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SHIPBUILDING ICCAS Busan • 2013

International Conference on Computer Applications in Shipbuilding

24-26 September 2013 | Busan | South Korea

The 16th International Conference on Computer Applications in Shipbuilding (ICCAS) will review operational experience from existing computer applications in the design and build of ships and offshore structures and will cover a full range of topics including; CAD, CAM, integrated systems, knowledge management, simulation and virtual reality applications, etc.
It will also examine the advances in Information Technology which have contributed to increased productivity in both shipbuilding and maritime operations; including increasing co-operative working between shipyards, marine equipment and system manufacturers, engineering partners and shipping companies.
These conferences attract a large international audience and provide a excellent forum for both those developing and using computer applications in shipbuilding.

Call for Papers

Please send us an abstract of about 200 words before the 24th of February in order to begin the reviewing process. The successful papers will be related to the research, development and application of information technology in shipbuilding and will focus on the following subjects:

- EARLY DESIGN

Concept design, tendering, initial design, general arrangement, cost & work estimation, hull form, hydrodynamic analysis & basic structural design, risk based design

- DETAILED AND PRODUCTION DESIGN

Structure, machinery, hull and outfitting

- FUNCTIONAL DESIGN

Capture and management of systems diagrams and schematics with 'intelligence'. Identification and consolidation of diagram contents for comparison with physical design layout. Verification that detailed design meets functional design specifications and intent.

- PARTS MANUFACTURING & ASSEMBLY

Prefabrication, shop automation, robotics, assembly & accuracy control

- MATERIAL MANAGEMENT: Material control, supply chain management, logistics & e-solutions
- MANAGEMENT OF SHIPBUILDING PROJECTS

Planning, work-flow analysis, PDM & ERP applications, Management of co-operative working between different actors in shipbuilding projects, e.g. shipyards and equipment and systems manufacturers.

- PROCESSES: Life cycle management. Design and/or manufacturing processes and their use. Systems engineering. Multi-functional processes with progressive information capture and sharing.
- COMMISSIONING, INSPECTION AND MAINTENANCE

Life-cycle maintenance, lifecycle cost management, environmental cost management, parts & systems reliability, inspection standards & risk management inspection standards, risk management & security

- DATA MODELLING: Each stage of design, build and operate cycle. Shared environments (multi-company or multi-site). Long term data capture and management
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- INDUSTRY / ACADEMIA

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- SKILLS MANAGEMENT, KNOWLEDGE TRANSFER AND OTHER HUMAN RESOURCE ISSUES: Artificial Intelligence, Knowledge-based systems, Acquiring, retaining and sharing knowledge. Capturing the experience and skills of the workforce for younger engineers.
- SIMULATION , VIRTUAL ENVIRONMENTS and GAMING TECHNOLOGIES: Use in design, manufacturing, productivity, safety, human factors etc

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

Abstract submission deadline: 24th February 2013

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www.rina.org.uk/ICCAS2013

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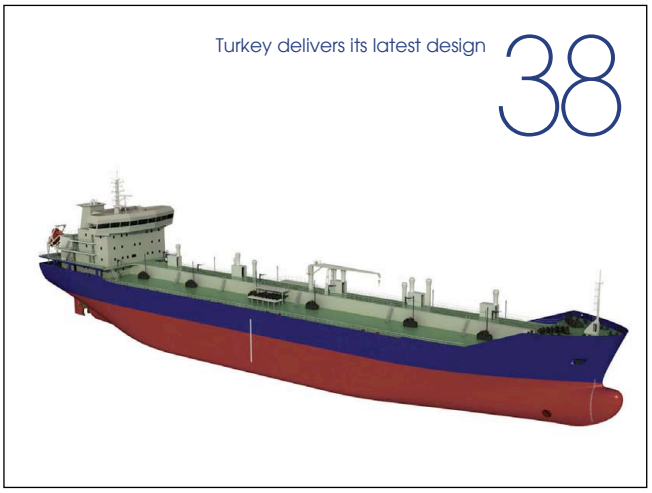

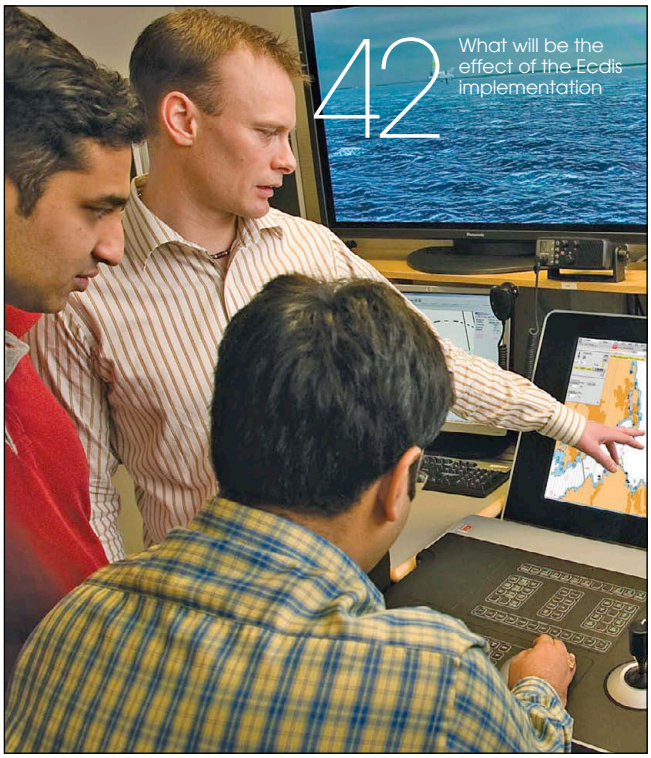

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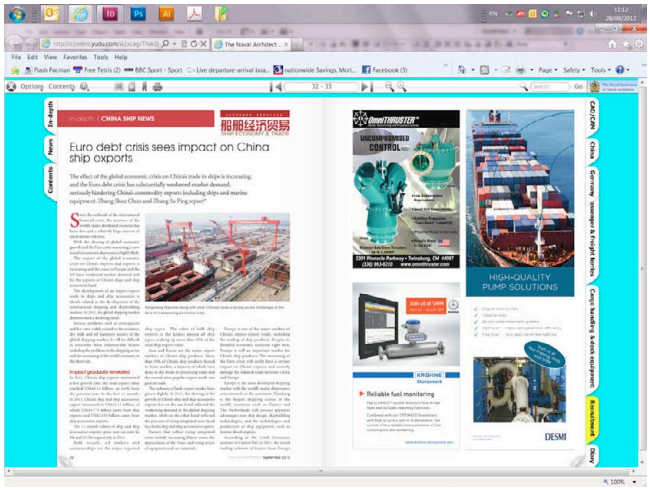

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Second Announcement

The Royal Institution of Naval Architects will continue its successful SURV series of International Conferences in 2013 now in its eighth edition.

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

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

The papers will cover a wide range of topics, such as:

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

A copy of the preliminary pgramme can be downloaded from the conference website. We are also interested to hear from any organisation wishing to exhibit crafts during the conference.

For more information, visit www.rina.org.uk/Surv8

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Nano state can reduce consumption

APL has been conducting research into different fuel additives that utilises nanotechnology

APL has been testing fuel additives, which it says could reduce fuel consumption on its ships by as much as 10%. Two types of additive have been tested, one that reduces friction within the engine and the other is a water emulsion technology that increases the burn efficiency.

Both additives are made by a Chinese subsidiary of the China Auto Corporation called Neftech and both use nanotechnology. According to Neftech APL tested the technology for six months and were so pleased with the results that they signed a five-year deal to supply additives for 50 ships. That deal is for the auxiliary engines only, however, tests on main engines are still ongoing.

The additives are added to the fuel on a monthly basis, along with the lube oil, says Neftech.

If the nanotechnology is shown to work the immediate reduction in emissions could be significant and could provide another way for owners to reduce emissions.

Even so the EU and many maritime commentators consider LNG as the immediate future for ship fuel, particularly for ships operating for any length of time in emission control areas.

According to a European Commission (EC) working document, published in January this year, the EU will establish a European Sustainable Shipping Forum (ESSF) which will, "progress all aspects of the sustainable waterborne transport toolbox".

In addition, the EC is co-financing a number of studies that are analysing and refining LNG bunkering networks on a regional basis, such as LNG in Baltic ports, LNG infrastructure and a pilot project in the North Sea, as well as the COSTA study on use of LNG in the Mediterranean, Atlantic Ocean and Black Sea.

The aim for the EU is for all core ports in the TENT – T (Trans-European Transport Networks) programme to provide LNG bunkering facilities to the maritime industry by 2020.

EU bureaucrats appear to have swallowed the myth that LNG will reduce carbon emissions substantially. This is not necessarily the case. LNG is largely composed of methane, a gas that is 21 times more potent than CO_2. Engine manufacturers claim that the problem of methane slip, where the gas in the cylinder that does not combust is released into the atmosphere through the exhaust, has been cured through greater efficiency. In some cases this means at high pressure and igniting the fuel at just after top-dead centre. Some independent observers are sceptical of this claim.

Another burning question is the ability for the bunker supply process to ensure that no gas escapes and that any boil-off can be used immediately, because reliquefaction increases the energy use, substantially and adds significantly to the cost; and none of the boil off gas can be simply vented into the atmosphere.

Still there are benefits to LNG; it emits less SOx, NOx and particulates all significant sources of pollution and all pose health risks. LNG also reduces CO_2 emissions by some 20%, which is also an improvement, even if it does have a lower calorific value, meaning you have to burn more to get the same power afforded by HFO and that might mean more cost.

And this could be one of the major difficulties. The idea that LNG will remain a cheaper source of fuel than HFO appears fanciful. LNG will be a major source of fuel for power generation in the coming years, particularly in Europe where older dirtier oil and coal burning power stations are being forced to close.

Demand for LNG in the coming decade is expected to soar and with that demand will come an increase in prices. If many owners switch to LNG power then there could be a decline in demand for HFO, would that mean a decline in prices and what effect would that have on LNG prices? It may also be that there are regional differences in price for HFO and LNG, which could further complicate the picture.

Either way the Neftech nanotechnology may offer some help in reducing carbon emissions, but the only real way to make certain that shipping reduces its carbon hull print is to ship less. That might mean relocating centres of production closer to home. But, for operators fuel flexibility may be the only way to ensure that you can get the best option; and that means dual fuel engines.

Don't forget to have your say

The Naval Architect would like to invite its readers to take part in our online survey, where you can have your say on which magazine sections and feature topics are of the most interest to you and what you'd like to see more of in future. All participants will be entered into a prize draw, with an iPad up for grabs for the lucky winner. To participate in the survey please visit: https://www.surveymonkey.com/s/DH6SJVN.

Classification

Opportunity knocks

Japanese class society ClassNK says that there is an opportunity for other class societies to gain market share if the merger between DNV and Germanischer Lloyd (GL) is given the green light by competition authorities.

Speaking in Hamburg last month following ClassNK's authorisation to carry out surveys on behalf of the German Government, ClassNK Chairman & President Noboru Ueda told *The Naval Architect*: "It [the DNV/GL merger] is an opportunity for ClassNK because owners do not want a monopoly, class societies must compete."

Following the merger the newly formed DNV GL Group (DGG) would have a market share of 25%, "if one and one equals two". However, Ueda believes that some owners may switch class societies because there may be a reluctance on the owners' part to see too many ships classed by one society.

In addition Ueda says that European competition authorities may take the view that the merger could create a company with a dominant position in the market and that could either result in the prevention of the merger or an order to sell off certain elements of the merged company.

According to ClassNK the attitude of the International Association of Classification Societies, "has not yet been fixed".

ClassNK's authorisation by BG Verkehr, which oversees the German flag and is the authorising body that determines which class societies can act on its behalf, means that the Japanese can now survey German ships and puts the class society in a prime position should there be any fall-out from the merger between the Norwegian class society DNV and the German GL Group.

Kai Krüger, speaking on behalf of Ulrich Schmidt, Head BG Verkehr's Ship Safety Division presenting the certificate of authorisation from BG Verkehr to ClassNK Chairman & President Noboru Ueda

LNG

Kogas and DNV in LNG bunker study

Korean gas corporation Kogas and the Norwegian class society DNV have agreed to cooperate on a feasibility study to establish LNG bunkering infrastructure in Korea.

Billed as the "largest and most comprehensive study" for the LNG industry, the study will seek to ascertain the feasibility of implementing LNG bunkering stations in both South Eastern Korea, in Busan and in Incheon and Pyeongtaek in the west.

A joint company release says: "Through this project, DNV aims to define Korea's commercial opportunities related to LNG distribution and shipping by addressing possible LNG supply chains and infrastructures, technologies related to LNG shipping and bunkering, standards, regulations and issues regarding public acceptance."

Kogas has already formed an LNG consultative group, in May last year, in an effort to build an LNG bunkering infrastructure and to develop and to develop LNG marine propulsion. The consultative group, which is led by Kogas, consists of the Korea Gas Safety Corporation, major shipbuilders Hyundai Heavy Industries, Daewoo Shipbuilding & Marine Engineering, Samsung Heavy Industries and STX Offshore & Shipbuilding; classification societies DNV, Lloyd's Register and the Korean Register; major energy companies POSCO, Kyungnam Energy, Samchully, SK E&S and STX Energy; STX Pan Ocean shipping company and relevant industry associations.

Kogas says: "By forming this expertise group and initiating R&D projects, KOGAS aims to expedite the development of LNG bunkering infrastructures and LNG bunkering vessels and make Korea one of the first movers in the global LNG bunkering industry."

Newbuildings

HHI signs MOCV deal

Offshore support vessel operator Toisa Ltd, which is headquartered in Bermuda, but operates in fields from North and South America to Europe and Asia has signed a deal with Hyundai Heavy Industries to build a multipurpose offshore construction vessel (MOCV). The contract includes an option for an additional vessel of the same class.

Delivery of the first vessel is expected in the second half of 2015.

The MOCV will sport a 900tonne and a 200tonne offshore crane and it will be capable of undertaking ultra deepwater installation and construction activities including subsea pipeline and cable laying and topside construction support work for FPSO and drilling rigs.

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A 3D model of multipurpose offshore construction vessel

Measuring 150m in length, 32m in width, and a depth of 13m the ship will have a service speed of 15knots. It will also feature a dynamic positioning system with five 3,350kW thrusters, and two 2,500kW thrusters for improved stability while operating.

Regulation

ECSA backs EU CO_2 monitoring

The Brussels-based shipowners lobby group, the European Community Shipowners Association (ECSA) backed EU proposals for a Monitoring, Reporting and Verification system (MRV) system for carbon emissions.

In a statement last month ECSA says: "ECSA can see value in the EU initiative for a Monitoring, Reporting and Verification system (MRV) of CO_2 emissions, as a contribution towards finding the most appropriate global solution for CO_2 monitoring from international shipping. It then follows that any mandatory requirements on MRV for the international shipping sector must be agreed upon at IMO level, as this is the only way of securing a globally harmonised system.

