore maritime conglomerate IMC earlier this year paints an interesting picture on what China's yards need to do to up their game. IMC polled 25 large Asian shipowners and the main issues raised concern quality, price and customer service.

According to the survey, quality is the first factor for a shipowner to choose a shipbuilder, then comes price and payment terms. Most shipowners expect Chinese newbuilding prices to be between 10 and 15% lower than Japanese similar products and 5% to 10% lower than Korean's.

Owners nowadays are placing huge attention to ship speed, fuel consumption and resale prices, the survey showed – and it made clear that in this trio of vital sale components, China lags its East Asian rivals.

Statistics show 47% of shipowners think the quality of Chinese shipyards are much lower than Japanese shipbuilders and most believe they are lower than Korean shipyards.

Chinese shipyards must up their quality management systems if they are to compete and focus more spending on research and development.

While Japanese shipyards scored an average of 9 out of 10 for fuel efficient designs, China's yards notched just 3.5.

Chinese ship designers and shipyards need to hold more open and constant dialogue with shipowners during construction, but also after delivery.

Outsourcing by subcontractors is a severe irritation for owners building in China, according to the poll.

In short, as a school report, the poll results might read: Room for improvement. *NA*

Rongsheng diversifies

As shipbuilding undergoes a structural change Rongsheng looks to adapt to survive the upheavals in the ship construction market

China Rongsheng Heavy Industries Group, the Hong Kong-listed giant yard located in Jiangsu province, has rightly made a name for itself for its Suezmax tankers (which it can boast the world's second largest orderbook) and the very large ore carriers for Vale and Oman Shipping that have caused such a ruckus on the international dry bulk trades for the past two years. However, the product offerings of China's largest private shipyard are far more diverse than these two staples.

Chen Qiang, chief executive officer of the seven year old yard, has similar views to China's shipbuilding predicament as those reported at the front end of this country report.

"The global economy is volatile and adding uncertainties to the shipbuilding

TECHNOLOGY FOR ENSURING CLEANLINESS OF INNER CAVITIES OF SHIP POWER PLANTS

Doctors of Technical Science: Nickolay I. Gerasimov, Dmitriy N. Kanaev, Ivan V. Grachev

Joint stock corporation "Shipbuilding & Shiprepair Technology Center" (JSC "SSTC") is one of the major research institutions in Saint Petersburg, a leading center of shipbuilding technologies in Russian Federation. The Center has status of State Scientific Center of Russian Federation and carries out fundamental and exploratory research in the field of creation of modern technologies for shipbuilding and engineering sectors. It incorporates research laboratories, design and construction divisions, dealing with creation and modernization of shipbuilding yards water-development facilities and engineering enterprises, creation of on-shore bases for marine objects, design and manufacturing of ship fittings, design of fishing and fish-processing vessels, as well as production facilities for manufacturing of designed equipment.

This article reviews methods and tools which ensure high cleanliness rate of ship power plants equipment and pipelines.

Imperative necessity arose to develop non-standard process solutions and special tools in order to provide cleanliness rate required by designers of SPP structure during its assembly and installation. Specialists of JSC SSTC developed VL-type mechanisms (vacuum lifting), which securely remove dry or liquid technological pollutions and capable to lift contaminated liquids up to 20 meters high, thus exceeding capabilities all existing tools.

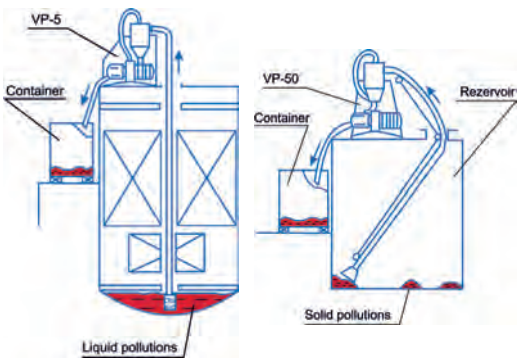

Figure 1

Figure 2

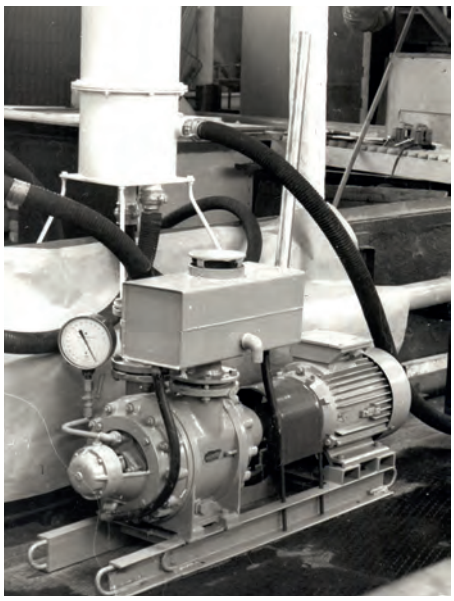

Figure 3

Lifting principle of heavy mechanical particles and liquid is based on creation of local vacuum in decontamination area and subsequent transportation of impurities through suction pipe controlled by local gas distribution unit.

Figure 1 shows 2 cleaning circuits of hard-to-reach areas, which accumulate pollutions.
JSC SSTC developed and implemented multipurpose vacuum-ejection machines at various shipyards and other industry branches. For instance, VP-5 machine is designed for removal of technological pollutions from SPP (Fig.2); VP-50 machine is designed for dry cleaning of ship compartments (Fig.3); VP-100 machine is designed for harvesting bottom ooze; UVP-1 machine is designed for removal of highly viscous residuals of vegetable-based fluid. One should consider another very important factor, influencing cleanliness of system inner cavities and equipment. This is pollution caused by protrusion of solid mechanical particles formed by cavitation/erosion process into water duct during operation of flushing stand.

In this case it becomes impossible to achieve required cleanliness rate using standard method. However JSC SSTC developed method and patented the device which uninterruptedly supplies flushing water without use of moving mechanical parts. Cleaning of system cavities is performed by special pumps, providing required pressure of high-quality water in duct by means of gas under rated pressure. Therefore, such hydrodynamic flushing stations lack mechanical movements of separate elements, thus decreasing flushing environment contamination (coming from conventional flushing stands) in about 100 times.

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industry worldwide as the industry undergoes a structural change in the future. The market for LNG carriers and large-scale offshore engineering equipment should remain active, while shipowners would favour new vessel types which meet international shipbuilding standards. Thus, China Rongsheng Heavy Industries is now devoting resources to the R&D of high-value added vessel types, so as to cope with market changes and enhance its development with high-tech high-value added products," he says.

Chen says a lack of advanced technology has prevented over one-third of Chinese shipyards from receiving orders in 2012. "It will be difficult to secure new orders of traditional vessel types. However, orders for high-value vessels such as very large container ships are expected to remain steady. The current market situation will guide the shipbuilding industry into a period of restructuring and polarisation. This tendency will further broaden the gap between leading shipyards and greenfield shipyards," he says. *NA*

Blowing in the wind

China is getting in on the wind installation craze, reports Sam Chambers

China has a second company capable of building the growing niche segment that is wind turbine installation vessels. Up until this summer Cosco Shipyard Group was China's sole builder of this ship type, but now it has been joined by Jiangsu Jiaolong Heavy Industry Group (JHI) who announced in June that it will build a wind turbine installation vessel for an undisclosed Singapore owner for delivery in the third quarter of 2013.

Cosco Shipyard celebrates the delivery of a wind turbine installation vessel

The 2008-founded shipbuilder joins Cosco Shipyard's Nantong and Qidong subsidiaries in offering this high-tech ship type.

The new self-propelled, self-elevating offshore installation vessel was made by JHI'S Singapore-based subsidiary JHI Engineering with basic design engineering done by US naval architects Bennett & Associates.

The DP-2 vessel has a long-boom 600-tonne crane and is designed to undertake wind turbine installation, repair, construction and maintenance.

With four 95m legs, the vessel can operate in water depths of more than 60m, and it is understood the vessel is being developed with Chinese waters in mind.

JHI already has experience in the wind industry through Renewable Energy Asia Group, a Singapore-listed subsidiary that operates wind and solar projects in China.

The company has set up another venture with Chinese power company Datang called Renewable Energy Asia Technology and Engineering, which will provide steel structures to Datang's 300MW offshore wind farm at Binhai in northeast China.

Cosco Shipyard, meanwhile, has delivered two wind turbine installation vessels to MPI Offshore and is now building two more for Denmark's A2Sea.

MPI's two ships were designed by GustoMSC. Key features on the two MPI vessels include the 1,000tonne capacity main crane, plus a 50tonne capacity auxiliary crane, accommodation capacity for 112 persons, and an ability to jack up with 6,000tonnes of cargo onboard. They have a maximum operation depth of 40m.

MPI Offshore claims that they are "the world's most advanced and most efficient wind turbine installation vessels," in terms of jacking speed, deck space, lifting capacity and positioning capabilities (DP2).

Meanwhile, the A2Sea ships are coming along, with one to deliver this year and another in 2014. One boasts a crane capacity of 900tonnes and the other has an 800tonnes capacity crane.

The ships are equipped with Voith Schneider Propellers and Voith Inline Thrusters.

With an overall length of 132m, a breadth of 39m the larger of the two ships, costing US$155million, is capable of carrying 60 staff as well as eight to 10 complete wind turbines, while the smaller ship can carry eight turbines.

Classification society Bureau Veritas has recently published guidance for designers and builders of wind farm service ships.

Maxime Pachot, offshore service vessel manager at Bureau Veritas, says: "Although some of the existing Offshore Service Vessel fleet can perform the tasks necessary for developing and maintaining offshore wind farms, we see an increasing need for specialist craft. These will include specialised vessels for servicing offshore wind farms. These will have particular characteristics and to be efficient they will have to be new designs. That means they need new class rules and guidance for designers and yards."

Bureau Veritas' new guidance notation for wind farms service ships is aimed at maximising the efficiency of new offshore wind farm service vessels. "These vessels have to move people quickly in rough offshore sea conditions, transferring maintenance personnel from shore or mother ships onto turbines," Pachot explains. "That is why we have come up with a specific notation." *NA*

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European researchers focus on ship energy efficiency

Energy efficiency and environmental considerations are today's driving force for ship operators to reduce costs and become greener. Dr Jochen Marzi, director CFD and Research at HSVA explains the latest programmes

Economic pressure and international legislation require a sensitive use of energy resources and a reduction of the associated emissions. While these constraints became apparent some years ago, major European maritime stake holders started a number of research activities to aid the industry to meet expected environmental targets as well as cut costs related to energy consumption for seaborne transportation.

At present, the Sustainable Surface Transport Programme within the EU's 7th Framework Research Programme contains no less than eight R&D projects directly addressing energy efficiency and environmental aspects. These projects form the core of an initiative gathered under the name of *Green Ship Energy Efficiency Network – GreenSEENet* – which is further complemented with other research performed for example on national levels at the various member states.

This network of energy efficiency and greening activities is expected to deliver the technologies of the future which will help to render shipping greener and more cost efficient in the future. The following article describing the TARGETS project is meant to start a series of similar stories on a number of related on-going developments.

TARGETS for seaborne transportation

The EU funded TARGETS project – Targeted Advanced Research for Global Efficiency of Transportation Shipping (*www.targets-project.eu*) – provides substantial improvements to ship energy efficiency by adopting a holistic approach to model and optimise energy consumption with a focus on a variety of operational conditions encountered through the life-cycle of a vessel. Lead by coordinating partner HSVA, 11 partners form industry and research / academia have joined forces in this project. These include: University of Newcastle, University of Strathclyde/SSRC, Maersk, Alpha Marine Systems, CMT, Istanbul Technical University, Technical University of Hamburg-Harburg, Marterra S.A., Safety at Sea and the Shipbuilders and Ship repairers Association UK.

Developments comprise tools and concepts to be applied in ship design and operation. Integrating component-based knowledge of resistance and propulsion, main on-board energy consumers and alternative/renewable energy sources at system-based level, the TARGETS energy model will allow the group to achieve significant improvements to the overall energy efficiency of ships through using advanced modelling techniques.

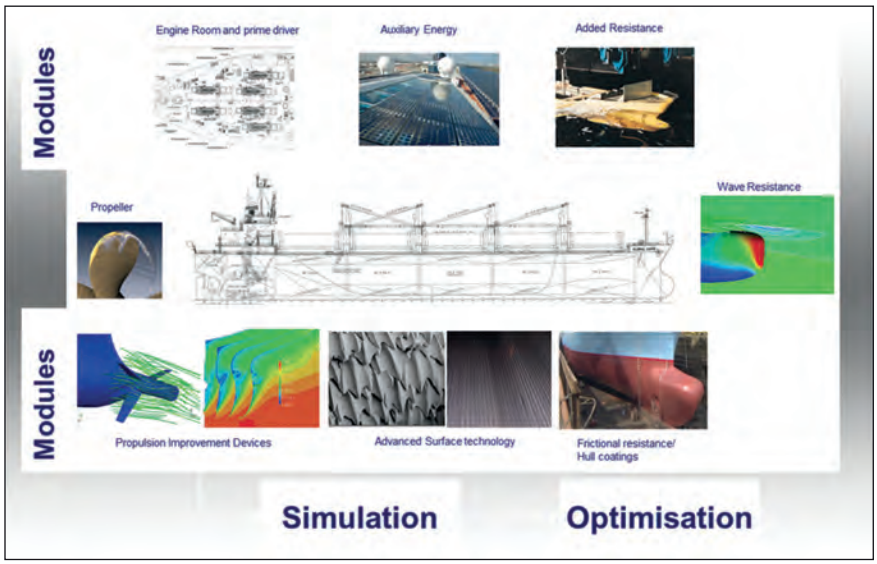
The TARGETS concept

Ship emissions are directly related to the energy efficiency of ship operations. Besides technical features such as exhaust gas cleaning or similar, an energy efficient vessel will always prove to be a "cleaner" vessel compared with a ship not optimised for energy consumption. The most efficient solution will consequently be to first save energy and, in a second stage apply additional technologies to artificially reduce emissions, which in turn will consume mostly additional energy. The TARGETS project focuses on a holistic analysis and improvement of energy aspects related to ship operation at sea.

To achieve the goal of a ship optimised for energy consumption the TARGETS project takes a holistic view at the causes of the use of energy during ship operation. In doing so, the project addresses:

- The most important hydrodynamic causes for energy consumption, for example ship resistance and propulsion.
- Promising technologies for auxiliary energy generation (from non-fossil sources)
- The management of energy consumption onboard a ship
- The integration of technologies to reduce energy consumption into a holistic management & simulation system.