Backing from ECSA follows the December stakeholders' meeting, at which 120 flag states, class societies, owners and operators and other groups including representatives of DG's CLIMA and MOVE, discussed the implementation of an MPV system.

At that meeting the group agreed that: "The key element of this approach is the focus on the discussion and decision making process in the IMO on market-based measures and intermediate regulatory measures addressing existing ships and operational measures."

According to the December meeting "concerns have been expressed regarding the accuracy of data from sources such as bunker delivery notes, which do not necessary exactly reflect the amount of fuel consumed. The main reason is the uncertainty of the composition of heavy fuel oil. Methods such as flow meters to measure actual fuel consumption and stack monitoring for direct CO_2 emission measurements are regarded by experts as more accurate although some technical challenges related to temperature variations remain."

Stack monitoring companies such as Parker Procal believe that monitoring of emissions is only really accurately possible at the point where gases are expelled from the engine, the exhaust.

Parker business development manager Steve Dye says that: "continuous monitoring is the way to go. There will always be people that will want to cut costs or flout regulations, but that won't help the environment."

Parker's monitoring system is, says Dye, a cost effective way of showing that your ship complies with regulations. The system works by beaming an infrared light through a tube to a mirror which reflects the light. The beam passes through the gases in the stack and the system can calibrate the absorption level, different gases are absorbed at different rates, which will reveal which gases and in what quantities are present.

The system can be installed in a day at a cost of around US$15,000 – US$30,000 and needs little maintenance, it can calibrate itself automatically says Dye and each analyser can measure up to six types of gas.

"Essentially it takes one hole and four bolts to fit the system and then you have to link it to an in situ analyser, but the advantage is that they are relatively maintenance free," says Dye. *NA*

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Thomson Majesty puts lifeboat safety under scrutiny

Lifeboat safety is likely to return to the top of the agenda following February's accident on the cruise ship *Thomson Majesty* in which five crew members lost their lives, *writes Sandra Speares*.

With an investigation into the accident ongoing after a cable snapped during a lifeboat exercise on the ship with eight crew on board, questions are already being asked about the number of crew in the boat during the training procedure, as well as whether the way the lifeboat was stored put unnecessary stress on the cable.

These issues will be at the centre of the inquiry into the accident which took place when *Thomson Majesty*, which is managed by Cyprus-based Louis Group, was alongside in Santa Cruz de la Palma in the Canary Islands.

Malta, who flags the vessel, have already announced that its Marine Safety Investigation Unit is working with the Spanish authorities on an inquiry. The vessel was classed by DNV who said that suggestions that a DNV inspector had been onboard the vessel conducting load tests the day before the accident were untrue. A spokesman for the class society said DNV's last survey of the vessel was in November 2012.

Guidance issued by the IMO in 2009 on lifeboats included the advice that that: "When performing drills with persons onboard a lifeboat, it is recommended that the boat first be lowered and recovered without persons on board to ascertain that the arrangement functions correctly. In this case, the boat should then be lowered into the water with only the number of persons onboard necessary to operate the boat." This according to Allan Graveson, senior national secretary of Nautilus International, "says it all".

The issue of the number of crew members in lifeboats during training is certainly not a new one. Writing in the Nautical Institute's magazine Seaways in 2006, Captain Dennis Barber of Marico Marine highlighted the then chief inspector of marine accidents at the UK's Marine Accident Investigation Branch, John Lang' questioning of the benefits of launching lifeboats for exercise. Barber referred to a Seaways article he had written the previous year in which he said that if any part of the suspension system failed a "gravity induced catastrophe" would be the result.

Nautilus has reiterated since the accident that design is the issue, not training or maintenance, Graveson says. "We need a full and complete investigation." Questions, he said needed to be asked about company instructions about the number of crew that should be in the lifeboat when it was being lowered and raised, and also the P&I, class and flag guidance in this respect. "Why were there so many people in that boat?" Malta has produced good investigation reports in the past, the union was putting their trust in a thorough investigation, he added.

Commenting on whether class provided guidance on the number people in the boat during a training exercise the DNV spokesman said: "It is not a DNV requirement but a SOLAS request that there should not be crew members onboard when the lifeboats are to be brought from sea level and into its original position again".

As the Bahamas Maritime Registry pointed out in January this year when commenting on lifeboat accidents: "While the number of accidents remains small in comparison with the number of Bahamian ships, the consequences of accidents can be unacceptably high. With this in mind, measures have already been implemented to limit the exposure of crews to the hazard associated with on-load release gear failure by allowing lifeboats to be initially lowered and recovered without personnel onboard during drills."

Following the *Costa Concordia* accident in January last year, the Cruise Lines International Association introduced the Life Boat Loading for Training Purposes policy which required the launching and full loading of a lifeboat at least once every six months for crew training purposes for all oceangoing members of the association and the European Cruise Council.

"During the training, the lifeboat is filled to capacity with crew members and manoeuvred in the water to facilitate familiarisation with lifeboat operations. It is mandatory that all crew members involved in operating or loading of lifeboats attend the drill. Smaller ships with less than 300 crewmembers will conduct similar training as appropriate," CLIA said.

Amendments to the Safety of Life at Sea Convention regarding lifeboats were introduced at the beginning of this year. The amendments, adopted in May 2011, add a new paragraph 5 to SOLAS regulation III/1, to require lifeboat on-load release mechanisms not complying with new International Life-Saving Appliances (LSA) Code requirements to be replaced, no later than the first scheduled dry-docking of the ship after 1 July 2014 but, in any case, not later than 1 July 2019.

Guidelines on the use of fall preventer devices have been available for a number of years, although when issuing guidance in 2009 the Maritime Safety Committee said the "the use of FPDs should be considered as an interim risk mitigation measure, only to be used in connection with existing on-load release hooks, at the discretion of the master, pending the wide implementation of improved hook designs with enhanced safety features." *NA*

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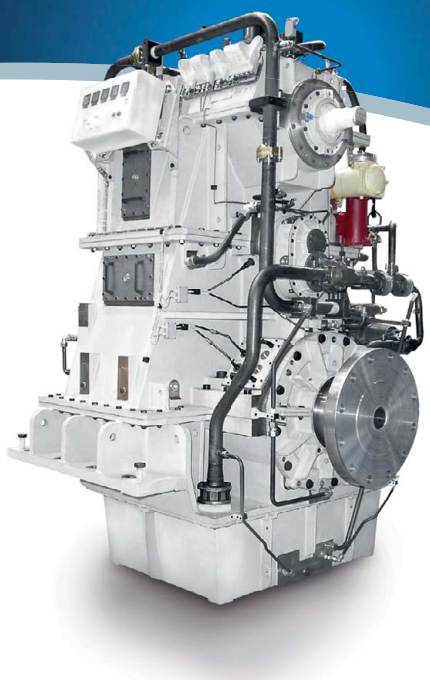

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Propulsion

Improved design for Azipod XO

Experiences from the first vessels fitted with latest generation Azipod XO propulsion system confirm that the challenging design targets have been met and the latest features and improvements exceed expectations, says the Finnish propulsion manufacturer ABB.

The main design targets for the Azipod XO were to improve maintainability and reliability as well as energy efficiency, says ABB. The first Azipod XO units have now been delivered and they have been in operation on two fast ferries in Japan, utilising CRP (Contra Rotating Propulsion) configuration and in the cruise vessel *Celebrity Reflection*.

ABB enhances its azipods

Although the final judgement of the product can be done only after a longer period of operation, the first operational experiences of the latest product are good, highlighted ABB. The sea trials and the first months of ship operations have proved that the design targets have been exceeded.

The main design enhancements in the Azipod XO are the construction of thrust bearings and shaft seals, electrical steering system and hydrodynamic improvements as well as improved condition monitoring. In the new design thrust bearings and seals can be maintained from inside the Azipod hull without dry docking the vessel. The space inside the Azipod is also designed to improve the safety during maintenance.

In the ferries the change of shaft seals has been changed to the newly developed more environmentally friendly water lubricated seals.

The hydrodynamic features of the new design X-tail and assymmetric fin are located under the pod unit. These additions can also be installed for existing older Azipod VO units, which have had their behaviour tested. In addition to these improvements the Azipod XO strut and propeller designs have been modified. With today's fuel price the efficiency improvement represents in a typical cruise vessel operation annually up to US$850,000 savings, claims ABB.

ABB has said that the new Azipod XO improvements bring with it also more flexibility to the ship hull and general arrangement design and shipbuilding process.

www.abb.com

Deck equipment

More drive for car carriers

MacGregor Group has secured a contract to deliver electrically-driven RoRo equipment for two new car carriers under construction at Shin-Kurushima's main facility, Onishi Shipyard, in Japan. Each ship will be supplied with a stern ramp, a side ramp, six internal ramps, a ramp cover and hoistable car decks. The order is booked into Cargotec's 2012 fourth quarter order intake.

The monitoring system will provide a continual data stream and equipment status updates. The system has been optimised for future developments and is ready for external integration into other ship management safety systems.

The first vessels with all-electrically-driven internal and external RoRo outfits entered service in 2011, including Nissan's eco-friendly coastal car carrier, *Nichioh Maru*, which was also delivered by Shin-Kurushima.

www.cargotec.com

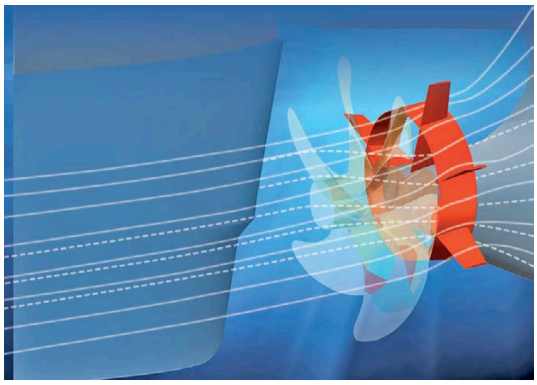
Propulsion

Becker goes with the flow

Becker Marine Systems has developed its latest energy-saving device tailor-made for container ships and other types of fast vessels with bulbous stern the Becker Twisted Fin.

The savings of the Becker Mewis Duct are reduced at speeds above approximately 20knots, which is why the solution was better suited for slower ships such as tankers, bulk carriers and heavy load vessels, highlights Becker Marine. Becker Marine Systems is now introducing its Becker Twisted Fin for faster ships with speeds above 18knots.

Like the Becker Mewis Duct, the Becker Twisted Fin has no moveable parts, is also installed in front of the propeller and generates a pre-swirl. The nozzle ring is



Becker develops twisted fin for higher speeds

significantly smaller than that of the Becker Mewis Duct and has a special, flat profile with much lower drag. The fins familiar from the Becker Mewis Duct on the inside of the nozzle ring extend outwards beyond the nozzle. To prevent the formation of a swirl with cavitation at the ends of the fins Becker has developed special end caps for the fins. The small nozzle ring generates thrust, provides stability to the fins and reduces vibrations.

Computational Fluid Dynamics (CFD) tests, model tests and full scale operation have shown fuel savings averaging 3% for container ships and even better results can be obtained with the combination of a Becker Twisted Fin and the Becker TLKSR Twisted Rudder, claims the company.

Each Becker Twisted Fin system is individually designed according to hull geometry, propeller design and engine data. The design takes into account the latest strength, fatigue and vibration requirements from classification societies.

Becker Marine Systems had already signed a contract with Hamburg Süd to retrofit the Becker Twisted Fin system on a series of 10 7,100TEU container vessels. The tank tests were conducted at HSVA in Hamburg in October 2012 and the first installation took place at Damen Shipyard in Rotterdam in December 2012. Following the first journeys, the measured power savings from the model test were able to be reproduced during the vessel's operation, says Becker Marine.

www.becker-marine-systems.com

Ancillary equipment

Hatlapa and Loewe Marine get together

Hatlapa Uetersener Maschinenfabrik GmbH & Co. KG and Loewe Marine GmbH & Co. KG will be collaborating closely in the area of steering gear and rudder system maintenance and repairs. The two companies have said that they are confident that the resulting synergies will offer an increased benefit to their existing customers and create new business opportunities.

Hatlapa's global sales and service network will be working with Loewe Marine's international network of shipping lines, shipyards and suppliers.

Together, Hatlapa and Loewe Marine have also highlighted that they will also provide seamless interface management to ensure that their customers' projects proceed smoothly and cost-effectively.

www.hatlapa.de

Propulsion

VEEM signs MOU with SAIM Group

VEEM Limited, has executed a memorandum of understanding (MOU) with the Italian marine equipment distributor SAIM Group. The objective of the MOU is to build the foundations for a Central European VEEM Gyro sales agency, bringing with it a new delivery platform for all gyro products.

www.veem.com/au

Bridge & communications

Transas Marine installs for SafeMed II

Transas Middle East has installed and commissioned its Standalone AIS Solution at the Port of Aqaba, Jordan within the EU-funded SafeMed II Project.

The primary purpose of the project is to provide a comprehensive picture of the maritime traffic to all interested parties, which will help to forecast dangers and risks related to the marine pollution.

Transas standalone AIS solution incorporates the latest VTS technology and meets all international standards. At the core of the system is Transas AIS Base station T214, designed specifically for coastal surveillance, vessel traffic monitoring and ports management.

Intended to cover Aqaba Port, its inner port waters, navigational channels and fairways, this effective solution will significantly contribute to the prevention of marine pollution, improvement of safety navigation and overall security of the port.

In addition, Transas supplied and commissioned AIS VTS Server, WEB server and related hardware equipment to the Jordan Maritime Authority financed by the EU-funded SafeMed II regional project. This project is implemented in the

Mediterranean region by the Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea (REMPEC) on behalf of the International Maritime Organization (IMO).

The Regional Marine Pollution Emergency Response Centre for the Mediterranean Sea is based in Malta and assists the Mediterranean coastal States in ratifying, transposing, implementing and enforcing international maritime conventions related to the prevention of and response to marine pollution from ships.

www.transas.com

Ballast water

Ocean Guard gets onboard with Maersk

DESMI Ocean Guard containerised solution for ballast water treatment has been tested by A.P. Moller Maersk. Per Hother Rasmussen from Maersk Maritime Technology explains: "We have tested containerised ballast water treatment system plants on two different vessels and we find it a viable way of overcoming space problems in crowded engine rooms as well as it gives the advantage of easy and short installation time, even with the vessel in service. Starting in September 2011, we have tested the DESMI Ocean Guard containerised solution over seven months on one of our vessels and found that it lived up to our needs and expectations. We are satisfied with the results."

DESMI Ocean Guard offers the OxyClean system to the market both as a component delivery, skid-mounted or installed in a container. The containerised solution can be delivered with flow rates up to 500m^3/h in a 20" container, and up to 3,000m^3/h in a configuration with two 40" containers placed on top of each other. The reason for placing the containers on top of each other is to accommodate the required service height of the filter, the company highlights.