Figure 1. The TARGETS Concept – a holistic energy model for transport vessels



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Hydrodynamic efficiency

As TARGETS focuses particularly on cargo vessels, hydrodynamic effects are typically the prime cause of energy consumption. Other than for passenger ships where hotel loads and other auxiliary systems are large contributors, cargo vessels use up to 85% of all practically available energy for propulsion, excluding all internal losses in a combustion engine which are not part of the present study. Consequently, a focus on low drag/ship resistance and improved propulsive efficiency promises the largest gains. Adapting the operational profile to environmental influences, that is ship speed vs. sea state and wind conditions will further help to achieve a global optimum in terms of energy consumption.

Ship resistance

Ship resistance is made up from different components: (i) the pressure or form related wave resistance, (ii) the viscous drag, and (iii) the added resistance due to wind and waves. Due to the different causes these resistance components need to be considered at different stages of the vessel's life cycle. Pressure related components depending on the hullform are a design feature while viscous resistance largely hinges on the surface quality, which is initially determined by production quality, the hull coating and maintenance. Especially the latter is clearly related to the operational stage of the vessel. The same holds for added resistance due to wind and waves, which can be influenced through weather routing. The following figure indicates the decomposition of ship resistance which is used in TARGETS to integrate this part into the overall dynamic energy modelling (DEM).

With different physical laws ruling individual aspects of ship resistance there

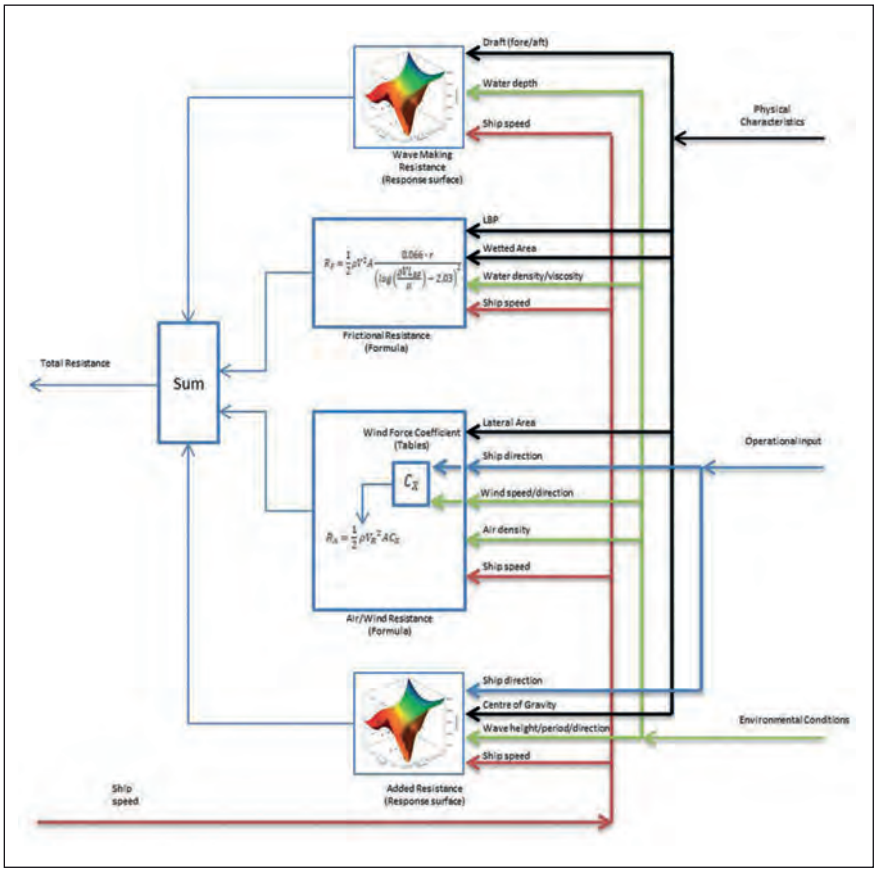

Figure 2. Ship resistance decomposition in the TARGETS dynamic energy model

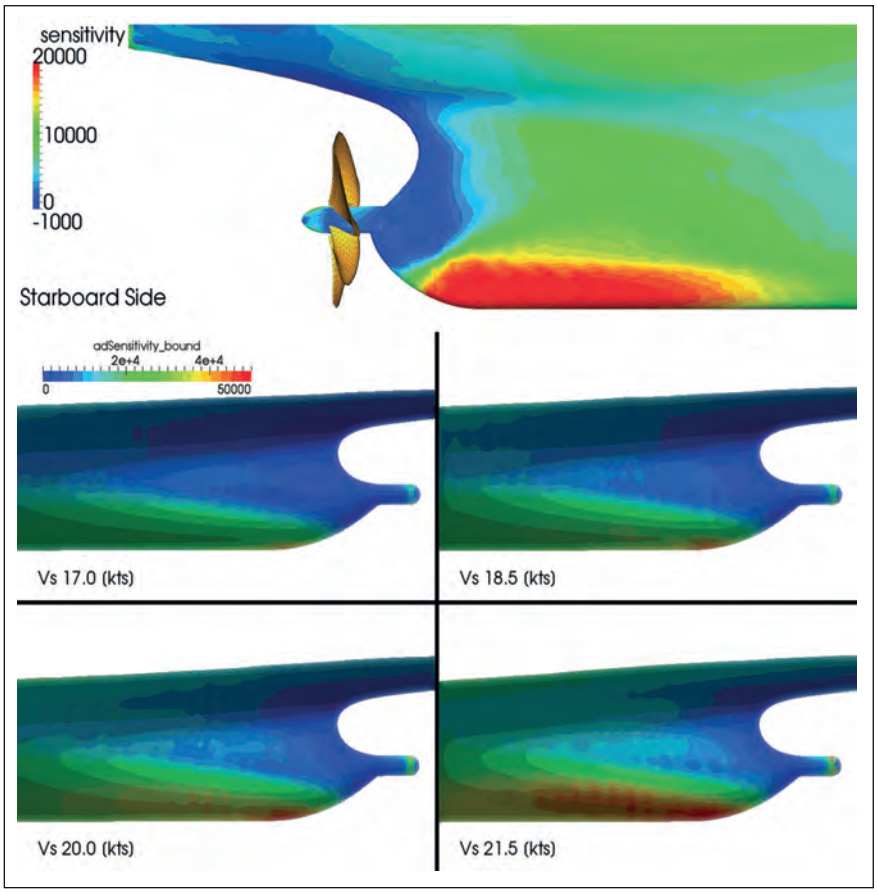

Figure 3. Predicted sensitivities: Bulk carrier with active propulsion (top), car carrier at 4 different speeds (bottom)"

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is no single means to predict operational ship resistance as a total. Although modern state-of-the-art RANS codes offer the potential to compute the total resistance of a ship, this is typically limited to clearly defined, standard conditions, that is a new vessel during trial conditions. Further factors imposed during operation over the life cycle of a vessel including hull fouling, added resistance in a seaway, etc., still need to be superimposed on the basis of empirical methods.

TARGETS develops a number of new tools to provide better input to the overall prediction of hydrodynamic forces for a ship in operation. These cover both form – pressure - related components as well as viscosity-related contributions with the aim to shorten complex CFD optimisations. While hull form optimisation is a key element of ship design which largely influences energy consumption, a new path is chosen to overcome the shortcomings of today's panel-code-based optimisation methods.

As much as these methods benefit modern ship design, they suffer from the absence of viscosity in the simulation and hence do not offer the full potential CFD can provide. In contrast, RANS methods allow capturing all relevant flow phenomena at a largely increased accuracy, but due to much larger computational times they do not lend themselves to fully automatic optimisations easily.

A promising way forward is a novel technique using adjoint equations which compute the sensitivity to disturbances of a target variable or function inside the RANS code *FreSCo*$^+$ parallel to the solution of the momentum equations, (Stück et. al. 2011). This approach is used in TARGETS to perform hullform optimisation for a complete ship including propulsion. The following figure shows examples for computed sensitivities for two different vessels; the upper figure indicates the results for a composite objective function combining ship resistance and wake quality applied to a bulk carrier with active propulsion while the lower figure shows results for the influence on resistance at four different speeds on the aft body of a car carrier.

The adjoint RANS solver is applied to explore the design space for a new ship design. It helps to find optimal hullforms for a new vessel and, thus provides straightforward input to the DEM at the design stage of a ship.

Another important problem arising in both, design and operation is to find optimal hullforms and floating conditions to minimise wave resistance. As the quality of standard potential flow predictions is limited for blunt ships and off-design conditions that is ballast or significantly lower speeds, attempts are made to replace them with RANS based Volume of Fluid (VoF) predictions. These however require substantially more computational effort so that speed improvements are necessary.

The in-house code *FreSCo*$^+$ has been amended with free surface initialisation and changes to the internal algorithms to accept higher Courant numbers. This lead to an improved computational performance that reduces the wall clock time by a factor of four to seven depending on grid size and Froude number. Results shown below in the section on energy audits and simulaion for operational scenarios have been computed using this approach.

Besides form related resistance effects, the project performed fundamental investigations related to frictional drag. One of the major outcomes of the first phase was a systematic characterisation of surface roughness. TARGETS has researched viscous resistance in a combination of experimental and numerical approaches which lead to a characterisation and correlation database for surface coatings and their effect on energy loss. The main parameter affecting viscous resistance is surface roughness. Having performed a large number of tests with different coatings in a dedicated flow cell, roughness effects are now modelled into CFD to capture the effects of a deteriorating surface over time. This novel capability of CFD codes also allows it to perform comprehensive investigations of life-cycle effects of ships over a broad range of different operational conditions.

Besides standard surface conditions, further advanced treatments and surface structures were investigated. In a comprehensive report effects of patterned surfaces (figure 4) have been investigated and their potential has been assessed. In a second step, the potential of different air lubrication techniques will be assessed.

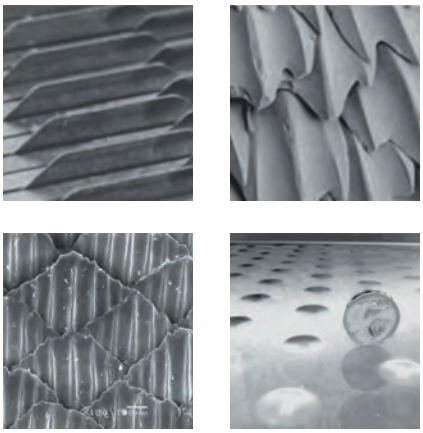


Figure 4. Examples of patterned surfaces: Riblets, Shark skins and Dimples

Finally, added resistance caused by the natural seaway and the wind will be considered. Whilst in a large number of practical cases only rough empirical estimates for the added resistance are used to determine the maximum continuous rating of the main engine for a new design, more accurate methods are available today.

Potential flow based strip methods or panel codes are available to predict the effects of a natural seaway over a large range of conditions (sea state). For more extreme cases RANS-based methods may be applied to assess the effect of either more severe wave conditions or fuller hullforms (tankers, bulk carriers), which exceed the limits of the linearised potential flow methods. Partners in TARGETS investigate the use of both types of methods to predict added resistance

Propulsion

Ship propulsion equally contributes to hydrodynamic efficiency and hence determines the energy efficiency of operations. Increasing propulsive efficiency consequently is high up on the TARGETS development agenda. Research includes improvement of propeller efficiency as well as propeller-hull interaction using conventional and unconventional means of Propulsion Improvement Devices (PIDs). This development will deliver practical design tools for the improvement of the propulsive efficiency for conventional propellers as well as more advanced unconventional propulsion devices.

As a first step, TARGETS developed a focused, high performance standard

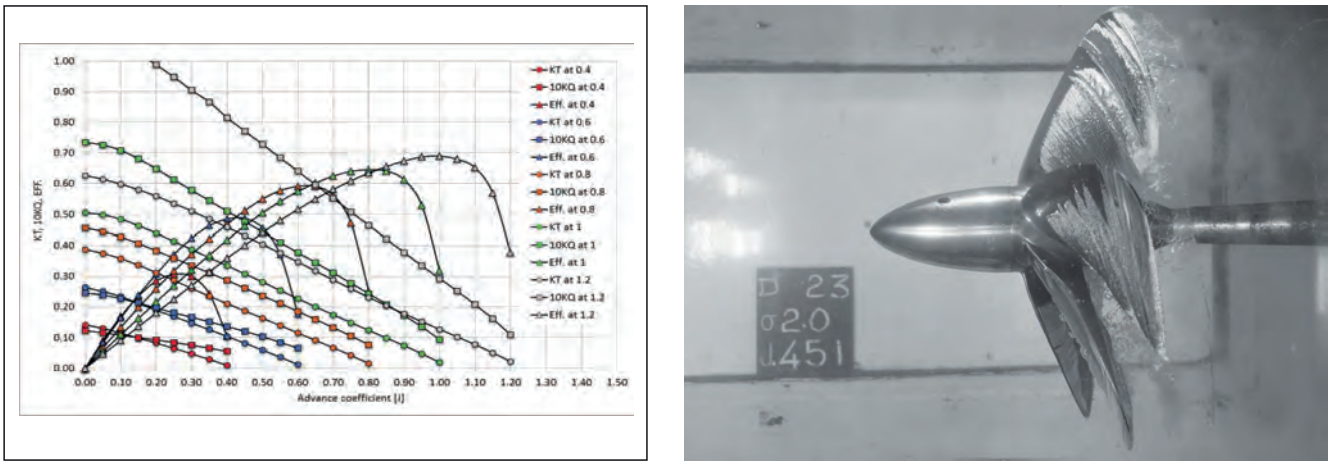


Figure 5. Meridian propeller series performance data (KT, 10KQ, ηo), for varying Pitch / Diameter ratio and cavitation pattern in tunnel test

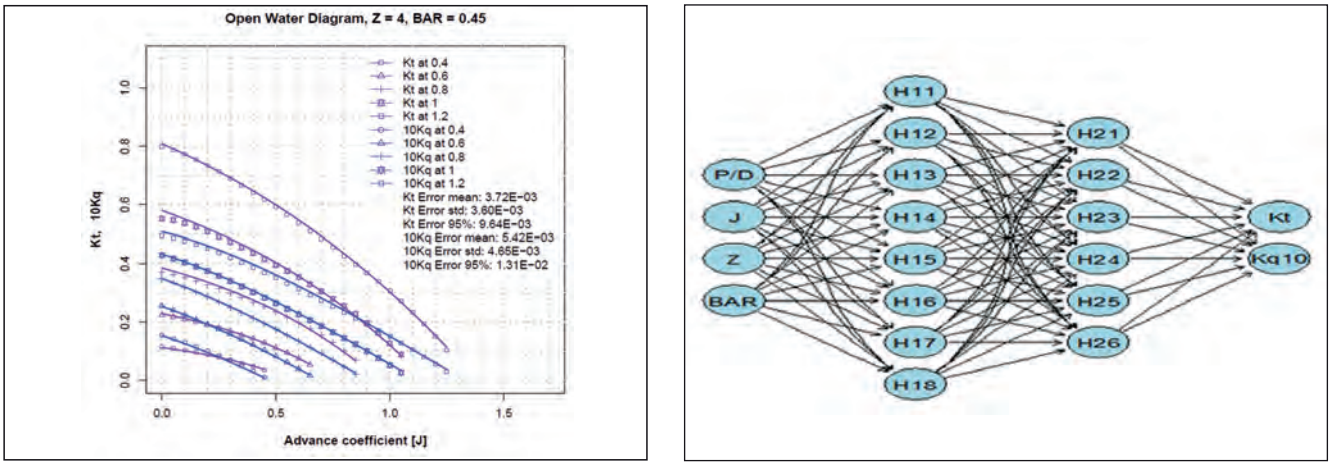


Figure 6. ANN analysis and resulting open water diagram for extended propeller series

propeller series for initial design, based on an existing established propeller series, which forms the basis of subsequent improvements. For this purpose, a strong candidate has been designated as the Meridian Series [e.g. Emerson et.al.], which were originally developed by extensive model tests conducted in the Emerson Cavitation Tunnel of Newcastle University in cooperation with three other members of the consortium.

The series has been expanded in terms of the number of blades, blade area ratios and pitch ratios as well as modern blade outlines (skew) and profile sections to form the Upgraded Meridian Series, a modern high performance propeller series. This extension was based entirely on CFD predictions rather than traditional model tests. Typical open water performance data and the cavitation pattern of a six-bladed propeller during tests in the cavitation tunnel are shown in following figure.

Development of Artificial Neural Networks (ANN) has been performed in parallel to a conventional regression analysis for the calculation of KT and KQ coefficients. The following figure presents the basic ANN used and the resulting open water diagram. This yielded a reliable and user-friendly format for design and analysis purposes, which can be readily integrated into the DEM. The performance data of some members of the new series will be represented in "full-scale" to provide a practical ability to evaluate the full-scale propeller performance.

During the next phase the standard propeller series will be followed by developments for specific PID involving a series of contra-rotating propellers (CRP) for commercial vessels as well as a small range of pre- and post-swirl devices. The development of a coating technology tool will be included too. Based on an established relationship between the drag and roughness of some selected commercial coatings, roughness effects will be built in an in-house propeller analysis code to enhance the drag characteristics of the blade sections accordingly and hence to represent the effect of coatings in the propeller's performance.

Finally, ship propulsion-related activities involve two specific development sub-tasks:

i. A practical optimisation methodology will be devised for improving the efficiency and cavitation performance characteristics of any basic propulsor, which will be selected from the earlier developed series, by taking into account the effect of wake distribution of specific hull forms
ii. The development of a novel hull flow improvement means, which is a boundary layer alignment device (BLAD), initiated in-house by partner HSVA requiring further development using RANS-based design and analysis approach.

Auxiliary energy

Using environmentally-friendly fuels and alternative, renewable energy sources will largely improve the environmental footprint of shipping operations. The TARGETS project consequently investigates the potential of such alternative energy sources and the integration of energy storage in the entire energy household onboard ships.

Fuel cells offer a large potential for change of existing energy supply structures. Thanks to extensive research programmes rapid technological developments have taken place so that these technologies become more and more attractive also for the maritime industry today. TARGETS looks specifically into new technical solutions, exploring the opportunities for an increased use of environmentally-friendly fuels (dual or multiple) and alternative energy sources – photovoltaic installations and wind energy – for auxiliary uses.

This leads to a comprehensive presentation of available technologies for energy storage, applicable to cargo ships covering four categories: mechanical, electro-chemical, thermal storage and fuel cell technology. Available technologies and concepts are validated considering their interaction at ship-system level. This assessment comprises the use of alternative energy sources as well as an overall energy management, and ranks the technologies in terms of their potential for energy savings when applied over long periods of operation.

Figure 3.1: Photovoltaic installations on ships

Two dedicated application cases are presently developed: firstly, a model of an auxiliary fuel cell supply system for a ro-ro-carrier and secondly a system for a container vessel. In the first case, the main focus will be the usage of fuels with a flash point lower than 60°C (for example LNG/LPG) in combination with the main engines as well as a primary energy source for the fuel cell system. The container vessel case will focus on the simulation of waste heat powered by onboard hydrogen generation in order to allow a semi-emission free harbour mode. The main topics that will be addressed cover:

- Establishment of the Fuel Cell concept for maritime applications by model based design
- Development of a robust, generic and profitable basic system for using fuel cells as a reliable alternative source of energy
- Simulation of the integrated model.

Wind is another source of natural energy freely available at sea. The potential of wind energy to be used for ship propulsion is substantial, and forms an attractive alternative for certain services and operational conditions. TARGETS has investigated a range of possible modern "wind propulsion" options covering kites, Flettner rotors or modern rig types, either fixed wing options such as the Dyna rig or more conventional designs such as

Figure 7. Dyna Rig (wind tunnel model) and Power generated as a function of wind speed and angle

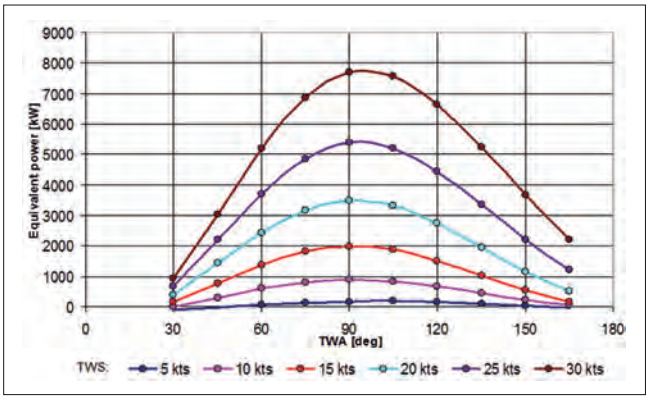
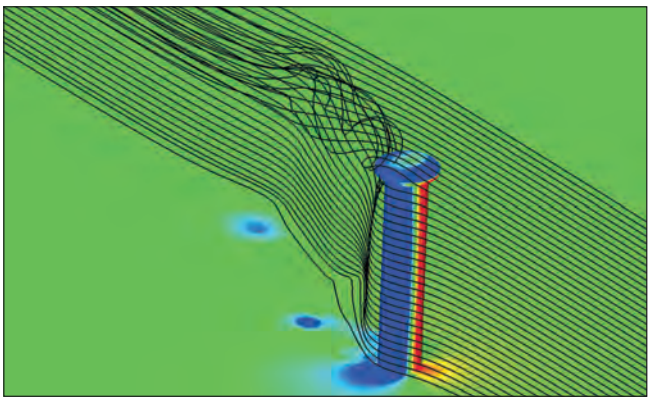
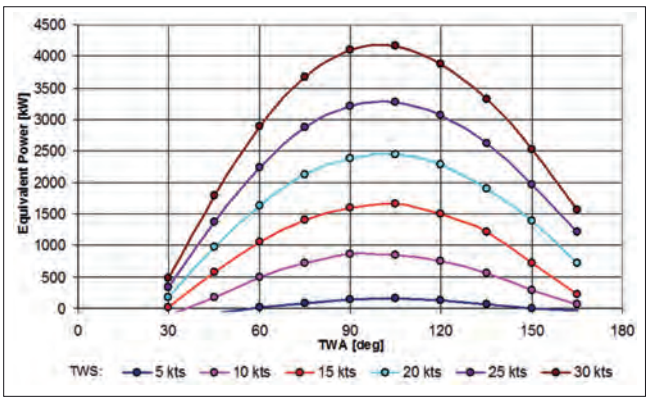


Figure 8. Flettner Rotor (CFD simulation) and Power generated as a function of wind speed and angle





the Indosail rig. Renzsch (2012) gives an assessment of equivalent horsepower for Dyna rig equipped bulk carrier obtaining up to 7500kW power. The figures 7 and 8, which show some results of the wind power study performed in the project.

Energy audits and simulation

Energy Audits are anything but new for the land-based industry. However this concept is only recently applied to ships, mainly because shipping contribution to CO_2 emissions represents a very small portion of the world's emissions and related international legislation for emissions from ships has recently been put into force. Nevertheless, energy audits conducted at proper intervals can provide a thorough insight of the hull and machinery energy performance trends. This, together with the day-to-day ship monitoring may lead to an optimisation of performance, effective reductions in fuel consumption and evident financial benefits.

TARGETS undertakes the task of performing Energy Audits on cargo ships such as container vessels, tankers, bulk carriers and ro-ro vessels, with the aim of identifying Energy Saving Potentials (ESP). ESPs are defined as the room for improvement (to procedures, processes or equipment or replacement of equipment with more efficient and / or better sized units, etc.). They are identified when measuring and analysing an energy consuming / converting system, which can lead to increased energy efficiency and decreased energy consumption. The ESPs are identified through the investigation of a number of energy consumption indicators, which are determined according to past experience gained in this field by the TARGETS partners.

Operational scenarios covering all modes of operation (fully laden, anchorage, loading / discharging, ballast voyage, etc.) are considered for a variety of weather conditions, where there is documented evidence of poor performance of the ships under consideration. These scenarios address aspects of:

i. Replacement of installed energy systems with others of more fit-for-purpose performance, and
ii. Energy management during operation i.e. identification of the systems that do not perform as expected under the current operational conditions and require various levels of intervention.

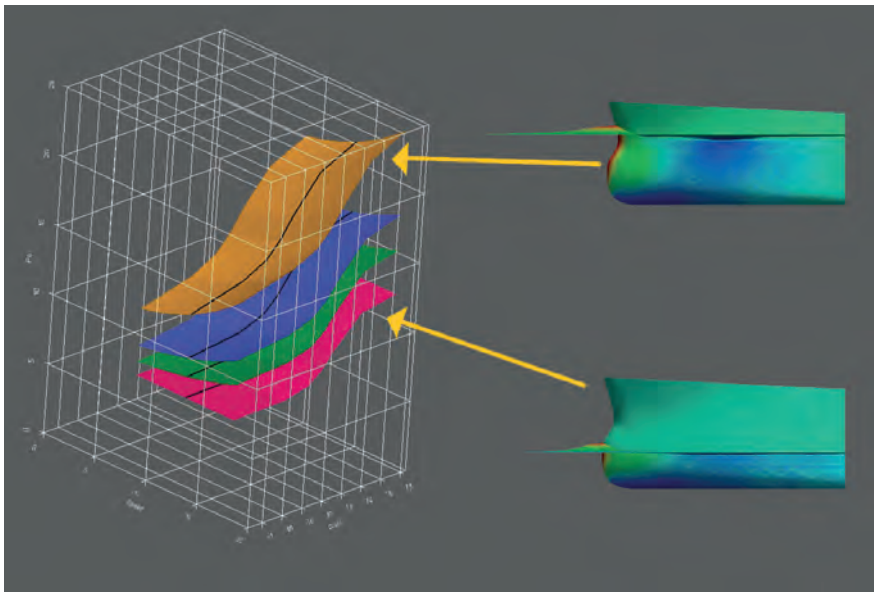


Figure 9. "Simulated response surface – Power requirements for different operation conditions"

The identified ESP highlight the areas of largest impact and describe the maximum achievements in terms of energy savings, when applying the best possible set of technologies and routines available in the industry whilst not sacrificing fundamental aspects of waterborne transportation such as safety of lives and cargo at sea.

The results collected from the onboard investigation of the abovementioned ESPs are analysed and ranked based on a Cost-Benefit Analysis in order to obtain the required conclusions. A comparison of the theoretical CO_2 emission against actual onboard measurements is performed. The actual NO_X and SO_X emissions will be measured too. Energy performance benchmarking will also be undertaken, with the purpose of comparing the selected ships' performance against industry standards, with the objective of improving their performance. For this, simulations using tools described above are applied. The following figures shows numerically predicted results for propulsive power for a capesize bulk carrier.

For the different benchmarking cases pre-defined comparisons will be performed with design alternatives generated in DEM. The latter will cover a broad range of different options and combinations of technologies identified and developed in the course of the project.

Dynamic energy modelling

Recent developments in the maritime industry strongly advocate performance-based approaches in the assessment of the operational behaviour of ships. Stemming from a long incubating period in the area of safety, the environmental performance of a ship arrives as a follow-up requirement and occupies the top lines of the agenda of all national and international forums related to global warming, GHG emissions and over-utilisation of natural energy sources. Although shipping is the most environmentally-efficient means of transportation (low ratio of emitted gases over transport capacity), it attracts attention as the vast majority of ships use fuel of poor quality, a fact which in combination to the increased shipping traffic due to emergence of new economies in the international markets, is expected to raise the contribution to GHG of shipping substantially in the immediate future.

Not-withstanding this situation and in direct response to the immediate need to rationalise further the design and operation of cargo ships, the partners in the TARGETS consortium elaborate on the development of the DEM

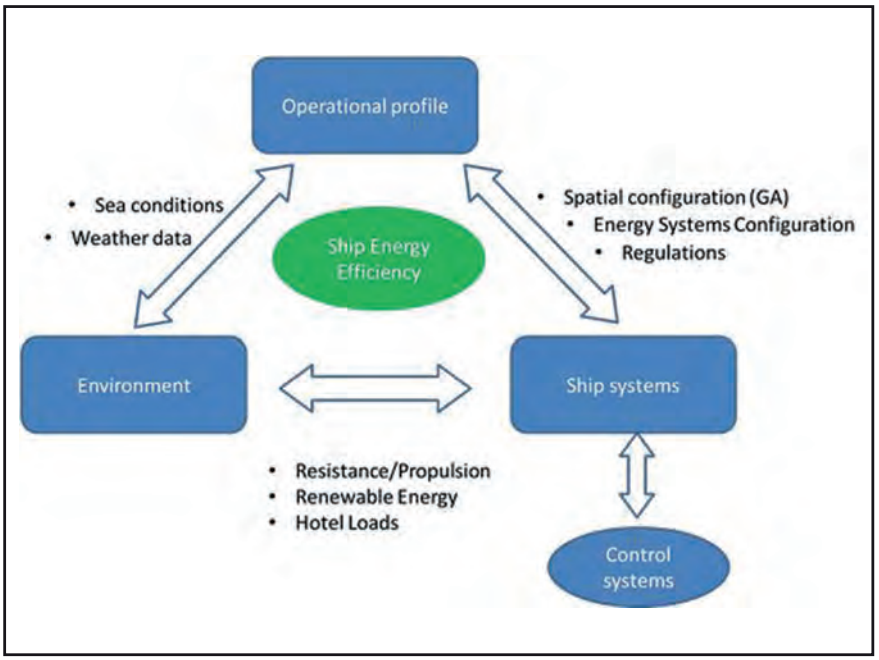


Figure 10. The interactions in the DEM methodology

methodology, (Mermiris et al, 2011), which aims to capture *holistically the transfer, conversion and storage* of energy onboard a ship as a function of its operational profile and over long periods of time or during its commercial life-cycle. The foundation of DEM is comprised by the mature knowledge in (i) the hydrodynamic performance of ships, and (ii) the energy systems onboard a ship (internal combustion engines, hydraulic and pneumatic networks, electrical networks, and HVAC systems). In this context, the main body of development is concerned with the compilation of *energy modules* pertaining to the performance of each system onboard, and their *integration* from local level to ship-level in order to create an overall energy model for the ships that will be considered in the course of the project. Table 1 presents the list with the generic modules that will be used in TARGETS.