The DESMI Ocean Guard OxyClean ballast water treatment system was type approved by Lloyd's Register in November 2012. In January 2013 DNV concluded their Safety Assessment of the system and ABS issued a Design Assessment certificate. The OxyClean system is based on mechanical filtration followed by disinfection with a combination of UV and ozone. The system is the first ballast water treatment system on the market that has done successful IMO testing in fresh, brackish and salt water claims the company.

www.desmioceanguard.com

Bridge & communications

Intellian launches latest solutions

Intellian has introduced three solutions for the Inmarsat FleetBroadband (FB) networks with new features and latest design radomes.

The FB150, the FB250 and the FB500 are the latest in Intellian's product line supported by its three year warranty. All three terminals of the latest Intellian FB product line include a broad range of IP and networking related value-added features such as IP routing, Firewall capability and vessel fleet tracking.

The Intellian FB150 is a satellite communication solution designed to provide global, high quality data and voice for business, operational or recreational applications in a compact size and light weight ADU (Above Deck Unit) with the optional matching dome solution and simple user installation.

All three new products go with Intellian's GX hardware and are XpressLink systems and are covered by the Inmarsat's global broadband I4 satellite coverage. The products provide simultaneous voice and data service, have compact and reliable hardware, IP connection for e-mail, Internet, fax and SMS, LAN interface and single-user and multi-user router features, IP Handset interface, matching dome solutions with the Intellian TVRO systems, and are available worldwide from Intellian's global depots (US, Korea, The Netherlands, and the UK).

www.intelliantech.com

Ancillary equipment

Vulkan goes to Australia

The Vulkan Group of companies has established a new fully owned subsidiary company located in a strategically favourable site in Gosford, near Sydney.

Following several years of successful presence in the Australian market through the branch office of Vulkan Industries Far East Pte Ltd. Vulkan wanted to reinforce its sales activities in Australia, said the company. With effect from 1st January 2013, Vulkan Australia PTY Ltd (VA) has been representing all three Divisions of the Group Vulkan Couplings, Vulkan Drive Tech and Vulkan Lokring.

The Managing Director of the new subsidiary company Stephen Samson said: "As far as the future of Vulkan Australia is concerned, I shall focus on the growing business in marine couplings and the increasing demand in the Vulkan Lokring business Division. Moreover, I would like to launch the products of Vulkan Drive Tech for industrial drive technology in the Australian market - primarily in the sectors of underground and surface mining."

www.vulkan.com

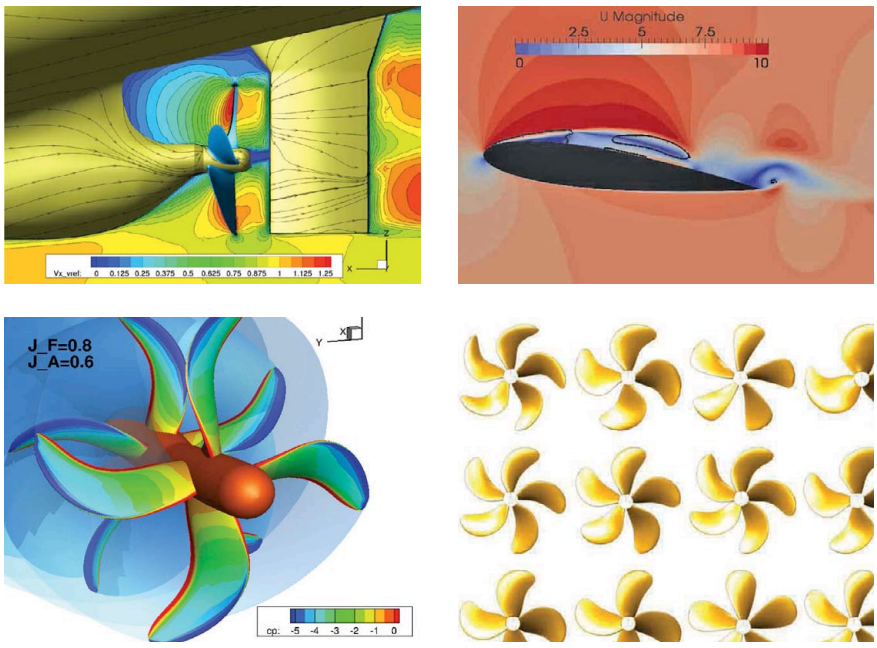
STREAMLINE realises greater efficiencies

Up to 90% of all goods handled in Europe are transported by sea and within the EU more than 40% of goods are carried by water. Increasing environmental concerns, borne out in new legislation, coupled with volatile oil prices, have created a renewed focus on fuel efficiency for the industry. Rolls Royce, SSPA, Marin and DST report

There has been little real change in the state-of-the-art for conventional screw propeller propulsion for many years with only a marginal rate of improvement during the last 50 years. More substantial progress has been achieved through the use of better propulsor configurations and improved integration of the propeller with the vessel hull hydrodynamics.

In our previous article the authors introduced STREAMLINE - STrategic REsearch for InnovAtive Marine PropuLsIoN ConcEpts (www.streamline-project.eu); a €10.9 million (US$14.39 million) programme led by Rolls-Royce, focussing on propulsion. That article covered some of the technologies under development, including Large Area Propellers, a Biomechanical thruster (the Walvisstaart POD) and methods for optimising state of the art propellers.

This paper will address the remaining concepts, first by introducing the advances in CFD that have been made and then by elaborating on some of the concepts that they have been used on, including a study on contra-rotating propeller arrangements, distributed thrust for inland waterway vessels and advanced waterjets.



STREAMLINE develops improved algorithms to combine propeller-induction and hull-induced wakefield

Advanced CFD tools

In order to optimise a propulsion system to the utmost, numerical analysis tools must be capable to distinguish between small details in flow around design variants. On the other hand, tools must be capable of predicting the restrictions of a design, like cavitation extent and pressure fluctuations and of course, tools must be fast enough to use in an optimisation procedure.

The accuracy of CFD tools has been improved by enhancing their capabilities. The tools from CRNS, HSVA/TUHH and MARIN have been extended with grid adaptivity methods, and methods for modelling moving propellers. Grid adaptivity allows for automatic refinement of the calculation grid where-ever that is needed.

The criterion for refinement can for instance be local changes in the flow, local vorticity, pressure gradient, etc. Based on such a criterion, the grid is automatically refined by splitting grid cells and the calculation is continued. Modelling of propellers in CFD requires the capability to have rotating and non-rotating parts of the geometry in one calculation. This can be achieved by having two calculation domains sliding along each other, or by having to calculation domains overlap.

Both techniques have been studied by the partners; it turns out that overlapping grids may be more generic in application, but very time consuming, whereas sliding grids perform well in reasonable calculation times.

In the attempt to increase hydrodynamic efficiency, the design of a propulsion system is restricted by cavitation extent and pressure fluctuations on the hull. To this purpose, CFD tools have been revised to enhance the modelling of cavitating flows and to introduce the possibility to describe air entrainment effects, as in the case of ventilation of propeller blades. Special attention was given to the accurate modelling of mechanisms at the origin of cavitation-induced harmful effects like erosion, pressure pulses and radiated noise. The coupling of multi-phase flow modelling with compressible flow RANSE and LES solvers has been proposed by Chalmers University as the most

advanced approach to numerically detect the erosion potential of cavitating flow structures.

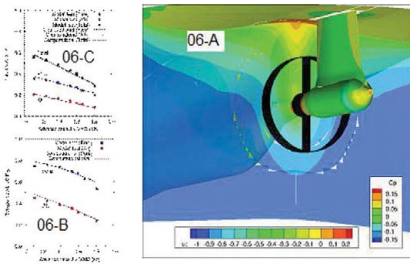
Conventional models to predict propeller-induced pressure pulses on the hull surface and noise radiated to the flow have been recast through the introduction of hydroacoustic models in which pressure fluctuations are described through wave propagation mechanisms.

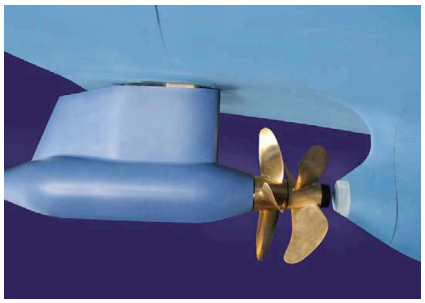
Hydroacoustics solvers based on Kirchhoff-Helmholtz and Ffowcs-Williams & Hawkings equations have been developed by MARIN and CNR-INSEAN. The full-coupling between CFD models to predict emission sources and hydroacoustics models have been accomplished and validated.

Combining the new modelling features that have been introduced, enhanced CFD methods by RANSE or LES can yield very accurate predictions of the flow around a propulsion system. However, the computational effort involved is quite large, prohibiting the use of these tools in the design process. There still is a clear need for tools based on potential flow models (typically BEM) that predict propeller flow reasonably well and are very fast. In this area, an existing BEM solver has been revised by CNR-INSEAN to improve reliability and range of applicability.

More general and fast cavitating flow and trailing vorticity models have been introduced and algorithms valid for isolated propellers have been extended to analyse complex configurations like contra-rotating propellers and podded propellers. CFD and potential flow solvers are typically applied along the design spiral through a sequential approach, in which the latter are used at early design stage, whereas CFD is applied in the last refinements steps.

Figure 1





STREAMLINE looks into the effects of CRP/ICP podded propulsion

However, a far more effective approach has been taken by MARIN, HSVA and CNR-INSEAN, which can fully exploit the complementary features of both CFD and potential flow solvers. Hybrid viscous/inviscid flow solvers have been developed in which a viscous flow solver (RANSE) is used to predict the turbulent flow around the hull with propulsion effects indirectly taken into account as forcing terms evaluated by a potential flow propeller model (BEM).

Major achievements within STREAMLINE include the development of improved algorithms to combine propeller-induction and hull-induced wakefield and the possibility to account for transient propeller flow effects. Numerical applications of hybrid RANSE/BEM solvers to determine ship propulsion factors of single screw vessels as well as to compare the performance of different contra-rotating podded propulsion layouts have been addressed.

With all the new tools and capabilities, it has become possible to optimise the propulsion system numerically. To complete an optimisation procedure, geometry variations need to be derived, and optimisation criteria need to be set. For the geometrical variations, two methods have been tested: free-form deformation and parametric variations. With free-form deformation, the geometry of a hullform or a propeller can be varied in any way the user or the optimisation procedure wants. Problems arise, of course, in limiting the variations to something that is useful and realistic. With parametric variations, existing propeller geometries are modelled with a limited set of parameters, and by varying the parameter values new geometries are derived. Of course, drawback of this method is that no revolutionary new system will be found. Both methods have been implemented by the partners, and have been challenged in the optimisation of propeller and hull aftbody of an existing state-of-art single-screw tanker design. The outcome of this optimisation study has been discussed in the previous article on STREAMLINE (Pages 28-34 Jan 2013).

Contra-Rotating Pods: CRP / ICP

Besides studying the propulsion of large propellers, present propellers and distributed propulsion, STREAMLINE also deals with podded propulsion. In this case the studies were focused on a special application of podded propulsion, namely contra-rotating podded propulsion. These studies have consisted of two main concepts (see image at top of page):

1) A pod unit placed behind a conventional main propeller called CRP (Contra Rotating Pod)
2) A pod unit with two pulling contra-rotating propellers called ICP (Integrated Contra-rotating Pod)

As a reference ship for these studies a twin screw, twin skeg, ro-ro (roll-on, roll-off) ship was selected. This ship was to a high extent optimised to achieve a very high efficiency. The ambition was also to have a safe ship with redundancy regarding propulsion therefore the twin screw arrangement. For the CRP concept, instead of two skegs, the afterbody was redesigned with one center skeg and a conventional main propeller, designed by Rolls-Royce. Also a new type of pod unit with a propeller contra-rotating to the main propeller was designed by Rolls-Royce. The ICP concept was designed by SSPA, both pod house and

propellers. Here one difficult assumption was to estimate the necessary size of the pod house to have enough space for the electrical engines in full scale and necessary equipment in model scale.

Both concepts were model tested in SSPA's towing tank regarding prediction of power as well as in the cavitation tunnel to predict cavitation performance and pressure pulses. The design speed for both concepts was 20knots, a speed that should not have to create any major problems regarding cavitation. However, as always when contra-rotating systems are involved, the interaction between the two propellers can show quite special cavitation behavior, like we could see here.

For these two concepts the CRP showed a fully acceptable cavitation while the ICP were more likely to need an optimisation of propeller design, perhaps somewhat increased blade area ratio. A very low blade area ratio was chosen to result in high propeller efficiency, which in a way paid off, but the CRP design resulted anyway in the highest total efficiency. The main reason for this is that the much bigger pod house for the ICP gives some 40% higher resistance which decreases the pod efficiency significantly and thereby the total efficiency. In any case, both concepts showed significant efficiency improvements. The CRP showed a reduction in power by some 14% and the ICP 11% compared to the reference ship. The CRP can also be regarded as presenting a redundant solution.

In parallel to experimental work described above, analysis of the two contra-rotating podded propulsors by using Computational Fluid Dynamics (CFD) tools has also been carried out. The challenge here was to demonstrate the capability of the so-called hybrid RANSE/BEM hydrodynamics model (as described earlier) to provide accurate descriptions of very complex ship-propulsion solutions. In doing so this demonstrated the benefits of our cost-effective CFD simulations that are affordable at design level and do not require CFD-developer expertise and supercomputing facilities.

Though hybrid RANSE/BEM models have already been used to analyse conventional ship-propeller configurations, simulating the hydrodynamic interaction between hull and different types of contra-rotating podded propulsors represents a cutting-edge application achieved in STREAMLINE. Preliminary results from this computational study carried out by partner CNR-INSEAN have demonstrated that quantitative predictions of propulsor performance, as well as details of the flowfield, can be obtained to complement model test results and support designer's activity and decision making process (Figure 1).

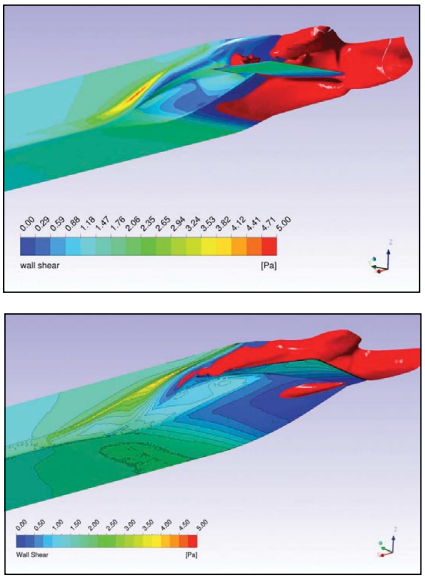


Figure 2: CFD optimisation convention code

> "The STREAMLINE project is systematically tackling a full range of approaches to improving propulsive efficiency of ships"

Distributed Thrust

From basic momentum theory, propulsors for efficient ships should be as large as possible, since this way they can accelerate more water to a reduced velocity. However, due to spatial constraints, the actual size of a propulsor is limited. This in particular holds for inland crafts, were the restricted water depth and the unfortunate B/T ratio results in rather small possible propellers with accordingly less efficiency.