Table 1: Generic modules used in TARGETS

Module name
Compressible / incompressible fluid volume with convective mass and heat transfer
Radial compressor
Exhaust gas turbine
Incompressible fluid pump (fan)
Rotational / translational energy storage
Heat exchanger
Piping / fitting
Phase change fluid with convective mass & heat transfer
Induction motor
Synchronous generator
Transformer
Lighting
Fictitious module

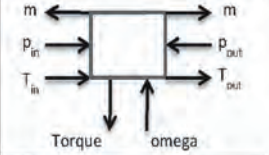
Potential Variables	Flow Variables
Pressure	Volume Flowrate
Force	Translational Speed
Torque	Rotational Speed
Temperature	Entropy Flow
Voltage	Current

Table 2: State variables

Each of the energy modules is associated to a set of equations corresponding to its operational state and coupling to other modules, and with a set of *state variables* (Table 2). These conjugate variables were first introduced in the *Bond graphs* (Paynter, 1961), a modelling methodology for multidisciplinary systems. In this manner, the selected energy modules constitute the building bricks, which are repeatedly utilised for the configuration of any ship energy model. Table 3 depicts the specifics of module *Radial Compressor*, (Mermiris and Mermiris, 2011), as an example.

DEM is developed to be inherently *modular*, a fact justified by the need to assess alternative configurations of systems (especially during the design stage), and to identify the contribution of each system individually to the overall energy performance of the ship. The latter point is also linked to the optimisation (for a set of operational conditions) and energy management onboard, which are central to the energy performance of the ship. Moreover,

Table 3: Example of module configuration of Radial Compressor

Input	p_{in}, p_{out}, T_{in}, ω
Output	$\dot{m}$, T_{out}, τ
Parameters	Performance maps
Pictorial representation of module	
Indicative application	Air compressor

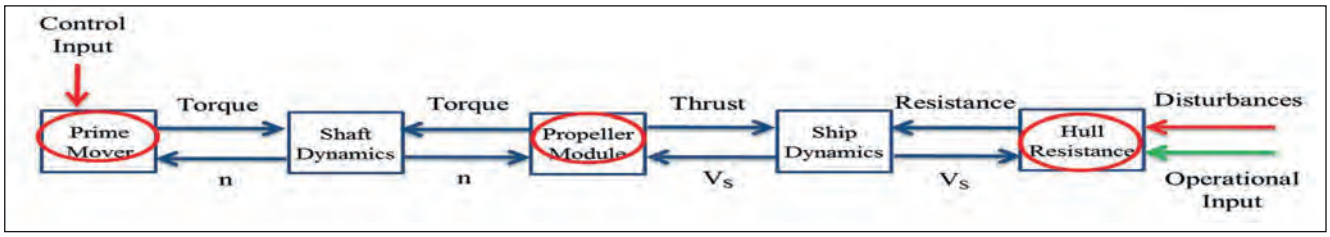


Figure 11. Integration of TARGETS components into the energy model of the ship under consideration

the modularity of the methodology allows the integration and assessment of alternative sources of energy (solar, wind, fuel cells, etc.), which have started receiving attention in the maritime industry recently.

Finally, it should be noted that the combination of energy audits and ESP has a dual input to the simulation results with DEM. The on-site measurements will be used for the benchmarking of the DEM results and, following this, the ESP will set the basis for alterations that will improve the energy efficiency of a ship. These alternative configurations (either in the choice of systems of different capacity or combination of systems) will be assessed with DEM. The outcome of this work will be compiled in a set of guidelines for the improvement of the energy performance of cargo ships and will constitute one of the major outcomes of TARGETS.

Conclusions

Bringing together the principal elements determining the use of energy onboard a cargo ship and integrating them in a holistic simulation TARGETS assess key elements responsible for the use of energy. The interplay of advanced hydrodynamic tools for resistance and propulsion together with models for engines and auxiliary machinery as well as auxiliary energy converters complements a comprehensive dynamic energy simulation model for the complete ship. Benchmarking against dedicated energy audits will prove the viability of the concept towards the end of the project.

The final dynamic energy simulation tool to be delivered at the end of the project will be applied through a number of stages during the life cycle of a ship. Starting from the assessment of early designs throughout its operational stages the dynamic energy model will allow assessing energy consumption of a ship and guide users to achieve optimised levels of energy consumption. *NA*

Acknowledgements

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Mastering the challenges

Last year the framework conditions for shipbuilding and marine technology were extremely difficult for the German shipbuilding industry, but Germany is adapting to the change in market demands says the German Shipbuilding and Ocean Industries Association (VSM)

The slump in demand, difficult financing conditions and low construction prices formed an extremely problematic environment and required further structural adaptations. In 2011 the deliveries of commercial vessels from German shipyards were significantly below the results of previous years, so that the total turnover of the shipyards was also greatly reduced, which also had a knock on effect to the supply industry with fewer orders and a time lag on those orders.

However, VSM, which stands for Verband für Schiffbau und Meerestechnik, has said that in spite of the existing problems, shipbuilding and marine technology in Germany are well positioned in a European comparison and form the basis of a maritime growth strategy, which is essential for overcoming maritime targets, ranging from green shipping to regenerative energy supply, particularly in the field of offshore wind energy.

Currently the shipyards have five orders for the construction of platforms for offshore wind parks (Nobiskrug (2), Nordic Yards (3)), furthermore there are also three installation ships for the offshore industry (P+S), a jack-up vessel for offshore wind parks (Sietas), a research ship (Neptun). In recent weeks Flensburger Schiffbaugesellschaft (FSG) has received two additional orders for Seismic vessels.

Finance

Ship finance has become significantly tighter following the collapse of Lehmann Brothers and the subsequent economic crises, including the Eurozone difficulties, which have led to banks refusing to accept, what they see, as significant risk. Therefore, functioning financing instruments are essential, says VSM. For example, the necessary adaptation and expansion of export credit insurance and federal state guarantees.

Financial instruments such as the Export Credit Guarantee Scheme (in accordance with the OECD consensus) are being used. Federal export credit guarantees support enterprises in their efforts to open difficult markets and expand traditional markets in unfavourable times. By taking out Federal guarantees, exporters and banks protect themselves from country and buyer risks involved in export transactions. Also, Federal State Guarantees (in accordance with Community Law). The federal states take over maximum 80% of the credit sum as a completion guarantee for covering investments or capital loans. These guarantees are applicable to the national shipping and shipbuilding sector.

"More difficult financing options are initially worth mentioning in this regard. The increase in equity capital requirements and lower willingness by the banks to accept risk lead to considerable problems in ship financing. The German shipbuilding industry suffers, as the shipbuilding industries in many other countries from a structural financing deficit, where it is often, even for merchantable newbuilding projects, difficult to find credit capital. The more specialised the purpose of use, the more difficult is the realisation in cases of insolvency and hence the higher are the risks for the creditor. This is one reason for conventional investors and creditors shying away from ship- and yard-financing today. Therefore, functioning and reliable financing instruments are essential for the shipbuilding industry", says Kathrin Ehlert-Larsen of VSM.

After a relatively positive first half-year, order development in the construction of merchant vessels in Germany remained behind expectations in the second half of the year. Nevertheless, the result for the full year was better than in the previous year with regard to the number of ships and the order values. The 28 ordered ships comprised an order value of €3 billion (US$3.6 million). The main shares were distributed (on a CGT basis) among passenger vessels (56%), yachts (15%) and other non-cargo vessels (16%); three larger offshore installation vessels mainly contributed to this, which mark important successes for the increased entry of German shipyards into the offshore market. The rest is distributed across, inter alia, special-purpose cargo vessels, gas tankers and research vessels. As the newly received order volume exceeded

German shipyards adapt to changes in the market

the deliveries, order books as of the end of December 2011 increased slightly again. They comprised 71 orders with 1.6 million CGT and an order value of €8.4 billion (US$10.3 million), of which 97% related to foreign orders. However, the capacity utilisation situation of the shipyards remained inconsistent. Furthermore, the shipyards had four orders for the construction of platforms for offshore wind farms. These orders do not go into the shipbuilding statistics, but with an order value of €170 million (US$208million), they represent a considerable employment volume for the shipyards.

Reductions in demand and cancellations due to the crisis in the years 2008 - 2010 had a negative effect on production and resulted in only 31 ship deliveries from the larger shipyards. With their tonnage of 442,000CGT and order values of €2 billion (US$2.4 billion), production more than halved compared to 2010. 92% of the delivery volume related to ships for export.

The turnover of the shipyards with construction and repairs in naval shipbuilding remained at around €1 million (US$1.2 million) in 2011. On a long-term average, they therefore account for around 20% of the total turnover of which 70% was generated with exports. Additional significant added-value has been achieved in the area of the maritime supplier industry for naval shipbuilding, which has equally had high export rates.

The turnover for shiprepairs, conversions and maintenance was maintained at the previous year's level in 2011, at €770 million (US$946 million). However, the trends were inconsistent with the individual German shipyards. The German shipyards were particularly successful in competition when, e.g. with respect to conversions, the clients attached great importance to quality, adherence to schedules and comprehensive engineering and design effort. Due to the efforts to reduce emissions and the rising fuel prices, conversion work and refitting services for improved efficiency, as well as environmental protection technologies continue to offer a high potential for demand.

The impact of the shipping crisis was clearly noticeable in 2011 for the inland vessel shipyards with the construction of cargo vessels. The continuing demand for special-purpose vessels for public clients, as well as the very good order development with passenger and river cruise vessels led to a positive overall result. Furthermore, many shipyards specialised in sophisticated conversions, modernisations and repairs. Fluctuations in capacity utilisation were flexibly compensated with the provision of supplies for the construction of ocean-going vessels or services outside of the shipbuilding industry, so that the German inland vessel shipyards were essentially able to report full capacity utilisation. In 2011, the inland vessel shipyards delivered 44 inland vessels with a value of around €134 million (US$164 million). These included nine passenger/river cruise vessels and ferries with a value of €95 million (US$116 million), seven cargo vessels/cargo-carrying units (€19 million/US$23.3 million) and 28 harbour, authority and special-purpose vessels (€20 million/US$24.5 million). In 2011, 59 units were taken in with an impressive value of around €322 million/US$395 million. Among these were 10 river cruise vessels alone, as well as eight passenger and ferry vessels different in terms of their design, which represented a total order value of around €271 million (US$333 million).

The shipbuilding supply industry, with approx. 70,000 employees, initially reported good to very good business development in the past year, due to the high level of exports. The declining business trends with shipping companies and shipyards in Germany were compensated by stronger global positioning with expansions in new markets such as India and Brazil. The environmental protection requirements and the trend towards higher energy efficiency had a positive impact on construction and repairs. The business was also supported by the demand by the offshore industry for oil production, gas production and wind power generation. However, during the fourth quarter, the falling demand in global shipbuilding had an impact on the entire supply industry.

German marine technology generated a turnover of approx. €11 million (US$13.5 million) and reached a global market share of around 4%. These figures have remained virtually unchanged since 2008, with the exception of the crisis year 2009. However, the outlook is positive due to high investment expectations, particularly in the deep water segment. The offshore segments with the highest turnover include oil/gas production and wind energy utilisation, which has become an important pillar for the German vendors due to its dynamic development. This has created a distinct spin-off effect in the shipbuilding industry.

The legal requirements for ship safety as well as marine environmental and climate protection pose additional challenges. With the implementation of new environmental standards, economic incentive systems and direct, practice-orientated supporting measures should be provided.

"With special-purpose vessels, offshore platforms and structures, as well as the devlopments of clean and energy efficient technologies, the structural change in the German shipbuilding industry is on the right course", says the Werner Lüken, chairman of VSM. "The current keywords, 'green shipping' and 'blue growth', stand for real growth propects, if these are dealt with across industries, segments and countries using concrete measures."

However, VSM notes that improvements in the framework conditions are essential for this, in order to bear up to the tougher competition, which is being triggered by the aggressive acquisition policy, particularly in Korea and China. The unbridled expansion of construction capacities by both countries far exceeds the medium-term and long-term demand for new ships with the consequence that the Asian competition is also trying to penetrate the niche markets of special-purpose vessels.

Furthermore, extensive support programmes are being established far more intensively e.g. in Asia than in Europe.

"In order to counteract this, we need an offensive industrial policy strategy, industry-appropriate framework conditions and particularly the goodwill and willingness to cooperate of all participants in Germany and the EU!" states Lüken.

He goes further by saying that without active political support, the existence of the entire maritime economy will be put at risk. The political decision-makers in Berlin and Brussels must finally back their commitments to the high strategic importance of the shipbuilding industry with actions, so that the necessary follow-up orders can be acquired and possible company collapses can be avoided.

If the German shipyards are pushed out of the market, major parts of the supply industry would also be at risk. Loss of the maritime expertise in Germany and Europe would quickly lead to a dangerous dependence on Asian shipping and shipbuilding countries, which would threaten Germany's economic independence in the long term, highlights VSM.

These major challenges increasingly require a concerted approach. The continuation of the "LeaderSHIP Germany" process and the implementation of the action recommendations of the 7th National Maritime Conference (NMK) form an important basis for this.

"The reorientation towards the high-tech and growth markets in the construction of special-purpose vessels and the offshore sector is correct, without alternatives and ultimately successful. But, we know that the new course is difficult and safe waters have not yet been reached," emphasises Lüken. *NA*

Catching the wind

German maritime kite manufacturer SkySails has taken it product development a step further by introducing its Skysails Performance Monitor as a standalone product

A vessel's fuel consumption and profitability heavily depends on operating conditions such as waves, wind and load. As these conditions change dynamically during sailing, finding the optimal settings for operational parameters such as speed and trim without a proper tool is a fairly complex task for captains and fleet owners.

"When we developed the kite we realised that you need information about the waves, ship motion, etc. We developed a programme that could take this data and helped optimise the vessels' performance along with the kite," says Stefan Wrage, managing director, SkySails. "The development of a separate performance monitoring product came as a natural step forward."

The performance monitoring tool constantly collects data about the operating conditions and analyses this information in real-time in order to deliver a meaningful description of the reality, making transparent the interrelations between the various factors that determine which settings are optimal for operating a vessel.

The Skysails Performance Monitor

By providing real-time onboard and onshore data and decision support the performance monitor offers the ease of use required to improve a ship's operational efficiency and also substantially reduces both fuel consumption and emissions, says SkySails.

The performance monitor displays relevant data for operational optimisation on the bridge, which includes recommendations about the optimal ship speed based on ambient conditions and economic data such as fuel price and charter rate. The master can also read off the display; the most profitable speed (highest time charter equivalent), the most economical speed (lowest fuel use per nautical mile) and the ETA speed (optimal ship speed for just-in-time arrival). The monitor shows real-time display of the ship's resistance curve (fuel consumption over speed) and information for empirical trim optimisation.

Data required for preparing position and voyage reports is compiled and communicated to shore automatically by the performance monitor. Using the performance monitor as a centralised reporting tool, the crew has to enter much less information. "The information that is provided tells you what you need to know, from this the ships master can optimise the performance of the vessel," says Wrage. "The interface has been developed with the masters of SkySails customers."

Additional recordings can be added as an option for any existing or future equipment such as rudder position, torque, data from the main engine and generators, ballast water treatment systems and fuel switches. All data is displayed onboard and automatically sent to shore on demand or in regular intervals and is included in respective reports.

"A year's average savings is around 10-15%, on a medium sized ship we expect around 10%, but for larger vessels this could be around 4% as the larger a vessel gets the less efficient in waves it becomes. We have conducted a study of a 90m vessel that made a saving of 300kg per day of energy, with a base line of 6tonnes", says Wrage.

Stefan Wrage, managing director of Skysails

The performance monitor provides vessel performance data analysis as a report after every voyage, including benchmarking and display of key performance indicators and increasing transparency for complete operational overview. Position and voyage report data is imported automatically into existing report formats hence reducing workload onshore.

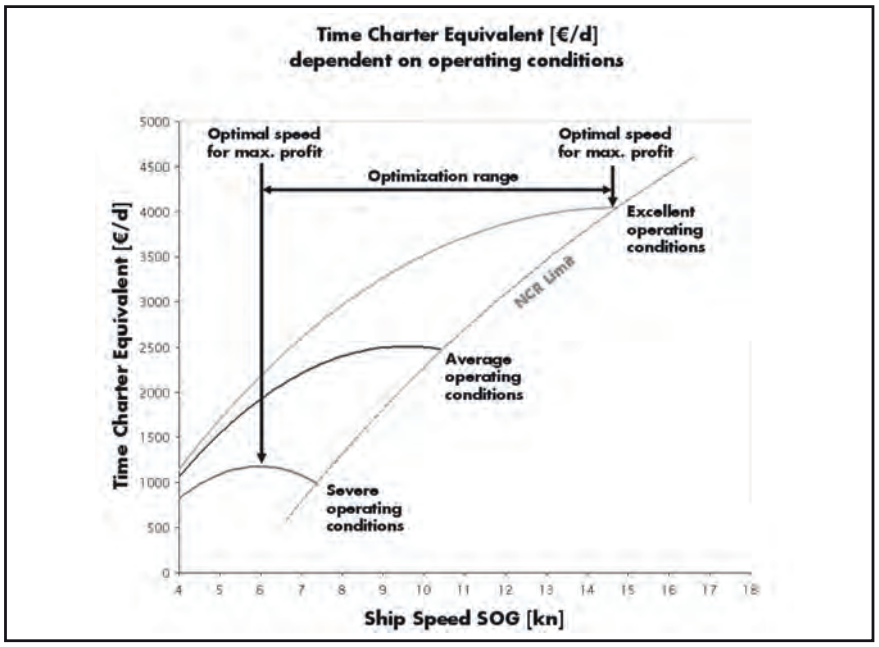
The data provided by the SkySails Performance Monitor creates the basis for joint decision making between ship management, chartering, operations and the crew onboard, allowing for operational optimisation such as improved voyage planning. Voyage instructions can be sent onboard via the performance monitor.

By including economic data into its analysis the performance monitor provides

a yet untapped class of information to which the actual operational settings onboard and the results of a voyage can be compared to the optimum. This gives information on what time and for what reason the optimum has, or has not, been realised.

"Economies and ecology can be achieved by this product with a payback of six to 12 months," says Wrage. "We can also clock the wind and in future will be able to do business studies of routes using real data that has been collected."

As the basis for planning and improvement within the SEEMP process, shipping companies need a support system that collects and checks an array of data to uncover opportunities for optimisation and to determine the effectiveness of the actions taken. The SkySails Performance Monitor provides raw data for the assembly of a SEEMP including display of the EEOI and emissions values. *NA*



A vessel's operating conditions change dynamically, with heavy impact on fuel consumption and profitability

Building on a new Synapsis

German-based Rayetheon Anschütz gets approval and sees orders for its latest integrated bridge system

The Synapsis bridge control system is the next generation of Bridge systems from Raytheon Anschütz and is the first type approved navigation system according to IMO's latest performance standards for integrated navigation systems (INS), claims the company.

The INS performance standards are specified in the IMO resolution MSC. 252(83) and apply to all newbuildings since 1 January 2011 where integrated navigation systems are installed. According to the standards, an INS is required to integrate the tasks of collision avoidance, route monitoring, route planning, navigation control data display, status and data display and a centralised human-machine interface for alert management on multi-functional displays. "IMO's new INS rules are focused on two subjects: Ease of operation and system safety", Andreas Lentfer, director of business developments, Raytheon Anschütz says.

The company says that by requiring additional functions and a higher degree of system integration, the new standards help making navigation safer and bridge operations simpler and more efficient. Every INS is now required to feature a consistent common reference system (CCRS) to provide ship wide consistent sensor information management.

The system monitors all navigation sensors and automatically selects the best available data. Another major improvement is the intelligent handling and processing of alarms, warnings and cautions within a centralised alert management system, which helps to avoid unnecessary multiple alerts on the bridge.

A key element of Synapsis Bridge Control is the multifunctional workstations, which can replace stand-alone displays like ARPA radars, ECDIS or conning displays. Standardised hardware and software allow customising bridge systems for any ship's requirements in a standardised, but flexible manner. The developed software framework controls all configurations, functional tasks and displays of the bridge workstations but also provides flexibility for system upgrades and extensions.

In addition Raytheon Anschütz has been awarded the contract for the supply of its Synapsis system to two heavy-lift vessels for Jumbo shipping, which are under construction at Brodosplit shipyard, Croatia.

The delivery of the two K-3000 heavy-lift vessels is scheduled for 2013 with an option for a third vessel. The vessels will be 152m long and have a lifting capacity of 3,000tonnes, will service international transport and offshore installation programmes.

The INS includes S-band- and X-band radar sensors, which are configured as full wide-screen multifunctional workstations for chart radar, radar, ECDIS and conning. Two additional multifunctional workstations with the same configuration serve as main and backup ECDIS, another multifunctional workstation with ECDIS and conning function will be supplied for route planning purposes. Additionally, the bridge will be equipped with two fixed-role conning displays.

Within the INS all workstations will be connected through a redundant Ethernet-based local area network (LAN). Relevant navigation data such as charts, routes and sensor information can be shared within the network and stored independently on each system. The integrated consistent common reference system (CCRS) will monitor all navigation sensors and automatically selects the best available data.

On all conning displays within the INS, the operator can access the human machine interface (HMI) of the new CCRS to observe sensor quality or switch over to manual sensor selection mode as needed. The conning also includes a new page for central alert monitoring. The intelligent handling and processing of alarms, warnings and cautions within a centralised alert management system will avoid unnecessary multiple alerts on the bridge.

For manual and automatic steering control, Raytheon Anschütz will be providing equipment from the new NautoSteer AS series and the adaptive NautoPilot 5300. The scope of supply is completed with a double Anschütz Standard 22 gyro compass system, the full package of navigation sensors, and GMDSS radio communication equipment. *NA*

Synapsis Bridge Control is Raytheon Anschütz's latest generation Integrated Navigation System

Vulkan lightens the load

German-based Vulkan couplings has launched its latest in coupling technology with the Rato R+ featuring high dynamic load capacity and enhanced rotational dynamic properties

The Rato R+ has been developed as part of an extended range of its advanced compound technology (ACOTEC) couplings. In the low to middle torque ranges where the handling and installation of a complete element is practical the RATO Ring coupling is an additional alternative. A customised tuning of the system's torsional vibration characteristics is possible due to the variety of torsional stiffness and element configurations available. The radial, axial and angular flexibility of the RATO R+ coupling, with the shortest possible installation length, enables good compensation of shaft misalignments caused by the flexible mounting of the prime mover, foundation movements etc. to be achieved.

The development of the new RATO R+ was primarily focused on the on the centrepiece of the coupling: the elastomer. Innovative research on compounds and highly specialised vulcanisation technology facilitated the development of an elastomer with considerably higher power density. The ACOTEC compound characterises itself in comparison to other conventionally used materials not only with the enhanced tensile strength and tear strength and increased ultimate elongation, but also with a high thermal resistance and lesser ageing effects. Vulkan Couplings guarantees a high level of process stability for the new elastomer from the aspects of manufacturing and further processing, since this involves in-house production processes, the quality of which is subject to constant and continuous control. An application has already been lodged for the industrial property rights for the new ACOTEC elastomer.

Vulkan offers a flexible coupling solution

With this enhancement in power and performance of the Rato R +, which is facilitated by the use of the new elastomer, VULKAN Couplings is falling in line with the latest trend worldwide for increasingly more powerful engines operating at higher speeds: The Rato R + replaces the next higher size of the conventional Rato R respectively. As a result of the lower mass and correspondingly lower centrifugal forces higher speed performance is achieved for the coupling. In addition, the RATO R + has yet another significant commercial benefit since a small size coupling may be used for the same power requirements.

Another product advantage of the RATO R+ compared with other highly flexible couplings which are used in engines operating at high speeds is the great level of ease with which it can be integrated into different drive solutions, says Vulkan. The main components of this coupling serve as the basis for different special designs such as, for example, Cardan shaft couplings or composite shaft systems. *NA*

SAM Electronics launches ECDISPilot Basic

Hamburg-based SAM Electronics, an L-3 company, has introduced ECDISPilot Basic, a new space and cost-efficient ECDIS unit specifically designed in accordance with IMO carriage requirements beginning this July

Simple to install, operate and update, the compact stand-alone 22-inch panel PC system with a high-resolution TFT display is fully compatible with all main chart databases such as electronic chart navigation (ENC) S57/S63, Admiralty AVCS and ARCS, and C-MAP CM93-3. Its features include an extendable navaid sensor interface module, advanced route planning facilities, a separate layer for user objects (Notices to Mariners), overlays of ARPA and AIS targets, on-screen NAVTEX information, and tidal and current data; there is also an integrated conning page. Depending on class, flag and/or customer requirements, the system capability can be extended to include options for a printer, installation of uninterrupted power supply (UPS) facilities, and an interface unit for external radar overlays. Type-specific training is available via SAM Electronics' own training facilities as well as by its own agencies. Alternatively, web-based training is being provided by online tuition specialists, Safebridge of Hamburg. LAN-based systems can be operated either as a stand-alone units or as a functional part of SAM's series of NACOS Platinum integrated navigation control assemblies featuring better operation with flexible architectures, enabling simple installation of third-party applications highlights SAM Electronics. ECDISPilot bridge displays can also be monitored from an engine control room, automated workstations or, if required, the Captain's office. Meanwhile, SAM Electronics, in its capacity as supplier of integrated bridge systems to new-generation cruise liners, has equipped Carnival Cruise Lines' latest flagship recently launched from Fincantieri's Monfalcone yard, the 130,000gt *Carnival Breeze*. *NA*

Incat and the hard sell

Incat has been in the business of fast ferries since the 1970s but "they've been hard to sell lately" according to chairman Robert Clifford. Sandra Speares reports

Fast ferries are becoming harder to sell in the current climate according to one supplier of the vessels; having said that Incat are selling a 50knot plus gas turbine vessel to South America's Buquebus – the eighth vessel for that customer.

The delivery is due to take place in November. "We are also talking with a number of European operators – they are in the market but are very slow about making the decisions," says Clifford.

This slow decision making process is partly due to the fuel costs, but also because of ferry companies existing tonnage in operation. "They don't have to do it and they haven't got the passenger numbers at the moment to justify new boats," he says.

The new and tougher regime as far as emissions are concerned is going to help the company, Clifford says. "Lighter ships running on high quality distillate won't have the same problems as ships running on heavy fuel oil," he explains. "They are going to have to change to distillates or very expensive scrubbers, so we do think the fuel situation is working in our favour. Our ships are light, and light weight ships take less power to drive than heavy ships and are pushing a lot less water."

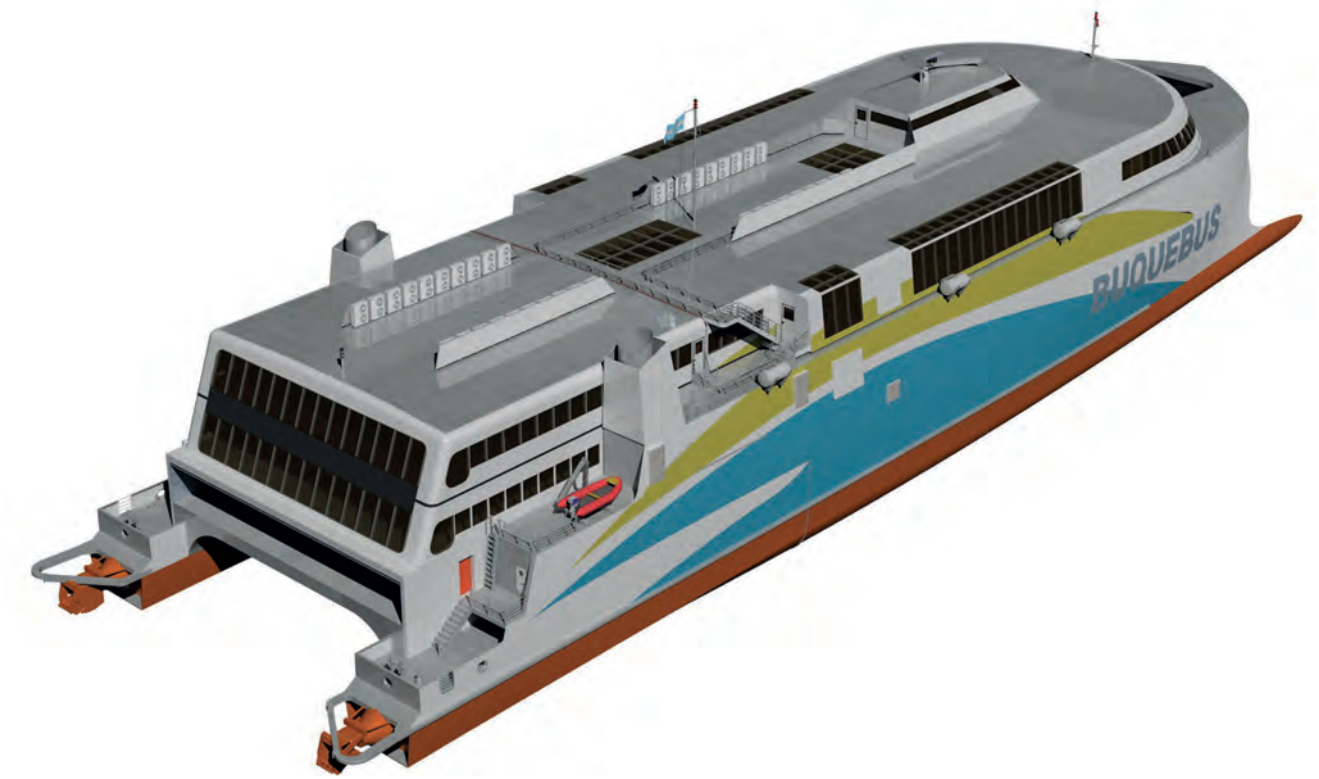
In the past, Clifford says, the company has elected to go fast with that extra power, but in future, he believes ships will be going to what he calls "medium speed". This means speeds of 25 to 30knots rather than 30 to 35 knots. "That reduction in speed will be very fuel efficient for us, and we'll still be faster than conventional ships which in turn have also had to slow down five knots".