As the depth is a hard limiting factor, inland ship propellers extend close to the free water surface in order to maximise the available space. This imposes another undesired phenomenon of air suction by the propellers from the free surface. The dilemma of efficiently propelling an inland ship is thus to make the propeller as big as possible (in order to have a good efficiency) and to prevent air suction from the free surface. Sailing in ballast, were the free surface is even closer to the propeller is thus one of the limiting cases.

Inland ship designers developed special tunnels covering the propeller to prevent or delay air suction while still maintaining reasonably big propellers. STREAMLINE addresses the challenging propulsion dilemma of inland ships with both the biometric propulsion approach covered in the previous article and by the distributed thrust concept. The idea here is to cover the available main frame area of a ship by a large number of smaller propellers, thus increasing the propulsive area without excessive depth.

The resistance of a tunnel was investigated by means of model tests with comparable ships, both with and without tunnel. A resistance contribution of more than 15% of the total resistance was confirmed. Thereafter, a new aft ship design was developed and optimised by standard CFD techniques, with six instead of one or two propellers. Instead of a tunnel, a wake plate was applied that also covers and protects the propellers from air, but at the same time has less resistance and a favourable effect to flow separation (another undesired phenomenon of full inland ships that results in yet another increase of the resistance). Some results are shown in Figure 2.

The developed design also features 3% more displacement, which from a transport efficiency point of view is a nice spin-off. Two phase CFD calculations were performed firstly on the original design to check the risk of air suction and

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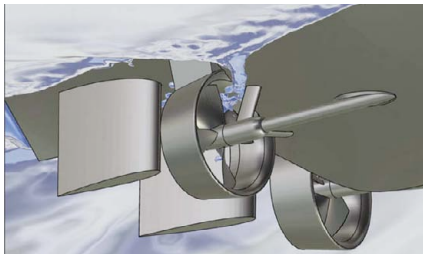

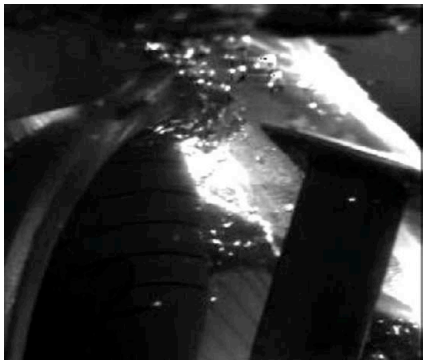

Figure 3: CFD check air suction dedicated code

to validate the code. For these calculations, the ISIS-CFD code of CNRS was extended within the STREAMLINE project to cope with such complex situations, where rotating propulsors, complex geometries and two phase flow problems simultaneously have to be dealt with. An example result of these calculations is shown in Figure 3.

Model tests were conducted in depressurised conditions to even scale down the compressibility of the air for the case that air is sucked under water by the acting propellers. The results are summarised in table 1.

The conclusion is not uniformly positive. Despite the increased displacement and an extraordinary 38% reduction in demanded thrust of the new design, the gain in power was unexpectedly small. A power reduction of 7% is still a good result however.

It has been hypothesised that the large number of rudder propellers and their corresponding drag from the housings is to blame. As the net thrust of rudder propellers is reduced by its housing's resistance, the delivered thrust of the propeller is accordingly higher. As this thrust is to be balanced by the engine's power, the net savings are accordingly reduced. It is now the plan to reduce the housing's resistance and to exploit the achieved improvements better. For this purpose, again STREAMLINE techniques partly from other WPs will be used.

Property	Change relative to baseline
Resistance	-22%
Displacement	+3%
Required thrust	-38%
Propulsive power	-7%

Table 1

Advanced waterjets

The waterjet work package is aiming at improving the low speed performance of the waterjet by reducing the losses associated with the inlet. A standard inlet is a generally a compromise between high and low speed performance. In most cases the higher speeds get priority making the inlet less suitable for lower speeds with higher losses and reduced propulsive efficiency as a consequence.

Improving the efficiency in the low speed region without compromising the high speed performance is the aim with the work carried out in the waterjet part of STREAMLINE. The work is focused on improving the performance by actively controlling the flow based on the speed of the vessel. The intention is that the active control of the flow will remove the need to compromise between a high and a low speed optimised inlet design. Instead the active control will allow for low speed inlets to operate at high speed, or vice versa, without the normally associated losses.

Conclusion

The STREAMLINE project is systematically tackling a full range of approaches to improving propulsive efficiency of ships. To date the project has shown promising results on the more radical concepts of a Large Area Propeller and biomechanical thruster and investigations have uncovered numerous interesting aspects affecting performance in distributed thrust systems and advanced waterjet designs.

The research teams have collaborated to significantly advance CFD methods and these are now being applied to taxing configurations such as the contra-rotating propeller and distributed thrust configurations. In addition, new geometric optimisation routines have already demonstrated that advanced CFD and optimisation models provide enhanced propeller design tools by introducing the capability of analysing hull/propeller/rudder interaction at early stage of design, of investigating through numerical experiments the impact of retrofitting solutions and of exploring potentially high-performance layouts from fully automated optimisation procedures. Although the project is still running, it is becoming clear that there are still good efficiency gains to be made by moving away from conventional configurations.

This article forms part of the series focussing in on projects that are part of GreenSEE Net (Green Ship Energy Efficiency Network) a gathering of EU FP7 funded projects with a common focus. The next article will describe the work of the GRIP project, which is focused on understanding energy saving devices for retro-fitting onto existing ships. *NA*

Acknowledgements

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Safer, greener, smarter; maritime IT trendsetters

The 12th Computer and IT Applications in the Maritime Industries (COMPIT) conference will take place in Cortona, Italy, next month. First held in 2000, COMPIT brings software developers and users together to describe and set future trends. Volker Bertram, senior project manager at GL reports

COMPIT covers the lifecycle of ships, offshore structures and equipment, from design to operation. In addition, the conference serves as a contact platform for recruiting and the preparation of international R&D projects. Traditionally most participants come from industry, reflecting the practical relevance of the event. Selected papers for COMPIT 2013 are discussed below, illustrating some of the general trends in IT for the maritime industries.

The main trends, in short, are:

- IT saves fuel - The quest for energy efficiency is driving IT applications, both in design and in operation. In design, Computational Fluid Dynamics (CFD) is the key technology, increasingly coupled to formal optimisation to create fuel efficient designs. In operation, the trend is towards more sophisticated and more cross-linked advisory software.
- Advanced simulations - Simulation models grow in realism. For CFD simulations, we move from the "numerical towing tank" to "numerical sea trials". Simulations are then performed for full-scale flow conditions. Besides CFD, two other simulation techniques catch our attention: Process simulation based on Discrete Event Simulation is the latest wonder weapon with a striking array of new applications. Virtual reality applications are becoming more sophisticated and more affordable.
- Product Data Models for life-cycle support – Product data models (PDMs) accompany ships over their lifecycle, opening the door for safer and more economic ship operation, e.g. for condition-based maintenance of hull structure and machinery. We are only at the beginning of a development that may take decades for full acceptance and implementation in our industry, but there is visible progress in the scope of PDM applications.
- Autonomous Robots may play a key role in many maritime applications in the future. Advances in individual and swarm intelligence are opening new applications in surveying, hull cleaning, and search and rescue tasks.

Product data models galore

Over the decades, CAD (Computer Aided Design) has progressed from electronic drawing to a central design platform. This has evolved with the trend of employing 3D models of ship hulls and machinery. Modern product data models (PDMs) combine geometric information with other product data (such as material, tolerances, suppliers, etc.). These reflect the general trend towards distributed, concurrent work with frequent updates, where information is increasingly exchanged via the internet.

In-service integrity management is becoming recognised as a safety and business critical element by operators of offshore installations, but increasingly also for shipping. Operators can greatly benefit from access to PDMs, where access to accurate 3D geometry can be the basis of life-cycle structural maintenance, a multitude of simulation options, refit and upgrade design and even training and walkthrough.

Highly detailed 3D models that closely represent the as-built condition are currently developed in the design and construction stages of large maritime assets. Ideally these as-built models would be handed over to the operator who would maintain and update them as a single as-operated model - providing the most efficient and reliable way to support the in-service processes.

While PDMs are everybody's darling, in practice information sharing between shipyards, suppliers, service providers and ship operators faces many challenges. First and foremost is the current status quo, where drawings and documents are the standard and legally accepted way to hand over information from the shipyard and suppliers. Closely related is the problem that there are currently no established procedures for the protection of intellectual property rights.

David Thomson (Aveva) and Philippe Renard (Bureau Veritas) provide with "The Digital Handover - Shipyards as Producers of Life-Cycle Maintenance Models?" a comprehensive introduction to the challenges of product life-cycle management, addressing the benefits, stumbling stones and potential solutions.

IT in ship design and shipbuilding

Ship design without computers is no longer imaginable. IT supports the naval architect in every facet of the design process, from the initial concept to the detailed design.

In the early design stages, fast and experience-based tools are needed, as little information is available and quick responses are required. At later design stages, more information is available and higher accuracy is required in evaluations. This constellation has promoted the development of different tools for different design stages.

Design starts with concept design, which is usually acknowledged to be the

most critical phase in designing a ship, there is confusion as to how computers should be employed to assist the concept designer.

Researchers at the University College in London (UCL) have spearheaded many innovative developments in this respect, including the role of sketching in modern CAD and risk-based design procedures for passenger and navy vessels. UCL continues its tradition this year with David Andrews' presentation "The True Nature of Ship Concept Design – And What It Means for the Future Development of CASD".

Andrews points out that conceptual design is distinctly different from the subsequent detailing of the design and the eventual build definition, at least for complex ships such as cruise vessels and navy combatants.

Several potential approaches to exploit emergent computer based methods for concept design are examined. Pawling et al., from UCL and two other leading research groups in architectural ship design, namely the University of Michigan and TU Delft, present "An Integrated Approach to Style Definition in Early Stage Design". This paper provides a brief review of research in the use of computers for the architectural design of ships.

The authors then present a new integrated approach, allowing the utilisation of their different methods in combination to generate and assess arrangements in preliminary ship design. The approach aims at relieving the designer of the burden of defining details, enabling him to focus on understanding the significance of design decisions, requirements and constraints in the resulting solutions.

In the detailed design stage, modern industry processes rely heavily on 3D PDMs. These require more work in their initial set-up, but also offer greater benefits and streamline the data transition from design over production to ship operation.

However, there seems to be a general, albeit slow paradigm change. The dream of a central monolithic data model that captures and manages all the data and relationships from all systems is fading. This approach to integration has been perceived as being at least unsuitable for application in the shipbuilding world.

Integration needs to be approached in a different way. A more layered approach is required to retain the efficient working process of the core departments, be that systems design, 3D modelling, advanced simulations or management of large lists of materials.

David Thomson argues in his paper "Loosely Coupled Applications – The Right Approach for Shipbuilding Systems Integration" that coupling key shipbuilding applications at carefully selected points, in an incremental and agile manner is easier and quicker to implement and therefore more likely to succeed.

Runar Aasen (BAS Engineering) couples ShipWeight and ShipConstructor to derive "An IT Link between Weight and 3D Structural Design". This link is not only important in structural design, but also in life-cycle management. It not only covers weight, but also associated values. Rox and Astrup (TUHH and DNV) bring together the conceptual design system E4 with DNV's Nauticus in "Streamlining the Steel Design Process by Linking Design and Rule Scantling Tools". The data links are often based on XML (extended mark-up language), which has developed into a de facto standard for data exchange.

Alonso et al. (SENER) present the "Efficient Use of 3D Tools at Early Design Stages", showing how conceptual design and detailed design can be linked within one software. CAD investments are very important, as they often bind a company to a selected product for more than a decade.

Autonomous robots are coming

Robots are in high demand for offshore, oceanographic and military applications. The technology is rapidly advancing in this field. These advances are taking place along two broad fronts; on the one hand, the cognitive skills (the "intelligence") of robots are developing, while on the other researchers are focussing on using swarms of robots, which can perform tasks in parallel.

Andrea Caiti et al. (University of Pisa) present in "Distributed Cooperative Algorithms for Autonomous Underwater Vehicles in Marine Search Missions" an application of cooperative swarm robots that solve collectively a search task. The swarm organises itself in such a way that it maximises the information with respect to a priori specified probabilities, and the distance between neighbouring robots, while keeping in contact with the other robots.

Bruzzone et al. (CNR-ISSIA) present in "Cooperative Autonomous Robotic Towing System" a robotic system to support salvage operations. In emergency situations, a life-line to establish initial connection between the tug and towed ship needs to be recovered, sometimes in close proximity to the ship to be towed. This can lead to dangerous situations. Robotic technology can help here. Various approaches are pursued and some prototype applications of these approaches will be presented at COMPIT.

What of the ultimate dream in autonomous maritime operation, the unmanned ship? Apparently it is once again time to come back to this topic, in light of a variety of new technologies at our disposal. The EU project MUNIN (Maritime Unmanned Navigation through Intelligence in Networks) has as its objective to demonstrate the feasibility of putting a "Handymax" bulker under autonomous command and sail it through a number of different scenarios in a simulator environment.

The project includes autonomous navigation, autonomous engine control, fallback shore based remote control with the necessary communication links, small object detection and participation in search-and-rescue operations, and a consideration of the legal implications of autonomous shipping. Thomas Porathe (Chalmers Technical University) gives an overview of this recently launched project in "Maritime Unmanned Navigation through Intelligence in Networks". *NA*

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MAN takes fuel flexibility to another level

In an exclusive interview with *The Naval Architect* Søren Jensen, head of research and development at MAN Diesel and Turbo, low speed, explains the merits of the company's latest dual fuel engine, the ME-GI

Six orders for the latest development from MAN the ME-GI gas injection dual fuel engine means that the gas age has arrived for certain. Notwithstanding the developments for ferries such as *Viking Grace*, which was delivered in January, and other vessels, such as *Coral Energy* which have already been delivered MAN, along with its partners, has developed a system, rather than just an engine, that can be retro-fitted almost as easily as it is installed into a new vessel.

US ship operator Tote has ordered two ME-GI engines for its container ships that will operate between Florida and Puerto Rico on a fixed trade and a further four units will be supplied to two LNG carriers, two engines in each, being built for the major tanker operator Teekay.

However, the development of the ME-GI and the overcoming of the technological barriers that MAN and its partners needed to achieve in order to make the system available for retro-fitting as well as newbuilds is the key to making LNG a reality for the near future rather than a dream yet to be realised.

Daewoo Shipbuilding and Marine Engineering (DSME) developed the gas supply system for the ME-GI. The company converted a four-cylinder 50 bore two-stroke engine to gas in May 2011 to test and perfect its gas supply system.

"Initially we had problems with the cold high pressure pump which kept failing, they are not designed for continuous running which is needed in the ME-GI system, so we had to re-design the entire pump," explained Jensen, "now that problem is solved".