Clifford believes that the fuel efficiencies offered by Incat's ships will encourage European buyers to invest in new tonnage, particularly when moving to the next stage of ferry development, notably the use of LNG. "LNG is going to be even less expensive than distillate, how much nobody knows at the moment because there is a big problem with supply of LNG. On paper at least it's going to be a cheaper fuel and more importantly a much more eco-friendly fuel".

Currently there are relatively few places to refuel with LNG ships but "we think that is only one or two years away from changing". Incat is offering potential customers duel fuel engines which mean they can burn distillate and LNG when that is available. "Anyone buying anything other than a duel fuel ship at the moment would be very unwise".

So what of the impact on the design of the ship? Clifford says it does not impact too heavily on the design of catamarans because there is actually space to put the tanks. There would be double bottom standard tanks with gas tanks above. "That complies with all the latest rules and regulations. There are issues with the rules that need to be sorted out with LNG, for example if ships can be re-fuelled at the same time that passengers are being loaded."

The 99m wave piercing catermaran is due to be delivered to Buquebus in November, the no-name vessel is still listed as Hull 069 by Incat



However, he says LNG is proving to be a very safe fuel. While some might think that because it is a gas this is not the case "that has now been proved to be wrong. The LNG industry has an extremely good safety record, largely because the fuel can only burn at a very small window. As a liquid it doesn't burn at all, but when expanded to a gas it has to have almost exactly the right mixture of gas to oxygen or it doesn't ignite, so it is proving to be very safe. "It doesn't easily ignite in the engine, so 1% of distillate is included to fire it.

It does have negatives, Clifford says, because it typically produces a little less power for the same size engine, which means that for fast ferries, slower speeds are required, typically under 30knots, compared to 35knots before that.

For the future, speeds can be reduced still further to 15 to 20knots with smaller engines because the ship at that point, although going no faster than a conventional ferry is only half the weight, so it is burning half the fuel.

"The future is not so much fast, but fuel economy," Clifford believes.

There have been issues relating to the placement of LNG tanks and their proximity to passengers. In a catamaran the tanks are located in the hulls which are isolated from the rest of the ship. "Admittedly the passengers are above them but they are two more decks above them". Incat and DNV have been working together on the issue.

The Viking Line ship being built at the moment has LNG tanks based on the stern of the ship, nowhere near the passengers. "If necessary we could do that as well, but we don't believe it is necessary. "We and DNV are satisfied that the tanks within the catamaran hulls are perfectly safe. Even if they get damaged by a collision the fuel will only pour out. One of the other aspects in our favour is that aluminium does not suffer in cold temperatures, steel does". He does not buy the concept of fire risk for aluminium and says it is a "huge misconception. It is not a fire risk material".

Light weight vessels in the oil industry are much in demand and pose their own challenges, particularly as the oil industry is getting further offshore. For example in Brazil some of the rigs are 100 miles away from the coast and beyond the range of helicopters. "The oil and gas industry is a very strong candidate for aluminium ships in the future," Clifford says.

Fast ferry initiatives with freight have not been so successful so far, largely because ships have to be large enough. "We are getting there," Clifford believes. Incat's I30m prototype "is a ship that will carry a large quantity of freight on the main deck and cars on the upper deck, with bow and stern loading. The payload is getting bigger as the ships get bigger. Fast freight is definitely not far away. "

In the past few weeks Incat has contracted a ship on the straits of Taiwan, which has taken some experimental cargo with a target of 400tonnes a sailing from October carrying containers. "Freight is on its way, but with freight you have to be careful with the economics. The economics of going faster mean you get another sailing in," he explains.

The Far East offers opportunities and they are progressing quickly. "We believe the industry is going to be expanding very quickly on the water, there are a number of places where that is going to be happening, but an obvious place is the Straits of Taiwan because of those who have relatives living in China."

There are a lot of new ferries required for Japan also and Korea has taken a number of second hand Incat catamarans. "Korea will need new boats," he says. "The future is definitely in Asia, we are not going to write off Europe, but we are not going to wait around while they make up their mind what they are doing".

The Caribbean is also a buoyant market and there are now about six or seven fast ferries there, Clifford says. "Two of ours are operating in Trinidad and Tobago and they will need replacing with gas powered versions. Trinidad fortunately has plenty of gas". Buquebus's 50knot newbuild will be gas powered.

"The future's gas, the future's freight, the future's multi-use vessels and generally bigger and slower vessels focusing on economy. Quite often you can carry 50% more freight with only a 10% increase in power and that sort of ratio is working as we get bigger and bigger". With Incat's new eco-ship design cargo capacity grows as the ship grows.

Hydrofoils and hovercraft all reached a plateau after which they could not get any bigger, he explains, but with the eco ship, the cargo capacity gets bigger as the ship gets bigger. "There is no reason to believe a 150m ship wouldn't be bigger again, particularly if we go a bit slower. Efficiency is working in our favour".

The only way ships will get more fuel efficient he says is if they displace less water. The Incat Wing project has been under development for a number of years. The ship which looks like a combination of ship and aeroplane largely lifts out of the water on a column of air while the propulsion and steering of the vessel remain in the water in wave piercing hulls. Lifting the ship and supporting its weight on a column of thin air he believes is the answer to lowering the ship's total resistance and lower resistance

Gas power for Buquebus ferry

Incat's 99metre LNG powered passenger and car vessel for Buquebus is due to be delivered in November this year. While the company says that freight operators may not find the turbine solution used by Buquebus attractive, as they do not need the very high speed the turbines provide.

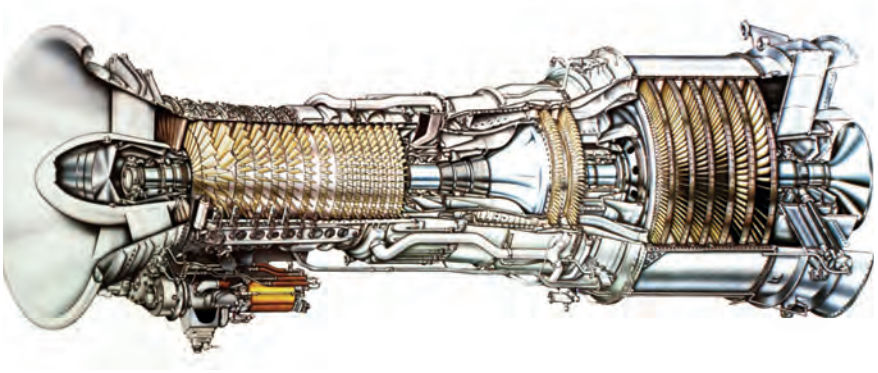
However, the switch to LNG does solve a number of issues not least those relating to the introduction of new emissions legislation, and the advent of emission control areas in the US and North America, the North Sea and the Baltic. According to Incat, for passenger services where high speed is essential, gas turbines are a smaller and lighter engine option.

The General Electric LM2500 engine being fitted to the newbuild has been adapted to operate on LNG or distillate fuels. The power plant is fuelled by distillate to start, but after ten minutes when the heat exchangers have produced enough gas from the liquefied gas in the main tanks the engine is changed over to gas fuel. On arrival in port, the engine reverts to distillate fuel burning for the manoeuvring process. The LM2500 is a single rotor gas turbine with an aero-dynamically coupled power turbine.

means lower power and higher speed. Cars and cargo could be carried in the wing. The project is still in the test stage but even in the testing stage Incat has gone from using 370kW down to 90kW still making the same speed. The model that has been constructed does about 50knots but the first production model will be about 70knots which will generate enough lift to lift the craft 95% out of the water.

He anticipates that the craft could be used for calm water routes saving time and energy. The first model will probably be passenger only. "At the moment we are very happy with the extremely low fuel consumption we have with the model so far". The existing model is three tonnes and the next model will be about 30tonnes. The wing is tailored to get maximum lift and efficiency at 70knots. The initial design would probably be restricted for use in one metre wave heights. The large wing will dampen the effect of bouncing on the water, which is a feature of both hovercraft and hydrofoils, Clifford says, thus providing a comfortable ride for passengers. Research so far has cost the company about A$1 million (US$1.03 million).

As the ships get larger, carrying freight is an essential part of the mix, and Incat is also talking to an Australian company who is interested in freight only ferries carrying a maximum of 12 passengers. The ferry would be gas fired. "Whatever we do with freight has to be fuel efficient, which might mean the freight has to go slower. We have to target customers that understand the economics." *NA*



The LM2500 single rotor gas turbine may not have been everyone's choice, but Buquebus's ferry will operate on the greener LNG fuel for most of its journey

Fast ferry futures?

Rising fuel costs and a reluctance from passengers and freight to pay a premium for rapid transit times has hit the fast ferry market, but Bill Moses, the former managing director at Hoverspeed claims that operators need to find the right niche to make the number crunching work, reports Sandra Speares

The current car carrying fleet of fast ferries, mainly catamarans, includes some impressive vessels, but this relatively infantile sector of the passenger shipping industry has been fraught with a variety of challenges that has seen a number of vessels laid-up or discarded, comments Bill Moses.

The former Hoverspeed boss says that: "Technological problems, to a large extent born of early prototypes, the rising cost of fuel and the corresponding unwillingness of passengers to pay a premium for faster crossings, has certainly hampered the sector's global advancement despite some impressive examples.

With the increase in size comes the blurring of the line between fast ferries and conventional ferries that are able to travel fast is one issue. "Take for example Stena Line's gas turbine powered HSS1500, a sturdy, 127m long vessel capable of 40knots with 1,500 passengers and 375 cars. No match perhaps in terms of sea-keeping for the conventional Superfast fleet that emerged in 1995, but with similar passenger capacity who could argue that the additional 10knots plus would provide a competitive, potentially very useful edge?

"Just as the Superfast fleet has dispersed, so too was one of the HSS catamarans, *Stena Discovery*, was sold to Venezuela in 2009, although strangely for an oil producing country with operator subsidies it has been laid up ever since. Quite clearly very few vehicle carrying fast ferries are making money for their owners, the profit and loss graph on the boardroom wall having more to do with OPEC than commercial reality.

"The conclusion is that speed and exponential energy costs result in a costly formula that is dependant, almost entirely on the need to create a unique route, preferably without competition, such that passengers and perhaps even hauliers will be prepared to pay for the privilege of getting to the other side quicker.

"The hovercraft succeeded despite its uncomfortable, noisy ride with windows you could not see through for spray, but remember this was at a time when conventional cross-Channel ferry operators were being blamed for their 'cattle boat' image. No wonder, perhaps, that passengers were prepared to pay a supplement of about 22% at the time," says Moses.

"The hovercraft was a truly remarkable invention and has never yet been surpassed in a number of ways. Take for example its ability to be turned around in just a few minutes, cars being loaded one end while incoming vehicles were leaving from the other. Its speed of turnaround and ability to cross at speeds of 55knots also influenced the amount of capacity that could be allocated to periods of high demand; hence Hoverlloyd operated seven daily return flights in winter and a maximum of 27 return flights, with four hovercraft at peak demand, in summer - something that conventional ferry services simply could not match.

"Regrettably they were not to last forever and in the early nineties came the order from Hoverspeed's parent company Sea Containers for five 74m so-called SeaCat catamarans from Incat Tasmania. Unfortunately, they were no match for the hovercraft's agility or reliability and soon attained nicknames such as 'sick cat' and 'vomit comet', names that although not without substance did nothing to endear the general public to these new

Hoverspeed's hovercraft had real advantages, not least the fact that simultaneous unloading and loading offered rapid turnaround times says

designs. Cracked bedplates on a number of the Ruston diesel engines meant that engines needed to be replaced, all of which caused further questions over the apparent or alleged progress from hovercraft to high speed ferries."

Moses says he recalls standing on the quay in Eastern Docks Dover as the first SeaCat arrived and turning to a colleague to say, "We'll either love them or hate them. Suffice to say I argued with Jim Sherwood and maintained the hovercraft on a seasonal basis rather than obeying his first command to withdraw them in favour of the SeaCats. History has proved that it was a good move and that Hoverspeed had some of its best years as a result."

But what of the future? "One should never answer a question with a question, but it is important to understand the operating landscape. In this case it is critically important to understand what is likely to happen with energy prices and whether new technology could help in making fast sea travel affordable at the same time as viable.

Stena Voyager leaving Stranraer en route to Belfast, *Voyager*'s sister ship, *Stena Discovery* was sold to a Venezuelan company in 2009

"There has been much talk in recent years of the need for fast ferries to carry freight although we are still waiting for someone brave enough to stray into these uncharted waters. Unless we are talking of very high value cargo where express delivery commands a premium I tend to take the view that this will never happen. If passengers will not pay a premium for speed of transit I doubt freight ever will. Balanced traffic would be another consideration for example crayfish, prawns, lobsters, etc from Scandinavia are unquestionably perishable and highly valuable necessitating a highly reliable and fast supply chain to main markets. However, where is the backload to cover significant fuel costs, and could these largely weather sensitive craft ensure timetable reliability?" Asks Moses. *NA*

Fast ferries on the pace

Brakes come off fast ferries as new designs with greater efficiencies offer pace with reduced power says Germanischer Lloyd. Sandra Speares reports

Fuel consumption has been a major brake on the fast ferry market, but according to Lutz Laubenstein, vice president at Germanischer Lloyd, there are newbuilding projects around that use the existing high speed fast ferry hull designs, but have a different propulsion system installed which allows for speeds of 20 plus knots against the older models that travelled at speeds of approximately 47knots.

These systems are diesel and propeller driven as opposed to the water jet concept of the past, he explains.

GL has the Austal-built trimaran servicing the Canary Islands in class and Laubenstein explains that the new trimaran design has the same space for passengers and trucks, but the number of engines has been reduced from four to three, maintaining the same speed with improved sea keeping that gives a more comfortable voyage experience for passengers, compared to high speed catamarans. Trimarans are also capable of operating in higher wave heights than catamarans.