Among the many other partners was Hyundai Heavy Industries (HHI) which developed the gas parts needed for the engine and also produced an 80 bore eight-cylinder full size engine in October 2012 for testing and performance optimisation. In addition Mitsui Engineering Services (MES) built the ME-GI and they have much experience in the field.

Jensen says that one of the major hurdles that the design group had to overcome was the sealing challenge set by the fact that the engine operates at 300bar pressure.

"We had several years experience from building land-based power plants and this knowledge is transferable to the marine engines," says Jensen. MAN developed PTFE –chromium plated surfaces for the mating parts of the engine which create a seal as the engine heats up.

Safety is in-built into the system with a succession of censors that monitor the engine and fuel delivery system to make sure that pressure is maintained and that there are no leaks.

"Double walled piping is included throughout the system and the outer pipe wall has censors so that if any leaked gas from the inner pipe is detected the engine will shut off the gas supply and switch automatically to running on diesel, without the loss of any power," Jensen says.

In addition there are censors on all cylinders and if the system records any abnormalities then it will switch to diesel operation automatically.

A third safety element is the gas safety system software. "This software is run on separate computers to those that control the engine's normal operations so there is redundancy built in to the system," explains Jensen.

In addition the company "managed" an increase in the NOx emissions explained Jensen. Engineers realised that the system had a "NOx margin" with the IMO Tier II limits set at 14.4kg/KWh the system allowed for an increase in NOx emissions that would deliver reduced gas consumption, but remain within the Tier II limits, says Jensen.

"We have optimised the performance of the ME-GI. The specific gas consumption is lower than the standard and when running on HFO the efficiency is better," claims Jensen.

He also claims that the ME-GI has eliminated methane slip. "It is built into the genes of the ME-GI," Jensen says. By introducing gas fuel at high pressure, just after top dead centre the fuel "combusts instantly and burns completely, it's very efficient," he says.

Retro-fitting the system is easier for LNG tankers as there is no need for LNG storage, says Jensen. "A gas control block is added to the modified cylinder head with gas injection valves, it can all be done during a scheduled, but extended, dry-docking." Jensen admitted that the costs for such a retro-fitting are uncertain and would be dependent on what type of ship and its design.

MAN are in the process of finalising a deal with the Saudi Arabian gas operator Nakilat, which has a fleet of 45 Q-Flex and Q-Max LNG carriers, the deal will see one of each vessel type converted to the ME-GI system. If the conversions are satisfactory then there could be further conversions for the Saudi company says Jensen.

The driving forces for the development of the ME-GI were regulatory as well as economic, with the strict SOx and NOx emissions controls being introduced by IMO and the expectation is that LNG will command a lower price than HFO and the penalties for pollution that new regulations will bring.

According to Jensen the industry needed "a simple, reliable two-stroke engine which was directly coupled to the propeller. Simple, efficient and reliable." The ME-GI is a cam-shaft controlled engine with gas injection and it offers the simple reliability required, says Jensen.

"This is the future of marine fuel – low price and clean – it will sit well alongside HFO," he adds. *NA*

Wärtsilä's X92 built for bigger things

In line with the trend towards ever larger container ships, the Wärtsilä X92 state-of-the-art two stroke engine has been developed to provide efficient propulsion power for this new generation of vessels. Dionysios Antonopoulos, manager two-stroke portfolio at Wärtsilä reports

Figure 1: The Wärtsilä X92 offers superior propulsion performance for large and ultra large container vessels

The size of container vessels has been steadily increasing in recent years, exploiting the advantages of economies of scale. The increase in container vessel size during the past 30 years has, in fact, been remarkable. At the beginning of the 1980s, container vessels were typically in the order of 4,000TEU. By the mid 2000s, container vessels in excess of 10,000TEU were being built.

Currently the largest container vessels on order are 18,000TEU in size. Global trade expansion, together with developments such as the Panama Canal expansion (New Panamax maximum dimensions: Length 365.8m, breadth 48.8m, draught 15.2m), better port and port handling facilities and modern shipbuilding technological capabilities, have all contributed to the development of modern large and ultra large container vessels. In recent years, emission regulations, market conditions, and increasing fuel prices have forced vessel designers and engine manufacturers to research and develop efficient solutions in all aspects of vessel and engine design. Large container vessels can be considered as "green vessels", since the fuel consumption per TEU transported is lower compared to smaller size container vessels. The large cargo capacity of these vessels, also results in a favourable EEDI (Energy Efficiency Design Index) value.

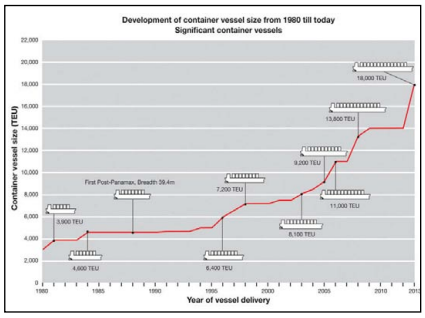

Figure 2: Development of container vessel size from 1980 till today

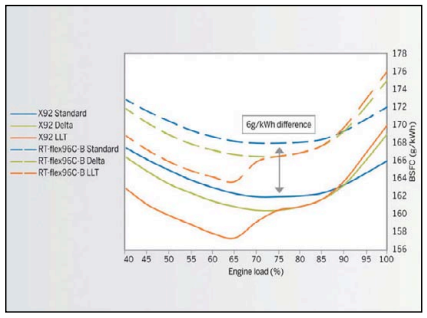

Figure 3: Brake speific fuel consumption of Wärtsilä X92 and RT-flex 96C

The Wärtsilä X92

The Wärtsilä X92 is a two-stroke diesel marine engine designed to provide efficient propulsion power to this new generation of large and ultra large container vessels. The combination of a large bore, long stroke, and low shaft speeds, together with the advanced proven common-rail technology, results in an engine with particularly high efficiency and excellent environmental performance. The new engine provides different tuning capabilities for providing optimum fuel consumption under different operating load profiles, such as part and low load. Very low, stable running speeds at 12% of nominal speed can be achieved. Engine parameters (power & rpm) have been selected providing flexibility in selection of different design speeds together with the increased propeller diameters. While

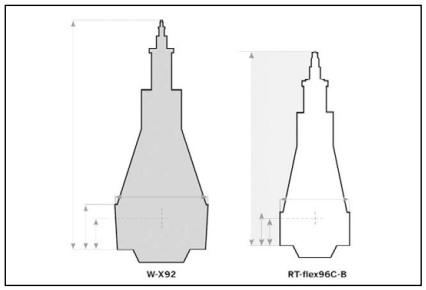

Figure 4: The difference between the Wärtsilä X92 engine compared with Wärtsilä RT-flex96C-B

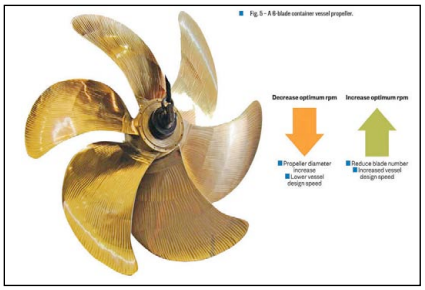

Figure 5: A6-blade container vessel propeller

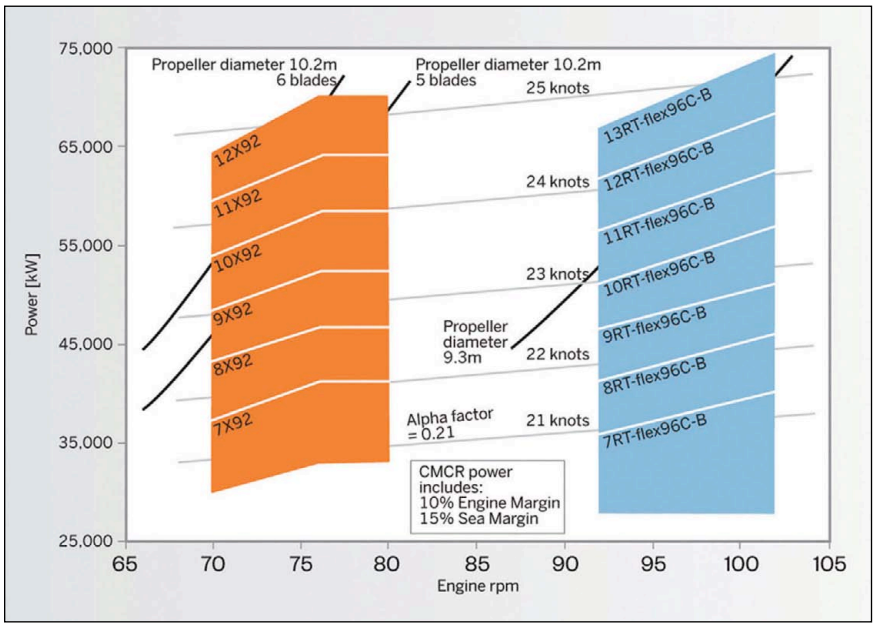

Figure 6: Propulsion of 13,000TEU container with different numbers of cylinder versions of X92 and RT-flex 96C versions engines, and 5- and 6-blades propellers

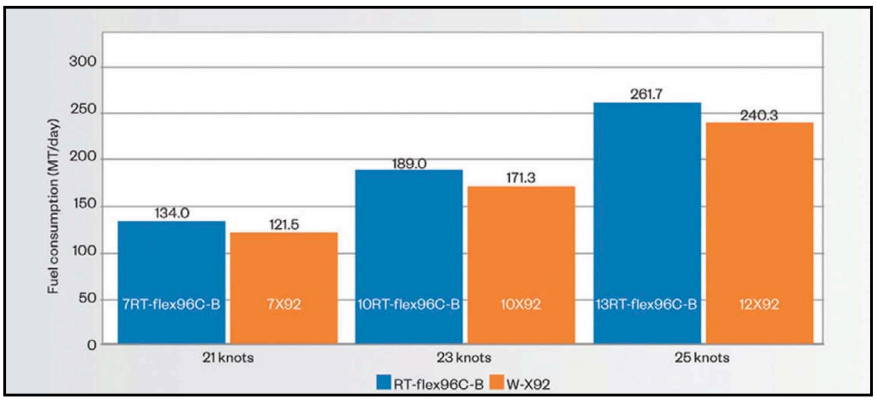

Figure 7: Fuel consumption calculation for 13,000 TEU container vessel (MDO-42,7000kJ/kg)

in the past the selected design speed has been approximately 25knots and higher, lately the preferred design speed has been reduced to 23-24knots, and even lower. The comparison in size between the Wärtsilä X92 and the RT-flex96C-B engines is shown in Figure 4. The slightly larger size of the Wärtsilä X92, in terms of breadth and height, can be attributed to the longer stroke.

Vessel and propeller design

The efficiency of a vessel can be increased by adapting a larger propeller diameter along with optimised aft hull lines. The larger the propeller diameter, the lower the resulting optimum rpm for a specific design speed. Hence, the engine must be able to provide the required lower rpm. As a general rule, the lower the design speed of a vessel the lower the resulting optimum rpm for a specific propeller diameter. Conversely, lower propeller loading results in the possibility of having a propeller with a reduced number of blades, and this means an increase in the optimum rpm. For lower design speeds, a propeller with five blades might be a possible solution. Cavitation and vibration are issues that have to be considered during the design and selection of the propeller.

Propulsion of a 13,000TEU container vessel In order to illustrate the efficiency gains provided by application of the new engine, a case study comparing the propulsion of a 13,000TEU container vessel with the new Wärtsilä X92 with that of a previous generation RT-flex96C-B engine, has been carried out. Part of the study has been based on a parametric study created by the German towing tank and test centre HSVA (Hamburgische Schiffbau-Versuchsanstalt) for a 13,000TEU ship in which propulsion efficiency is compared taking into consideration different propeller diameters and different design speeds. The propeller diameter varies from 70 to 75% of design draft and the design speeds are set at 21, 23, and 25knots. The assumed vessel has particulars as stated below:

Properties

- Length (oa): 366m
- Length (bp): 350m
- Beam: 48.2m
- Depth: 29.9m
- Design draft: 14.5m
- Scantling draft: 15.5m
- Deadweight: 123,000dwt at 14.5m / 135,000dwt at 15.5m
- Sea margin 15%
- Engine margin 10%
- FPP propeller / Blade no. 6 / option of five blades if feasible.

Design speed	21 knots		23 knots		25 knots	
Engine type	7RT-flex96C-B	7X92	10RT-flex96C-B	10X92	13RT-flex96C-B	12X92
CMCR (kW) x rpm	37,120 x 102	35,275 x 80	52,447 x 102	49,840 x 80	72,000 x 102	68,420 x 80
CSR (kW) x rpm	33,408 x 98.5	31,748 x 77.2	47,202 x 98.5	44,856 x 77.2	64,800 x 98.5	61,578 x 77.2
BSFC at CSR (g/kWh)	167.1	159.3	166.8	159.1	168.3	162.6
Tuning	Delta	Delta	Delta	Delta	Delta	Delta

The improved daily fuel consumption can be attributed due to the following: 1) the larger propeller resulting in improved hydrodynamic efficiency 2) engine efficiency together with the common rail concept 3) higher resulting de-rating.

Table 1 - Brake Specific Fuel Consumption at continuous service rating (CSR) - 90% of contracted maximum continuous rating

Design speed	21 knots		23 knots		25 knots	
Engine type	7RT-flex96C-B	7X92	10RT-flex96C-B	10X92	13RT-flex96C-B	12X92
Savings per year (USD)	**Reference**	**2,603,000**	**Reference**	**3,657,000**	**Reference**	**4,421,000**

The fuel comparison in Table 2 assuming 280 sailing days and fuel price 700USD/tonne (HFO-40,500kJ/kg) has been based on constant operation at 90% of engine load (CSR point). From an operator point of view, it would be also important the fuel consumption based on variable engine loading.

Table 2 - Annual savings for different design at coninuous service rating (CSR) - 90% contracted maximum continuous rating

Figure 8: The assumed sailing route is an Asia-Europe trade roundtrip with different sailing speeds. Fuel consumption concerns only the main engine and not auxillary engines. 6 roundtrips per year have been (10,726nm/leg - 7200hours/year - Fuel price 700 USD/tonne

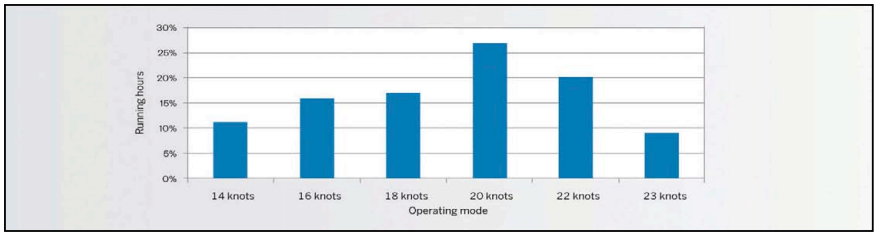

Figure 9: Operating profile per roundtrip

Design speed	23 knots	
Engine type	10RT-flex96C-B	10X92
CMCR (kW) x rpm	52,447 x 102	49,840 x 80
CSR (kW) x rpm	47,202 x 98.5	44,856 x 77.2
Tuning	Low load	Low load
Savings per year (USD)	Reference	2,100,000

Table 3 - Annual savings resulting from roundtrips Asia-Europe with variable sailing speed profile

The chart on Figure 6 illustrates the layout fields of the Wärtsilä X92 and Wärtsilä RT-flex96C-B for different cylinder configurations. On the graph the constant speed lines (Alpha factor 0.21) for different design speeds are plotted together with propeller curves for different diameters and number of blades.