Another new development Laubenstein points to is ferry designs involving carbon fibre or glass fibre construction as opposed to aluminium, with the lighter material improving performance and cutting fuel consumption. This new development is only possible because of the IMO High Speed Craft Code because normal commercial vessels' compliance with SOLAS fire safety requirements is necessary and this is not possible with a carbon or glass fibre construction.

GL vice president Lutz Laubenstein says that the maritime industry's drive for fuel efficiency has significantly slowed fast ferries, but their relative speed, compared to other ferries, remains higher

The IMO High Speed Craft Code has a "different philosophy" Laubenstein says, and it is this that permits glass fibre or carbon fibre craft to enter into service.

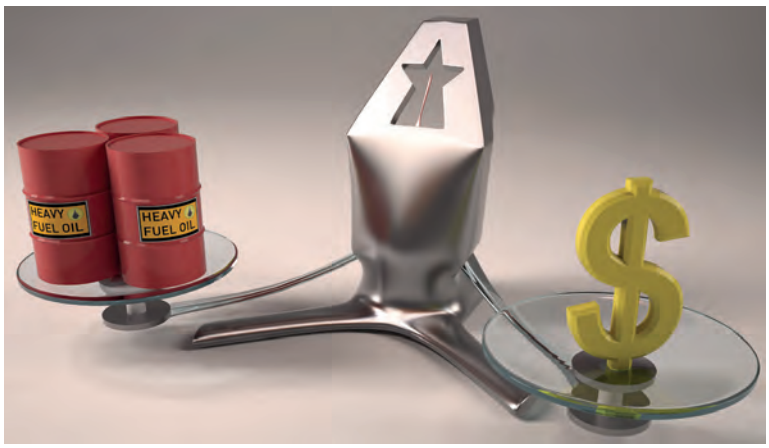
Although in the past use of such materials has been restricted to smaller craft, designs for 40m plus commercial vessels are now available, although designs for private vessels using these materials are obviously already on the market.

One of the points to bear in mind is the manufacturing process for a carbon fibre vessel is completely different, Laubenstein explains, because drilling holes in the hull is out of the question, as would be the case in carrying out repairs to a steel ship. This is not to say that repairs cannot be made, but more engineering has to be applied to the process and more attention has to be paid on how to do it. It is not a question of going to a yard and saying: "Please weld a new guard rail onto the vessel," he says.

Hulls also have to be built under cover. Although specialist shipyards for this kind of work are relatively few, the number is growing. Commercial vessels made of glass fibre are already in operation, and Laubenstein mentions one operating in Copenhagen.

The fast trimaran *Benchijigua Express* was delivered to Fred Olsen in 2005, and is powered by four MTU Series 8000 (20V) diesel engines each developing 8,200kW power pushing the 126.6m long vessel to speeds of 42knots

WHEN EFFICIENCY COUNTS...



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There are also a number of projects on the table he says for high speed catamarans that are not built in accordance with the IMO High Speed Code because they are for use in the offshore sector to ferry specialist personnel involved in offshore maintenance. There are wave height restrictions for these vessels. High speeds are essential if the vessels are to exploit weather windows to transport specialists to the installation and take them back to shore. Consideration also has to be given to the fact that if wave heights are excessive, seasickness could prevent the technicians from working when they arrive at the installation.

In the case of larger high speed catamarans, designs have changed little, he says, but for smaller craft, these have been customised to take into account the conditions in which they will be working. There is a good deal of discussion in Europe about approvals for vessels deployed in the offshore market not least because although they carry passengers, they are not passenger vessels per se. The Special Personnel Code, for example, excludes vessels used to transfer technicians. This means that vessels being used to transfer staff need to be assessed as passenger vessels, where different requirements apply.

Classification societies, including GL, are looking to flag states to provide a solution to the issue, and ensure that vessels are approved to a safe standard on an international basis. Most proposals on the table are based about 80% on the High Speed Craft Code requirements, Laubenstein says. However, there are problems as the High Speed Craft Code was intended to cover the voyage of a ferry on a fixed itinerary, and offshore craft could be going to a number of different installations on a rotation that is not fixed. *NA*

Viking Grace prepares for action

New LNG powered ferry will be operated in the Baltic by Viking Line and has been designed to meet new environmental regulations writes Sandra Speares

Planning work for the new Viking Line ferry that will go into service on the Turku–Stockholm route in 2013 is already fully under way.

The new vessel *Viking Grace* will be able to use three alternative fuels: traditional heavy fuel oil, diesel or liquefied natural gas, which results in less emissions. When running on LNG, the vessel meets all the new emission rules now being devised by the European Union.

The hull of the vessel will be hydrodynamically optimised to minimise its fuel consumption and cause the smallest possible swells, which is particularly important when passing through an archipelago.

The vessel's propulsion engines are diesel/gas electric to minimise its energy requirement. To achieve the highest efficiency, the propellers will be of a new type for this kind of passenger vessel.

Thanks to new soundproofing technology, the noise level will be very low. In practice, the new flagship will be a very quiet vessel, both when operating at sea and while in port.

The vessel, which is being built at the STX Turku shipyard in Finland, will be equipped with engines, propellers and bow thrusters from Wärtsilä.

The 57,000gt *Viking Grace* will be 218m in length, 31.8m across the beam with a speed of 22knots. It will run between Turku-Mariehamn/Långnäs-Stockholm and is classed by Lloyd's Register and flagged in Finland. It has a passenger capacity of 2,800. *NA*

The Royal Institution of Naval Architects

WARSHIP 2013: MINOR WARSHIPS

12-13 June 2013, Bath, UK

First Notice & Call For Papers

Minor warships are a category of naval vessel covering a wide range of roles, including mine counter measures, off-shore patrol and survey. These vessels may be deployed in a war role, within threat environments, but are usually small and of a specialised nature.

Traditionally, these roles have been achieved through the design of individual specialised classes of vessel. However, the emergence of new technologies, including the use of off-board, unmanned systems provides an opportunity to decrease the need for a highly specialised platforms and offers the potential of a single, re-configurable platform.

As with warships of all types, minor warships require to be affordable whilst meeting an often complex capability. Minor war vessels are often required to operate globally.
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- Remote Operated Vessels •
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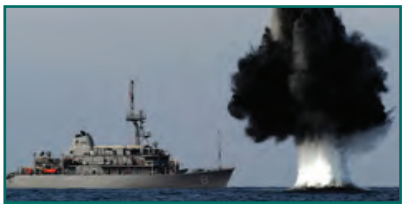

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Design should be defined by ship's cargo not by default

By starting from an understanding of a ship's cargo profile, a container ship's utilisation rates can be maximised and its environmental impact minimised, according to Cargotec's Dry Cargo business line sales director Ari Viitanen and senior naval architect Kari Tirkkonen

Traditionally, important factors when designing a container carrier are its hull dimensions, fuel efficiency and visibility from the bridge. The decisions made about these factors at the beginning of the ship building process pre-define the framework for the cargo handling system, and this can mean that the resulting features of the cargo handling system are determined by default rather than by design.

However, this approach underestimates the vital role that the cargo handling system plays in the environmental impact of a container ship and its cargo. The more efficient the cargo handling system, the greater the number of TEUs a ship can carry, which in turn reduces the emissions per carried TEU, and subsequently per transported commodity. Therefore, we believe that the traditional design process effectively starts from the 'wrong end'.

Cargotec defines cargo profile as the distribution of containers onboard a ship in terms of container sizes and container weights on a certain route. Our proposal takes a whole-ship approach and works forward from the cargo profile. But, this must happen at an early stage of the ship project, before any restrictive decisions have been made. As a result of this forward-thinking approach, it is possible to improve the specified loading ability and the efficiency of the entire system.

A tool for cargo profile analysis

Practical experience from existing ships already supports our approach, but it is Cargotec's wish to establish evidence that proves that an efficient cargo system really counts when addressing environmental issues. To do this, Cargotec has signed a co-operation agreement with the ship design evaluation specialist, Safety at Sea, based in Glasgow, Scotland. The purpose of the co-operation is to establish a statistical method and tools for analysing the cargo profiles of our customers' newbuildings, and to use these profiles to define the cargo handling system requirements for these vessels.

From a design point of view, the analysis tools provide the means to produce the optimal container stack arrangement and optimal stack container weight distributions for each cargo profile. The tools are based on statistical reviews of the cargo moved onboard and enable the user to compare the productivity of different cargo systems and ship concepts.

Traditionally, vessels are designed to carry a maximum number of containers loaded in the holds and on deck, and usually the method for deciding this figure is based on two considerations: the total number of boxes allowed by visibility rules from the bridge, and the homogeneous loading limited by the displacement of the hull.

These considerations can lead to an arrangement where the utilisation rate of the vessel's cargo space can vary significantly, depending on the actual cargo mix. Additionally, if designers do not have information about the intended cargo profile, they are forced to undertake several calculations of different homogeneous loadings for GM (metacentric height) and ballast scenarios to keep hull stability satisfactory. And this is done without being able to take into account, or the specification of, the actual capability of the cargo handling system.

MacGregor takes a different approach to cargo handling

Efficient use of space is efficient use of energy

Productivity of container ships can be measured using several indicators, such as maximum capacity and utilisation rate, fleet utilisation, and operating cost per TEU.

From a ship's productivity perspective, we believe that it is important to be able to design a cargo handling system which is fully aligned with the ship's hull design. In practice this means that the vessel's hull properties must not set restrictions on the loading and operating of the intended container stacks, and while operating with the intended container stacks, the ballast could be adjusted to its minimum.

Why are some ships not optimised for their cargo?

With the current way of conducting ship concept design, it is often not possible to obtain the best possible results. This is because the ship's hull and its cargo handling system are treated as separate blocks, and not optimised as one entity. Furthermore, parts of the cargo handling system such as hatch covers, lashing bridges, fixed container fittings and loose container lashings are often not considered from an overall cargo handling system point of view, but also as separate products.

This leads to the sub-optimisation of separate parts of the system, and subsequently to an underachievement from a cargo handling system productivity perspective. This is the reason why many container ships with a high nominal capacity (over 6,000TEU) are operated with reduced utilisation rates.

The cargo profile should, in part, dictate the basic parameters of the ship's hull design. However, it plays its most important role in the definition of the basic solutions for the cargo handling system, such as the arrangements for lashings, hatch covers and cargo holds. In itself, this system should be of minimum weight and therefore optimised in terms of cost and material use. It should be noted that by optimising the weight of the cargo system, the 'saved' weight can be used for the benefit of payload. The effect is marginal, but it exists.

What if the cargo profile changes?

We also need to consider that optimising a system for one cargo profile can have its drawbacks when it comes to cargo handling system flexibility, which in turn could lower productivity and therefore increase emissions per TEU if and when the cargo profile significantly changes. Change is inevitable and can happen if a vessel is re-located to operate on another route or when the charter period ends and a new charterer takes up the operation. Therefore, while designing the ship, both the current cargo profile and future flexibility to accommodate possible cargo profile changes must be taken into account. One of our main goals with Safety at Sea is to also find ways of improving the cargo handling system concept throughout the ship's lifetime.

Built-in environmental efficiency

It is clear that the future will bring ever stricter measures to protect the environment, which the shipping and shipbuilding industries will have to comply with. However, 'green' solutions are not just ways of conforming to legislation, or improving a company's image, they make economic sense – especially in today's turbulent economy and shipping business.

The shipbuilding process needs to be made more effective and it must serve its final purpose of optimising the cargo capacity for each vessel. To do this, the decision making process during the planning stage of a cargo ship needs to be re-organised. With our work with Safety at Sea, we are ready to help customers make the best decisions at the investment phase, and can provide cargo handling systems that improve the efficiency and environmental-friendliness of their investments.

As a built-in feature, MacGregor cargo handling systems optimise use of space, which improves the ship's earning ability while promoting environmental efficiency. *NA*

Can changing the design of the ship to fit the needs of the cargo bring better efficiency for vessels?

Joining forces

In the face of the economic crisis it has been said that for companies to survive they will need to pull together to share expertise

Sharing expertise is one way that companies are seeking to beat the global economic crisis, however, another trend has been consolidation between companies.

Larger companies are starting to buy up smaller companies and expanding their portfolio to meet clients' needs better. Recently, TTS Group entered into an agreement to purchase Neuenfelder Maschinenfabrik GmbH (NMF), located in Hamburg, Germany. The agreement was finalised in the first half of August.

The expected turnover of NMF in 2012 is expected to be NOK660 million (US$108 million). Over the last five years NMF has delivered marine cranes for a value of around NOK 5.3 billion (US$87 billion).

NMF has become a part of TTS existing activities in Germany, where the existing turnover is in the range of NOK750 million (US$123 million) NMF's product range is complementary to TTS' existing range.

On the other side of the world, Japanese yards are issuing licenses to other yards for the construction of deck equipment. Mitsubishi Heavy Industries, Ltd. (MHI) signed an agreement with Imabari Shipbuilding Co., Ltd in Imabari, Ehine Prefecture, Japan, under which MHI licenses will allow the production and marketing of deck machinery.

With this licensing, MHI says that it aims to expand the market share of the Mitsubishi brand of deck machinery production. The production of licensed machinery is scheduled to start in April 2013.

The licensed deck machineries consist of various configuration types and are capable for use in all ships. Hydraulic pumps and motors, which drive the machinery, will be supplied by MHI. Imabari plans to build the deck machinery at the shop in Dalian Imaoka Shipbuilding Co., Ltd.

The deck machinery consists of anchor windlasses, which are used for anchoring and anchor hoisting, mooring winches. MHI has also licensed deck crane technologies to Jiangsu Masada Heavy Industries Co., Ltd in Nantong, Jiangsu Province and allowed production and marketing of steering gears, earlier this year. *NA*

The Royal Institution of Naval Architects

Marine Heavy Transport & Lift III

24-25 October 2012, RINA HQ, London

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Second Notice

The marine heavy transport and lift sector has enjoyed a buoyant and growing market due to the boom in offshore oil & gas and large project cargo work. Current oil & gas prices have led to an increase in the number of offshore project requiring transportation, installation or removal of a wide range of structures and modules. The project cargo transport market has been growing, 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. 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 designs concepts aimed at servicing this increasing demand in the marine heavy transport and lift industry.

This conference, the third in the series from RINA, 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.

The Marine Heavy Transport & Lift III Conference papers include but not limited to:

-Wave Induced Motion Prediction as Operational Decision Support for Offshore Operations-*TU Delft*
-Heavy Lifting in 2500m Water Depth - Cascade & Chinook FSHR Installation - *Jumbo Offshore*
-Marine Transportation Design Lifted to the Next Level: Safetrans 5.0 - *MARIN*
-Removal and Installation of Modules onto Truss Spar with Dp Heavy Lift Vessel - *Saipem Itd*
-Effect of Free Surface on the Hydrodynamic Behaviour of Heavy Structures during Lifting Operations in Marine Environment - *University of Western Australia*
-DSME Windmill Turbine Installation Vessel - *Daewoo Shipbuilding & Marine Engineering Co. Itd*
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Kone launches hybrid power pack

Konecranes has introduced a hybrid (diesel/electric) power option for its rubber tyred gantry cranes (RTGs), which can reduce diesel fuel consumption by over 60% it claims

With the addition of this new power option, Konecranes can now provide a full range of solutions for RTGs: Hybrid Power Pack, Diesel Fuel Saver, and two electric power options, the Cable Reel and Busbar.

Customers can now choose either a diesel or an electric solution, depending on their requirements. The hybrid power pack and diesel fuel saver provide the flexibility of diesel power, while the two electric options provide the benefits and convenience of electricity, the added advantage of no diesel means less maintenance, less noise and lower emissions.

The Konecranes hybrid power pack turns a fully-diesel RTG into a diesel/electric hybrid RTG. Whenever possible, the crane can be operated with electrical power drawn from the energy store. It takes the energy generated during braking and converts it into electricity to recharge the batteries. Depending on usage, this solution can significantly reduce diesel fuel costs.

The diesel fuel saver provides power-on-demand, matching the rpms of the RTG engine to the work the machine is doing. It ensures that the diesel engine is running at maximum efficiency at all operating points, without high-speed idling. Compared with conventional diesel engine operation, the diesel fuel saver can considerably reduce fuel consumption, resulting in cost savings of tens of thousands of euros per RTG per year in typical operation.

The cable reel and Busbar options convert the RTG to fully-electric operation, eliminating diesel exhaust emissions and ensuring quiet RTG operation. The latter is an important consideration when the container terminal is located near a residential area. There is no downtime for refuelling, so the RTG can spend more time in productive operation. The company says that the time saved by not refuelling can amount to up to one working week per year. *NA*

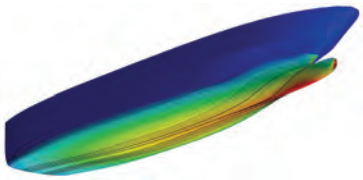
Konecranes launches latest power pack

The Royal Institution of Naval Architects

Design, Construction & Operation of Super and Mega Yachts

8-9 May 2013, Genoa, Italy

First Notice & Call for Papers



The Royal Institution of Naval Architects will be returning to Genoa, to host the International Conference on Super & Mega Yachts for a third edition.

Whilst we do not expect the rapid growth that the luxury yacht sector has encountered in the last decade, there is no question that the super yacht fleet will continue to grow. Even if the need for a bigger yacht seemed to have reached its peak, the complexity of the designs and the new requirements involved in custom production require innovative solutions.

RINA welcomes papers on all aspects of large sail and motor yacht design, construction, and operation, from designers, researchers, manufacturers, operators, and regulators. Topics may include the following:

- All Aspects of Design – Hull, General Arrangement, Interior, Features etc.
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To the power of four

Dealing with increased cargo capacity at ports is becoming an ever increasing challenge to the maritime industry, where rapid loading operations are critical. In facing up to this challenge Liebherr has announced the launch of its latest four rope grab cranes for both ship and shore

Liebherr's four-rope grab cranes have the ability for continuous operation, not only on land but also in the open seas. Both the slewing CBG type cranes and the double girder MPG cranes are specially designed for heavy duty continuous operation and provide efficient turnover rates, claim Liebherr.

Two major transhipping projects involving Liebherr's heavy duty marine cranes have also been highlighted. Coeclerici has selected 10 units of Liebherr heavy duty four-rope grab cranes type CBG 350 for installation on its two new tailor-made Supramax offshore transhipping units. These vessels operate in Mozambiquan waters on behalf of the South American mining giant Vale and the handling of over 11 million tonnes of coal per year is anticipated. Both vessels have successfully been put into operation.

Depending on tidal depths, the average load for the transhipper is 44,000tonnes of coal, which is then transhipped to open waters, where it is transferred to ocean-going vessels of up to 180,000dwt using the five Liebherr four-rope grab cranes (one for each hold). The transhipper is loaded using onshore conveyer belts. During this time the Liebherr cranes are placed towards the aft of the vessel, whereby a specially developed interlock device is installed in the slewing column and the jib is rested on a console positioned to the side of the pedestal of the next crane.

This locking system allows for the jib to be parked (or locked) into position without having to dismount the four-rope grab and so saves valuable time when putting the cranes into operation and/or when storing the cranes for the short journey between port and ocean going vessel and return, highlights Liebherr.

The Liebherr CBG cranes incorporate specific features for heavy duty conditions and operation in open water, including compact slewing column design, specially designed heavy duty hoisting winches, heel trim alarm systems and emergency operation functions. Additionally, an extended cabin ensures optimum visibility of the hold for the operator leading to safer and more efficient operation.

Safe and precise crane operation is further supported with Liebherr's own Litronic crane control and management system. Litronic facilitates smooth and high speed operation as well as preventive maintenance. Amongst other information the load indication and limitation as well as the load recordings are displayed. The machine data is recorded, including alarms and failures, and service and inspection intervals can be determined. Optionally, modem access is available for remote fault-finding through skilled Liebherr engineers. The software is available in several languages.

The latest major transhipping project for Liebherr involves the largest transhipping facility to date which has just been delivered by a Chinese shipyard, also for the South American mining company Vale. This facility is handling iron ore from Valemax vessels in Subic Bay in the Philippines. Design and advisory services were provided by Logmarin Advisors of Genoa, Italy, and the 285,000tonnes buffer storage floating terminal is equipped with five Liebherr MPG cranes and a sophisticated conveyor belt/loading system designed and built by Bedeschi. The cargo handling facility is certified by RINa.

The five Liebherr MPG 40tonne high-speed, heavy-duty, double girder jib cranes are side-mounted on the Vale vessel and have an outreach of 42m. Safety, performance and low maintenance requirements are of utmost importance and the design of the MPG cranes considers all of these points: reduced crane height leading to low centre of gravity, no luffing ropes/mechanism meaning less maintenance and better stability of the crane in offshore operations.

Liebherr has supplied its CBG 350 cranes for the Vale bulk carriers

Latest four rope grab cranes from Liebherr

The driver's cabin is positioned on the underside of the grab rotating arms allowing unrestricted views of the hold on both vessels, significant reduction in grab swing during slewing, faster crane cycle thanks to double geared configuration and faster hoisting/lowering speeds, independent drive systems ensuring continuous operation with full load, should a single drive fail operation can continue at reduced speed and so reduce downtime, less wear and therefore longer lifetime of ropes due to the special positioning of the hoisting winch, Liebherr's own Litronic Robot Control (LRC) and Dynamic Anti-Collision System (DACS)

LRC and DACS have been developed in-house by Liebherr in order to increase safety and enhance performance. The robot control eases operation between two pre-defined fixed points. DACS prevents collision between the cranes and/or fixed obstacles as each crane knows and compares its position with the other crane or any defined obstacle. This allows operation of two cranes on the same hold or close to any obstacle and therefore offers the highest flexibility and safety. Dynamic anti-collision does not mean only sector limitation, but dynamic position monitoring of the cranes. Therefore, there are no limitations in the cranes' working area.

With the design focus on maximum safety and operating capacities as well as minimum maintenance and life-cycle costs the Liebherr cranes are ideally suited to round-the-clock working cycles. *NA*

THE ROYAL INSTITUTION OF NAVAL ARCHITECTS

SAFEGUARD
Passenger Evacuation Seminar

One Day Seminar
30 November 2012, London, UK

- Do we really know that cruiseships and ferries can safely evacuate passengers in an emergency?
- Can we be certain the current passenger evacuation simulation software is realistic?
- How do "real" passengers actually react in an evacuation?

The EU-funded SAFEGUARD research project brings together nine international companies and research institutes based in the UK, France, Canada, Norway and Greece to perform a series of full-scale ship passenger evacuation trials to gather data for calibration and validation of ship based evacuation simulation models.

Data collected from real sea trials on three passenger ships and five semi-unannounced evacuation assemblies will be used by the SAFEGUARD partners to create a large data base of passenger response times and assembly times of a sufficient depth and detail to permit simulation model calibration, verification and validation. It is also hoped that this data will serve as the basis for improved evacuation analysis protocols beyond the International Maritime Organisations (IMO) MSC circular 1238.

- Background on ship evacuation, presenting the partners
- Introduction to the SAFEGUARD project, methodology, description of the three shipping companies and the ships.
- Enhanced Benchmark Scenarios and model performance and the recommendations to IMO MSC.
- Response time data set: data collection, the data sets, implications for IMO MSC.
- Validation data set: data collection, the data sets, the model performances and the recommendations to IMO MSC.
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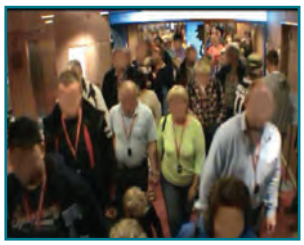
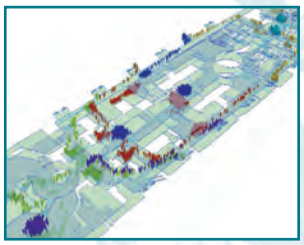

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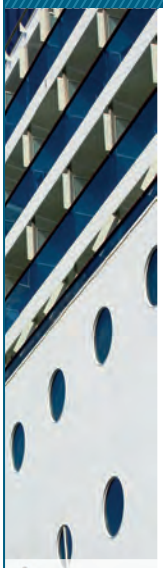

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The University's new £19M five-storey marine building, which opens in September 2012, represents a major enhancement to the UK's capability in marine renewable energy, and in coastal and offshore engineering research. This initiative has attracted national funding from BIS, DECC, SWRDA and HEFCE. The building will house exceptional marine testing facilities within the Coastal Ocean and Sediment Transport laboratory (COaST). These include: a 3 m deep ocean basin with lifting floor for testing under wind, wave and current loadings; a coastal basin, also with directional wave makers and current generation; a 35m re-circulating sediment flume with wavemaker. The University also operates a high performance cluster to support numerical modelling and CFD applications within CAESI. These facilities are further to others within the Marine Institute that include the 13.65 m Falcon Spirit survey vessel, extensive field measurement instrumentation, ROV and flying camera array and support from the Diving and Marine centre at Coxside. Equally, an impressive range of materials characterisation, analysis and testing equipment is available to support teaching and research in materials and structures.

The School is now looking to appoint a talented engineering academic to join the Mechanical and Marine or Civil and Coastal Engineering Team, enhancing our capability for exploiting the research and commercial potential of the COaST Laboratory. You will be expected to contribute to teaching at undergraduate and postgraduate level. You will be able to demonstrate an ability to identify and lead research into original areas of enquiry, and to enhance and complement the present marine-related research expertise, which ranges across wave impacts, marine renewable energy, marine hydrodynamics, sediment dynamics, materials analysis and structural integrity. You will have a track record of attracting research funding and being able to deliver internationally esteemed research output evidenced through publication and other indicators. You will be helping to lead a growing and enthusiastic team of researchers working in the South West of the UK

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Contract Management for Ship Construction, Repair & Design

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The Royal Institution of Naval Architects is pleased to announce another opportunity to attend Dr Kenneth Fisher's highly successful three day training programme. The course is primarily designed for project managers who handle day-to-day relations with other parties, people who form contracts and senior managers who monitor contract-related cash flow for marine related projects. Those attending the course will be better able to identify the pitfalls and traps experienced within the industry, and be more prepared to identify all the costs,schedule changes and to properly assign responsibilty for those changes and effects. This will save companies considerable sums in each major contract.

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Safinah

MARINE COATINGS RISK MANAGEMENT COURSE

2nd October 2012, London

The failure of marine coatings can lead to significant in-service costs for owners and operators of marine vehicles (ships and offshore structures). A good understanding of the problems that can result in coating failure is essential if the risks associated with marine coatings are to be avoided or mitigated and coating in service performance improved hence reducing operating costs through life and the potential for claims.

Marine Coatings – Risk Management is a one-day course for all maritime professionals in who are involved in managing risk associated with marine coatings - legal advisors, insurance claim managers, P&I Club claim advisors, ship superintendents and coating professionals and of course naval architects, marine engineers. No previous knowledge of coatings and the processes involved is required.

On completion of the course, the maritime professional will be familiar with basic coating terminology and risks, understand how these risks can be assessed and/or mitigated, and in the event of a coating failure understand the basic procedures required to assess the cause of the failure and the validity of any claim for compensation.

www.rina.org.uk/marine-coatings-course

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Second Notice

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The conference will be of interest and value to members of the many organisations world wide and others who are involved or interested in the preservation of these ships for the benefit of future generations.

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London, UK.
E-mail: conference@rina.org.uk
www.rina.org.uk/damaged_ship_2013

February 26-28, 2013
Asia Workboat 2013, international conference, Singapore.
E-mail: marinfo@baird.com.au
www.bairdmaritime.com

March 11-14, 2013
Cruise Shipping Miami,
international conference,
Miami, USA.
www.cruiseshippingevents.com

March 20-23, 2013
Europort Istanbul,
international conference,
Istanbul, Turkey.
E-mail: info@europort.nl
www.europort-istanbul.com

Third International Conference on Ship Manoeuvring in Shallow and Confined Water

with a non-exclusive focus on ***Ship Behaviour in Locks***

Ghent, Belgium, 3-5 June 2013

There has been a growing tendency to manoeuvre larger vessels in confined environments. As a consequence, the effects that occur when a ship manoeuvres in shallow or confined water continue to be of great importance. The Third International Conference on Ship Manoeuvring in Shallow and Confined Water provides an international forum to discuss the latest developments both in research and in practice. This conference will be organised by the Royal Institution of Naval Architects, Flanders Hydraulics Research and Ghent University – Maritime Technology Division.

After successful conferences focusing on bank effects and on ship – ship interaction, this edition will pay special attention to *Ship Behaviour in Locks*, which is an actual topic given that a significant number of locks for large sea-going vessels are being designed or under construction all over the world.

Papers are invited on the following topics:

Ship Behaviour in Locks
including ship hydrodynamics, development of ship – lock simulation models, design of approach lanes, effect of density currents and structure permeability, mooring forces

Shallow and Confined Water Effects
including ship-bank, ship-fender and ship-ship interaction effects, squat and other vertical motions in shallow water, effects of passing ships on moored vessels, shallow water effects on ship manoeuvring

Benchmark data obtained by model test at Flanders Hydraulics Research are also available in order to validate numerical calculation methods and simulation models.

Authors are invited to submit an abstract of 250 words to info@shallowwater.be by 28 September 2012. Papers on practical and operational aspects are particularly welcome and researchers are encouraged to jointly submit with pilots or masters.
For more information: http://www.lockeffects.ugent.be

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