Fuel consumption calculations

The main engine's fuel consumption has been calculated in order to show the benefits of the modern Wärtsilä X92 engine. Calculations of the daily fuel consumption at a continuous service rating (CSR) at 90% of the contracted maximum continuous rating (CMCR), and calculations based on an assumed sailing profile (variable engine loading), were performed. In all cases i.e. 21, 23, and 25knots, the Wärtsilä X92 can provide the necessary power with one less cylinder than the RT-flex96C-B. This is demonstrated in the case of 25 knots where a 12-cylinder X92 has been selected. For 23knots and 21knots a 9-cylinders and a 6-cylinder Wärtsilä X92 respectively could provide the necessary power. The same number of cylinders gives better fuel consumption due to the higher resulting de-rating. The Wärtsilä X92 has approximately 2% more power per cylinder compared to the RT-flex96C-B. For this case study, the power difference due to the different number of propeller blades (five or six) has been assumed to be the same. Also, the propeller diameter has been chosen to correspond to 70% of the Tdes, i.e. 10.2m. Theoretically even larger propeller diameters could be fitted. The improved daily fuel consumption can be attributed to the following factors:

1) the larger propeller resulting in improved hydrodynamic efficiency
2) engine efficiency together with the common rail concept
3) higher resulting de-rating. The daily fuel consumption for the different design speeds and engines is illustrated in Figure 7.

The fuel comparison in Table 2 has been based on constant operation at 90% of engine load (CSR point). From an operator point of view, it would also be important

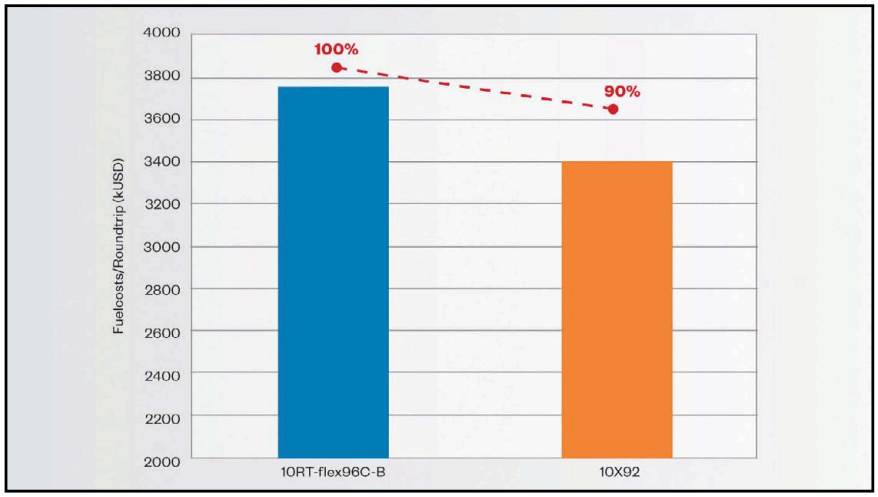

Figure 10: Savings per roundtrip Asia-Europe with variable sailing speed profile comparing 10-cylinder versions of the RT-flex 96 C-B and X92 engines

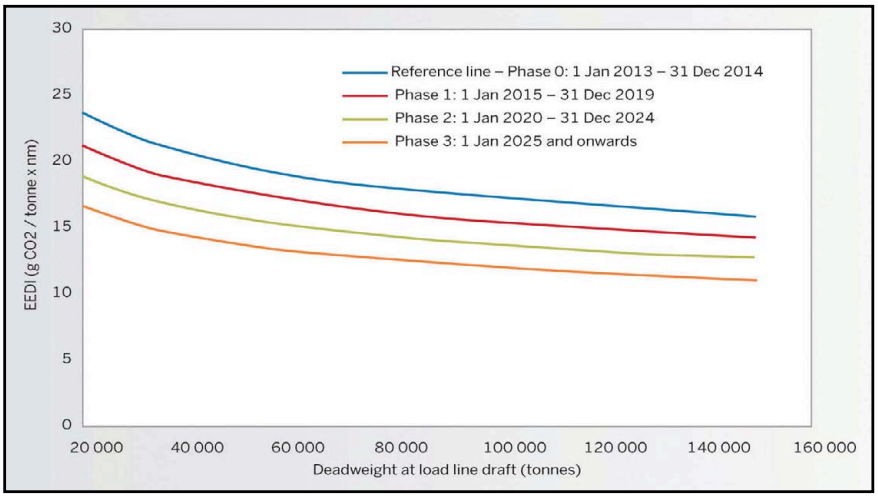

Figure 11: EEDI requirements for container vessels

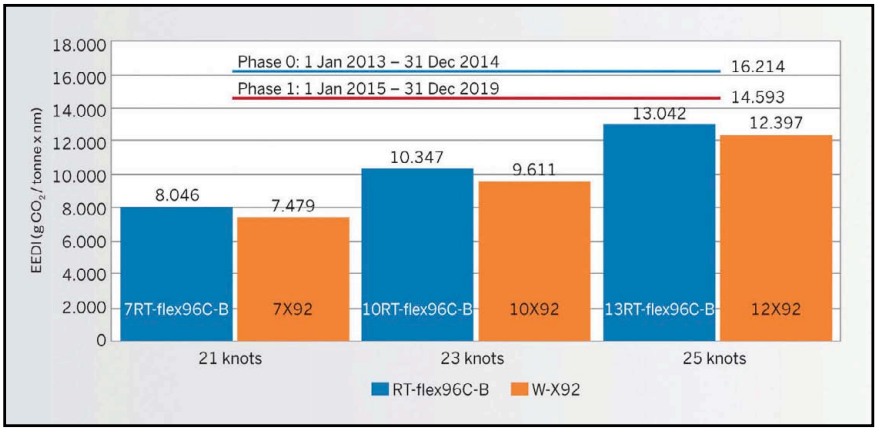

Figure 12: EEDI calculation of a 13,000TEU container vessel for different design speeds

that the fuel consumption is based on variable engine loading. For this reason, only the above vessel with a design speed of 23knots has been selected, and calculations based on an assumed sailing profile have been performed. Results are illustrated in Table 3.

EEDI calculations

The Energy Efficiency Design Index (EEDI) was made mandatory for new ships, as was the Ship Energy Efficiency Management Plan (SEEMP) for all ships at MEPC 62 on July 2011 with the adoption of amendments to MARPOL Annex VI (res. MEPC.203(62)), by Parties to MARPOL Annex VI. Further to the adoption, MEPC 63 in March 2012 adopted four sets of important guidelines assisting in the implementation of the mandatory regulations on Energy Efficiency for Ships in MARPOL Annex VI. The simplified EEDI formula:

$$\text{Attained EEDI} = \frac{\text{Power} \times \text{Specific fuel consumption} \times \text{Emission factor}}{70\ \%\text{dwt} \times \text{Vref}} \leq \text{EEDI}$$

For calculating EEDI for container vessels, 70 per cent of the deadweight (70% dwt) is used as capacity. From the following calculation, the impact of the new engine and the different design speeds on EEDI can be observed. With the Wärtsilä X92 a lower more competitive EEDI can be achieved. In all cases, due to the capacity of the vessel, the attained EEDI is well below Phase 0: 1 Jan 2013 – 31 Dec 2014 and Phase 1: 1 Jan 2015 – 31 Dec 2019 The comparison of EEDI in Figure 12 does not take into consideration Waste Heat Recovery Steam and Power Take-Off devices by which EEDI could be further reduced.

The increase in demand for large and ultra large container vessels is expected to continue and even increase further. Environmental legislation, such as the EEDI, together with high fuel prices and variable market conditions, has created the need for highly efficient solutions that offer owners and operators valuable operational flexibility. The new Wärtsilä X92 is a modern 2-stroke low-speed main engine. It is highly suitable for providing optimum propulsion power to modern container vessels of 8,000TEU and more in size. It can provide savings in fuel consumption in the order of approximately 10% compared to previous solutions. *NA*

The challenge of onboard ballast water sampling

Shipowners are concerned that the current procedure outlined by the IMO for sampling of ballast water once the convention has been ratified is not good enough. Dr Lothar Schillak, marine biologist, SGS Environmental Services, explains the sampling technique that SGS is currently working on

The IMO convention on ballast water management onboard ships pre-sets limit values for the quality of the ballast water, which is discharged from ships' ballast tanks back to the sea. The IMO defines limit values for the numbers of individuals per volume for three target organism size classes.

The compliance of these limit values demands the treatment of the ballast water by adequate technologies. To test the ballast water onboard ships and evaluate, if the limit values are kept, the ballast water has to be sampled from within the ballast water system installed onboard and has to be analysed in respect to these limit values.

Both, sampling and analysis of ballast water should provide easy handling and rapid protocols from sample to result, which enables port state controls, ships crews and independent laboratories to quickly assess the quality of the ballast water onboard ships entering harbours.

In 2012 the Federal Maritime and Hydrographic Agency of Germany commissioned SGS Environmental Services with the execution of a research and development project "Effective new Technologies for the Assessment of Compliance with the Ballast Water Management Convention".

The major project objectives were directed to (i) the development of rapid methods for ballast water analysis and to (ii) the development of adequate onboard ballast water sampling techniques.

SGS Environmental Services managed to convince outstanding experts in naval engineering, marine biology, marine chemistry and oceanography to cooperate on this project.

During the 17th session of the bulk-liquids-gases (BLG) sub-committee of the IMO SGS presented the results of the investigations executed by the international team of experts for the first time to a wider public.

IMO Size Class	Size	Limit value for discharge
Larger plankton organisms	>50µm	< 10 vital individuals / m³
Smaller plankton organisms	>10µm and <50µm	< 10 vital individuals / ml
Bacteria	in general <3µm	
Escherichia coli		< 250 cfu / 100ml
Enterococci		< 100 cfu / 100ml
Vibrio cholerae		< 1 cfu / 100 ml

Table 1: Limit values for the three IMO target organism size classes

With the development of rapid onboard methods for the analysis of ballast water SGS followed the intention that the onboard analysis should be of indicative character, which, in case of non-compliance, should be followed by a full scale regulatory in depth analysis of the ballast water, preferably executed in an independent land based laboratory.

On the BLG 17 SGS also presented analytical methods that fulfil the requirements for rapid onboard indicative analysis of ballast water. Moreover, SGS made clear that these methods have been transferred into simple test kits which are already available now.

Also, SGS presented a totally new, innovative ballast water sampling system, which requires a minimum of space and fulfils major criteria for onboard sampling of ballast water.

The sample taken from within ballast water systems onboard ship should be representative in two ways:

(1) The distribution of organisms in the sample should be the same as in the main ballast water system

(2) The sampling should give a complete picture of the entire process of de-ballasting on a ship.

Whereas (1) clearly addresses the way how the ballast water is taken from within the pipe system, (2) is directed to the procedure of how the ballast water samples are taken regarding the sample volume and the time intervals for sampling. Subsequently, to ensure a maximum of representativeness for

Table 2: Limit values for the three IMO target organism size classes

Criteria for onboard sampling of ballast water
Isokinetic sampling
Adequate filtration
Variable sample volume
Minimal watse water volume
Easy rapid sampling procedures
Applicable for all pipe system on all ships

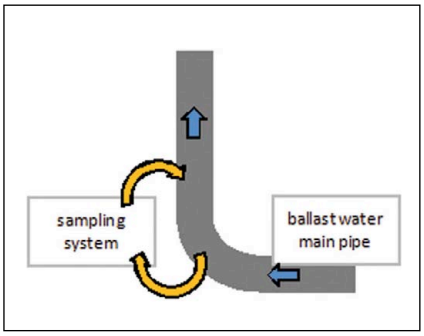

Figure 1: Schematic view of ballast water sampling system

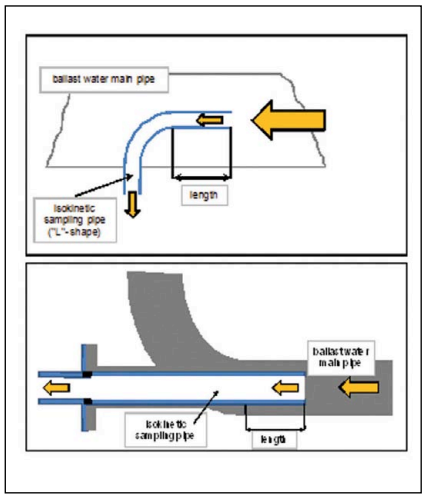

Figure 2: Options for isokinetic sampling ports

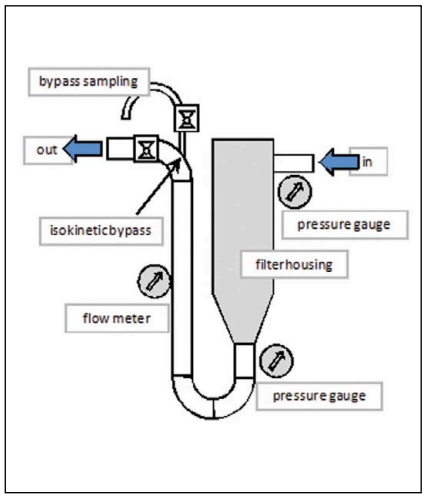

Figure 3: Schematic view of SGS Ballast Water Sampling System Prototype 01

(1) and (2) several criteria are crucial for any onboard sampling system.

In fact these criteria can only be fulfilled by a closed sampling system that is flanged to the ballast water pipe system onboard a ship as shown in figure 1.

Figure 4: SGS Ballast Water Sampling System Prototype 01

The ballast water is deviated, through an isokinetic sampling port, to the sampling system and is re-diverted into the ballast water pipe system through a backflush port.

In principle there are two options for the design of the isokinetic sampling port the "L-shaped type" and the "bend type" (figure 2)

As a result from innumerable test series SGS was able to develop the "SGS Ballast Water Sampling System Prototype 01", which matches all criteria for onboard sampling of ballast water as presented in table 2.

In principle the Prototype 01 comprises a filter stage for sampling the IMO target organism size class >50µm and a small isokinetic bypass sampling port for taking ballast water for analysis of IMO target organism size classes >10µm<50µm and bacteria. Figure 3 presents the scheme of Prototype 01.

After long test series Prototype 01 proved to fulfil all requirements for an onboard application. With a weight of approximately 12 kilograms, a very

Figure 5: SGS Ballast Water Sampling System Prototype 01 during testing

small footprint of 40x60cm and a height of 80cm, Prototype 01 can easily be transported onboard ships and flanged to the ballast water pipe system. As a prerequisite the adequate isokinetic sampling port and the backflush port have to be installed in the ballast water pipe system.

As Prototype 01 is now ready for onboard testing, SGS Environmental Services, thanks to its international network of more than 1,500 laboratories, 75,000 employees and representatives all over the world, successfully stepped into contacts with shipowners on the international level and asked for cooperation of onboard testing not only of the sampling system, but also of the new rapid analytical methods. The first test series on ships in operation will now commence by the end of March 2013.

On the BLG 17 the representative of SGS Environmental Services was not only member of the official German IMO delegation but also participated in the meeting of the international IMO Ballast Water Working group. The objective of this meeting was to further update an IMO working paper on ballast water sampling and analysis. It was the common opinion of all participating IMO delegates to integrate into the new working paper not only the rapid analytical onboard methods SGS developed but, also the sampling system SGS Environmental Services invented. At the same time all participating delegations agreed to set up a trial program onboard ships in operation to test all SGS methods and the SGS sampling system and - upon positive results - finally turn them into THE international standard for rapid, indicative compliance testing of ballast water onboard ships. *NA*

About the author

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Project website: www.Institut-Fresenius.de/ballast-water SGS website: www.SGS.com

BALLAST WATER MANAGEMENT SYSTEM

THINK GREEN!

PANASIA has a mission of 'reinforcing the competitiveness of on shore, off shore plant/marine equipment industry' by securing original technology. In order to transform the nature of products into eco-friendly products, PANASIA has constantly invested and as result, nearby 200 patents were acquired at present.

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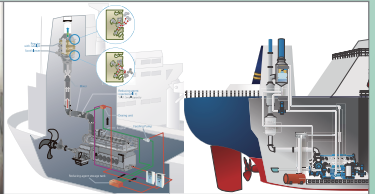
Offshore Seawater Filtration

BALLAST WATER MANAGEMENT SYSTEM
GloEn-Patrol™ III
Ballast Water Treatment System

GloEn PSR
Pit Stop Retrofit Service



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PANASIA

DIY sampling from PSM

Two marine technology suppliers have joined forces to address the impending legislation for ballast water treatment and offer a practical solution for areas that are currently at risk of being overlooked

Expectations that the requirements for the ratification of the IMO's 2004 Ballast Water Management Convention will be met this year means that owners will need to retrofit their ships with ballast water treatment systems over the next few years. These requirements have caused intense debate within the marine industry.

To date, discussion has largely centred around which type of treatment technology is most suited to the task. However, this has overshadowed two very important aspects of the new regulations which, must form part of the overall treatment regime in order to be effective in ensuring environmental compliance: Point of Discharge measurement and Recording and reporting of treatment activities. A joint development between PSM and the Chelsea Technologies Group aims to address these important issues.

FastBallast provides continuous online monitoring of ballast water to the IMO D2 (10-50µm) level. Data is streamed to a graphic user interface for real time data processing

Point of discharge

A key requirement for any treatment system installed is to provide analysis of the ballast water at the point of discharge to prove correct treatment. Developed by the Chelsea Technologies Group, the FastBallast Fast Repetition Rate fluorometer (FRRf) allows operators to monitor ballast water in real time to the IMO D2 standard (10 to 50µm category).

Richard Burt, marketing director, Chelsea Technologies Goup says: "The FastBallast is based on sensor technology we launched in 2011. It is currently being repacked and configured for ballast water applications in 2013. The system can be provided as either an open, or tamperproof installation."

The FRRf method is ideally suited for ballast water monitoring. It is often compared with Pulse Amplitude Modulation (PAM), and other fluorescence techniques, which were originally developed for working with static samples at high optical densities, as found within biofilms and terrestrial plants. The FRRf method has been specifically developed for working with phytoplankton within an aqueous phase at low optical density, exactly the conditions encountered in ballast water. Using the inherent high sensitivity of FastBallast, the variable fluorescence of live viable phytoplankton cells in moving ballast water can be monitored to the levels required by the IMO D2 standard.

"FastBallast samples two times a second through an optical window. It reacts to changes within a few seconds, much faster than competitive products, and is ideally suited to moving water as found in treatment systems. No need to stop and take a discrete sample" highlights Burt.

To ensure that phytoplankton from all groups are detected, FastBallast uses three LED excitation channels, with emission peaks at 450, 530 and 624nm. Each measurement takes only 200µs, which means that data can be collected from fast moving water (up to two metres of linear flow per second), typically when installed in ballast tanks or water treatment system piping.

"FastBallast will enable rapid online testing of ballast waters for the IMO D2 standard. It will enable ship operators to determine if their ballast water treatment systems are working correctly and provide evidence to the port state control. The technology also lends itself to be packaged into a hand held unit for use onboard by the PSC themselves. This will give the operators real time confidence in their treatment systems. It will, therefore, avoid unnecessary downtime for the vessel", says Burt.

FastBallast is designed to operate within challenging marine environments and is pressure rated to 60bar. Data is streamed to a graphic user interface (FastPro8) for real time data processing, whilst simultaneously being logged internally as backup. A number of options are available for transferring data between the installed FastBallast sensor and FastPro8 interface. FastBallast uses high grade titanium for the external housing which virtually eliminates maintenance requirements, other than biannual recalibration, claims the Chelsea Technology Group.

"The FastBallast is based on Fast Repetition Rate Fluorometry that we have been developing for over 15 years. It was originally developed for marine science applications investigating the photosynthesis reaction in marine algae. We have evolved the technique and applied it to wider applications including biofuel production, homeland security and pollution monitoring. It is ideally suited to ballast water monitoring due to its fast response time (less than one second) and ability to monitor all algal groups," says Burt.

In addition, Chelsea Technologies Group have considerable expertise in the design of manifolds and sample chambers that are effective in using flowing water to keep

the optical surface clear of sediment and biofouling, should this prove necessary, it further adds.

Recording and reporting of treatment activities

An equally critical stipulation of the new regulations is Requirement B-2, which calls for vessels to hold data in a ballast water record book. This can be in an electronic format, either standalone or integrated into another system. The recorded data must include the following key information to prove correct operation:

- When ballast is taken onboard, volume, date, time and geographical location
- Movement of ballast water for onboard ballast water management purposes
- When ballast is discharged to sea, volume, date, time and geographical location
- When ballast is discharged to a reception facility, volume, date, time and location
- Accidental or other exceptional uptake or discharges of ballast water.

Entries into the ballast water record book must be maintained onboard for a period of two years after the date of entry and thereafter kept in the company's control for a further three years.

The latest ClearView system is a modular solution comprising a suite of onboard and shoreside hardware and software elements, developed to ensure vessels are operated efficiently, safely and in an environmentally responsible manner. Integral to the system's functionality are recording capabilities which more than meet the stipulations set out for the new reporting requirements.

The system's ballast water treatment module allows vessel operators and onshore personnel to monitor the operation of ballast water treatment equipment. An encrypted recording capability electronically captures all key data and provides secure archive storage onboard or onshore, offering proof of correct operation for the three year period required.

Designed for compatibility, ClearView is scalable and can be integrated with existing system elements as required, minimising the cost of upgrades. The technology has already been successfully employed across a number of fleets for similar monitoring, recording and data transmission applications in complying with MARPOL regulations for Oily Water Treatment and Oil Record Book regulation.

While earlier products were only able to monitor and log signals from primary treatment equipment, the development of the new integrated systems means other areas, such as tank levels, pump operations and valve positions, can now also be monitored. *NA*

GEA Westfalia aims to clean up

As the IMO's Ballast Water Treatment Convention rolls on unratified we see ever more ballast water treatment systems come on to the market. But, GEA Westfalia claims that it will meet the needs of shipowners with its BallastMaster ultraV

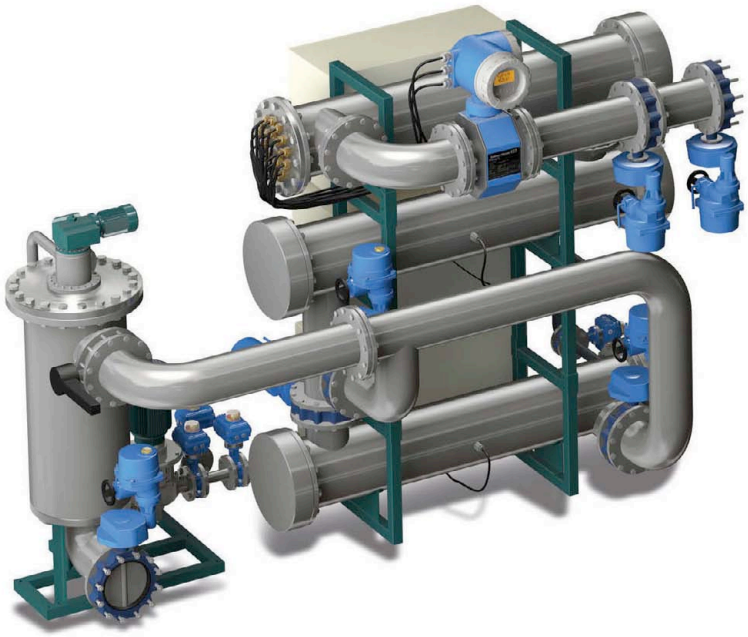
Nowadays, more than 10 billion tonnes of ballast water are estimated to be travelling at any time with ships on the world's oceans. Including the stowaway microorganisms and life forms which, in this way, easily overcome the normally insurmountable obstacles posed by the oceans.

The IMO has, for this purpose, set up clear rules stating how ballast water has to be treated in order to prevent this risk to the aquatic ecosystems world-wide. Probably by no later than 2017 (assuming that the convention is ratified), a regulation will come into force for all vessels specifying that ballast water may be discharged in ports only if specific threshold values according to the D2 standard are complied with.

"We are experiencing quite a few questions from shipowners about when the convention will be ratified, USCG approval standards – will systems meet with the D2 standard and pass the USCG standards and also about sampling, such as how and when it will be carried out and what they do if their system fails. So far shipowners are waiting until the convention is ratified", says Sven Jadzinski, senior product manager/ business line marine, GEA Westfalia.

GEA Westfalia Separator Group system which, in 2011, was awarded type approval by the BSH for treatment of ballast water (G8) in accordance with the IMO resolution MEPC.174(58) that works by means of filtration and UV-C treatment will eradicate microorganisms such as phytoplankton, zooplankton, bacteria, viruses, fish larvae, as well as sediments in the ballast water. The system operates with low energy consumption and operating costs, does not require any chemicals and is suitable for installation in new vessels and also as a retrofitting option in existing vessels.

"We are sending our system out to America to be tested at a facility out there to see that it will comply with the US standards. There is lots of focus on the USCG criteria at the moment", says Jadzinski.



GEA Westfalia enters the ballast water market

The company has said that the system will be able to work in waters that have high concentrations of organisms, sediment or particles. The two-phase system consists of mechanical pre-filtration with vacuum suction technology and UV-C treatment.

Two different UV techniques, differing in terms of their UV emission spectrum, are normally used for water disinfection. Medium pressure UV lamps (MPUV) emit rays of light in the range of UV and visible light. Whilst, low pressure UV lamps (LPUV), such as those used in the BallastMaster ultraV, will emit monochromatic light with a specific wave length of 254nm (UV 254nm), in order specifically to kill microorganisms and to prevent the formation of microorganisms.

The BallastMaster ultraV is installed directly downstream of the ballast water pumps of the vessel. It comprises mechanical filtration with a self-cleaning suction process as a pre-treatment stage. Any subsequent treatment uses low pressure UV-C radiation. The UV-C quartz tubes are self-cleaning by using ultrasound technology. The entire installation operates fully automatically and is remotely monitored in the automatic mode.

More than 30,000 vessels, which are plying their trade on the world's oceans will have to retrofit a ballast water treatment system soon after the IMO convention comes into force. The BallastMaster ultraV has a capacity of 250m^3/h) with a further version for a throughput of 500m^3/h that is currently undergoing the approval phase. The development of the next generation BWTS from GEA Westfalia will be catering for the 60,000dwt vessel market, highlights Jadzinski. *NA*

Techcross' outlook for 2013

Korean-based ballast water treatment manufacturer Techcross reports more orders, but is cautious about the convention being ratified this year

"Green Ships" is the latest buzz-word to illuminate the maritime industry.

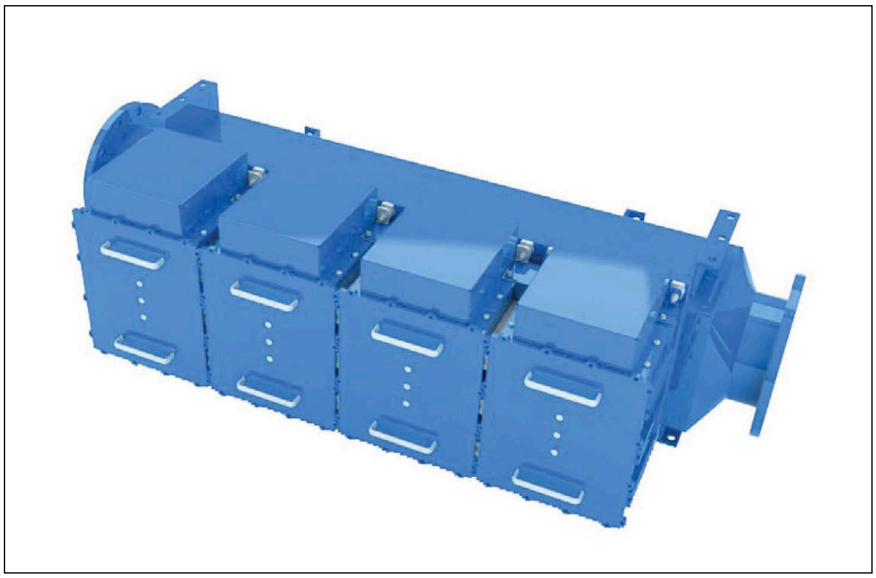
The term "Green Ships" refers to environmentally friendly vessels that can operate economically with low-greenhouse gas emissions. However, the need for environmentally friendly ships also includes ballast water treatment systems and ship recycling.

Ballast water treatment is one of the most important problems because it directly affects the vast sea and marine ecosystem. As of 16 December 2012, 36 countries representing 29.07% of world tonnage have ratified the Ballast Water Management (BWM) Convention. The BWM Convention will come into force 12 months after the date on which not less than 30 countries and not less than 35% of the tonnage of the world have ratified. Therefore, many in the industry expect ratification to occur very soon.

However, Jason Koo, marketing manager at Techcross says: "We forecast the convention will not be ratified this year, and this situation will be continued as long as the economic recession of shipping business holds out. We expect the economy will turn around next year and we hope the convention will be ratified too."

Among the many Ballast Water Management Systems (BWMS) makers, Techcross' ECS (Electro-Cleen System) uses a disinfection system which complies with not only IMO D-2 standards, but will meet the more stringent California standards, which has been going through testing at an independent Laboratory in the US. Although the BWM Convention is not yet fully ratified, some shipowners have already started to install BWMS to comply with the Convention.

To date five basic and three final BWMS using active substances have been approved. In contrast systems that do not use active substances and do not require IMO approval for active substances are only subject to Type Approval by the flag administration for onboard use. Currently there are 28 systems that have been Type Approval from flag administrations.



Techcross aims to meet all future market demand

Techcross reports that information provided by governments regarding the status installation of the BWMS indicates slow progress because of the unsolved sampling issue and concerns over the actual operational performance systems.

In addition MEPC 64 noted that subsequent delays in ratification of the BWM Convention is creating a challenge for retrofitting such as treating ships constructed in 2009 or thereafter as existing ships extending the compliance deadline from two or three years to five years exemption for older ships. There is a proposal to grant a maximum five years grace period. This issue will be further discussed by a correspondence group heading towards MEPC 65 (May 2013).

"When the convention is ratified the retrofit market will be increased enormously. In case of retrofits the market will burst, current BWMS capacity is insufficient. So we presuppose that the retrofit market deadline will be deferred until around 2020." says Koo.

During the MEPC 64 valid concerns regarding the supply, operation and suitability of some BWMS were discussed and their adverse impacts on BWMS performance associated with variations in salinity, temperature and flow rate. MEPC 64 requested delegations to submit case studies including quantitative data and information to facilitate a more informed analysis of these aspects.

Despite MEPC 64 expressing concerns on the consistencies and reliability of the Type Approved BWMS, they decided that it was not necessary at this time to amend the G8. However, they support to consider transparency on the operational limitations of BWMS that are Type Approved. The BWM Circular encourages the issuance a documentation stating compliance with the Convention earlier than the entry into force date.

Techcross, however, remains clear in its objectives for 2013. "This year our goal is to maintain top place in the BWMS market. We aim to reach US$100 million in sales and US$200 million in obtaining orders. To achieve our goal, we plan to build a new factory and develop upgraded products in preparation for strengthened rules", says Koo. *NA*

Turkish tankers come of age

Built at the RMK Shipyard in Tuzla, Turkey, *T. Esra*, is an 18,000m^3 oil products and asphalt tanker and is considered by some commentators as the most significant ship to be delivered from Turkey

Designed by Istanbul-based consultancy Delta Marine the vessel will be handed over to its Turkish owner, Ditas A.S. in the first quarter of 2014.

The vessel has a single screw and is unrestricted for navigation purposes. It is capable of carrying asphalt, vacuum/atmospheric residue, oil products (with a flash point of >60°C), cargoes with a density of 1.3t/m^3 maximum gravity at a maximum temperature of 250°C. The cargo area arrangement includes a continuous main deck, four independent cargo tank blocks, double bottom and side tanks for ballast and two cargo pump rooms.

Four pieces of prefabricated cargo tank blocks are carried by special tank supports installed on an inner bottom structure. The design limits the heat transfer to the hull structure to a maximum of 80°C while permitting the tank's expansion and contraction. Cargo tank blocks are surrounded by void spaces and are insulated with rockwool and covered by aluminium foil.

Flexible cargo operations are ensured with the loading and unloading of three different substances at full segregation and shore connection for all cargo tanks. The cargo/vapour pipelines outside cargo tanks are heat traced with thermal oil. The pipelines are insulated with mineral wool, polyurethane foam and polyethylene. Fixation and flexible points are of a special design to minimise pipe stress.

Four dry cargo pumps are fitted in pump room each capable of handling 500m^3/h of fresh water at 12bar pressure. The pumps are electric-driven, frequency controlled and jacketed. These pumps run simultaneously at full capacity and each cargo tank's loading/unloading rate is 500m^3/h giving less than 10 hours in operating time. The cargo is heated with thermal oil circulating in two 100% capacity independent heating coils with a 290°C inlet temperature.

The vessel's propulsion incorporates one main engine of 5640kW at 110rpm and one fixed pitch propeller of 5.65m in diameter. The vessel is fitted with three 1,200kW, medium speed, HFO-burning diesel generators. Manoeuvring capability is increased by a bow thruster of 900kW. Heating for all cargo and domestic services is generated by two thermal oil heaters.

TECHNICAL PARTICULARS

T.Esra

Length, oa: 155.0m
Length, bp: 149.0m
Breadth, moulded: 25.00m
Depth, moulded: 14.60m
Draught, design : 9.20m
Draught, scantling: 9.50m
Gross: 15500
Net: 4650
Deadweight, design: 18,500dwt
Deadweight, scantling: 19,995dwt
Speed, service: 14.0knots
Cargo capacity volume (100%): 18,040m^3

Bunkers
- Heavy Fuel Oil: 1,005m^3
- Diesel Oil: 132m^3
- Water Ballast: 9,983m^3

Classification: DNV+1A1 Tanker for Asphalt and Oil Product with FP above 60 °C, HOT (250 °C), ESP, HL (1,3), E0, BIS, TMON, ECA (Sox-A), NAUT-OC, CCO, Recyclable, COAT-PSPC (B,V), VCS-1B, BWM-T

Main Engine
- Design: Two stroke, low speed
- Manufacturer: MAN
- Model: 6S 46ME-B8.2
- Number: 1
- Output: 5640kW @110rpm

Propeller
- Material: Ni-Al-Br
- Manufacturer: Hyundai
- Number: 1

Pitch: Fixed
Diameter: 5.65mm
Speed: 110rpm

Cargo Tanks
- Number: 4 tanks, aft and fore tanks divided into 4 parts, centre tanks are divided into 2 parts

Auxiliary Engine
- Manufacturer: HIMSEN
- Model, type: 6H21/32
- Number: 3
- Output: 1,200kW @ 900rpm

Boiler
- Manufacturer: Alfa Naval
- Model: SVE - 16100
- Number: 2

Bow Thruster
- Manufacturer: Scana Volda
- Number: 1
- Output: 900kW

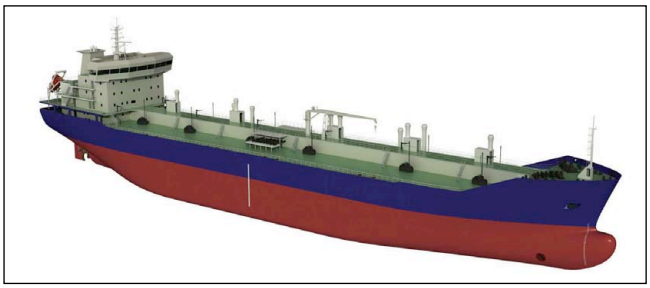
Ballast Water Treatment System
- Manufacturer: TechCross
- Model: ECU 600B
- Treatment Capacity: 600m^3/h
- Performance: TRO < 10mg/L

Mooring Equipment
- Manufacturer: Mariner
- Hydraulic Number: 5
- Anchor: POOL TW

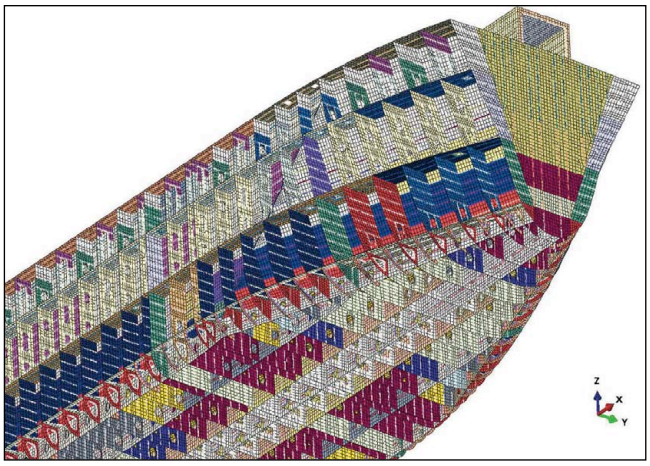
Cargo Cranes
- Number: 1
- Capacity: SWL 10tonnes x18.5m

Complement
- Officers: 5
- Crew: 14
- Rooms: 20

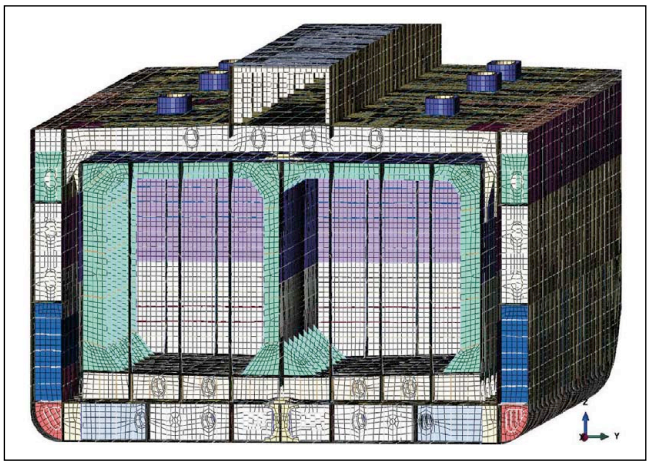
Bridge Control System
- One Man Bridge System: Yes
- Contract date: 2012



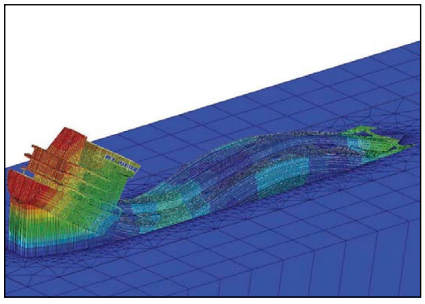
Model view of the 18,000m^3 asphalt tanker *T. Esra*



A 3-D model of *T. Esra*'s structural design



Cross section of the tanker's design



Vibration analysis of the *T.Esra*

Acoustic analysis of the asphalt tanker *T. Esra*

Accommodation, located aft, is divided into four decks with 19 cabins and a pilot cabin with private facilities, two mess rooms, a cargo control room, offices, galley, laundries, stores, provision room, a changing room and a hospital. Both sides of the funnel are utilised to accommodate HVAC system, fans, scrubber modules and CO_2 tubes for fire-fighting in separate rooms at different deck levels.

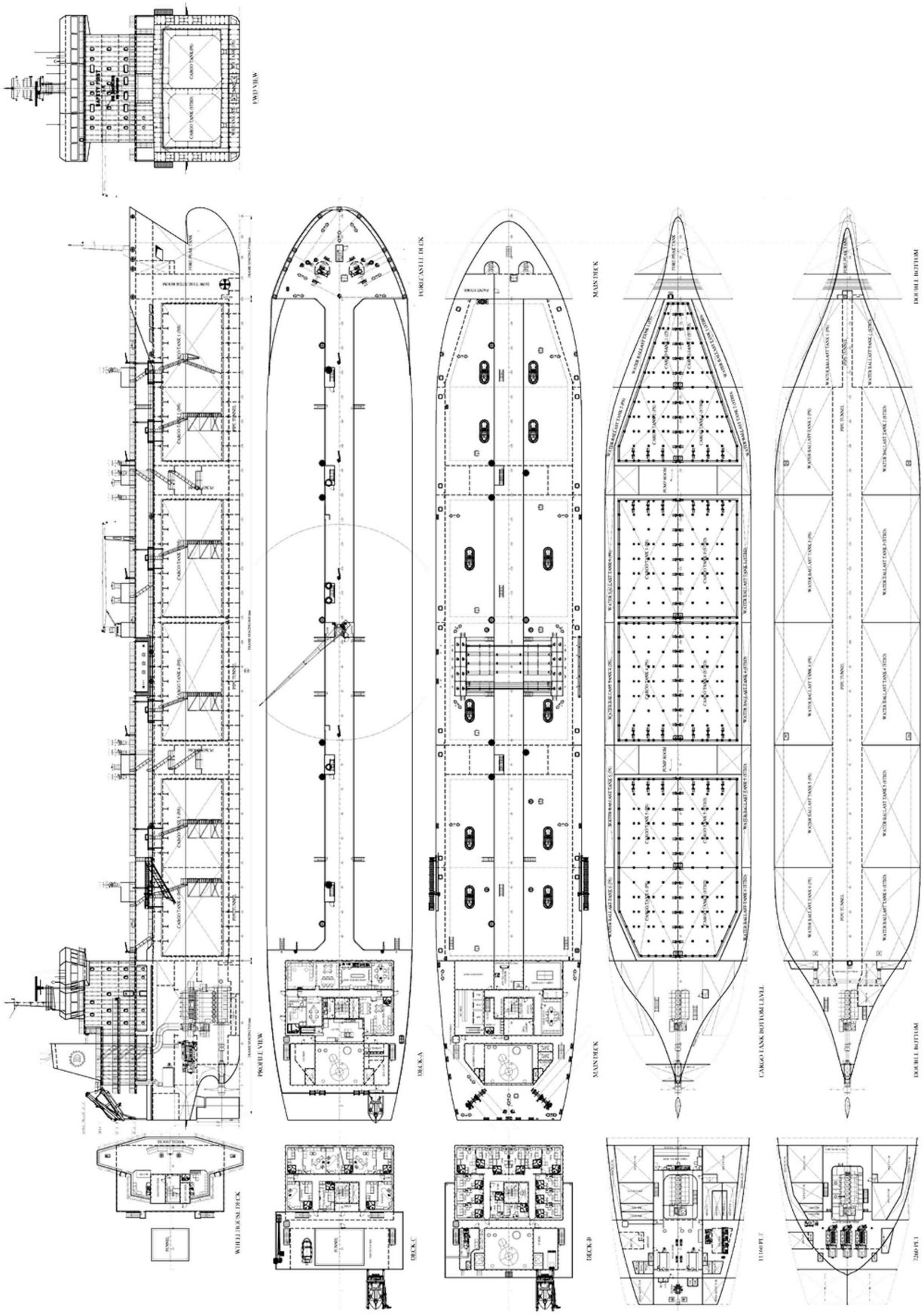
T. Esra's high efficiency hull form and propulsion system provide for minimised fuel consumption if economical speeds are maintained. The hull design is a result of careful hull form optimisation studies by numerical simulation and model tests. Delta Marine carried out potential and multiphase flow analyses to minimise the ship's friction, form and wave resistance and improve the hull form's performance while the Bulgarian Ship Hydrodynamics Centre (BSHC) took charge of the model resistance and powering test.

An extensive engineering analysis has been carried out by expert staff via special finite element analysis tools to determine the scantlings and load distribution in the cargo area facing high stress due to high temperature. Special structural elements such as anti-rolling and anti-pitching keys are used to absorb the mass and acceleration forces generated by the ship's movements. Furthermore, anti-flooding keys are installed to keep the cargo tanks in position in case of flooding. The steel material weight is optimised by structural analysis ensuring a lighter ship with sufficient strength and low building cost.

Special attention has been paid to the design to minimise noise and vibration levels onboard which will maximise crew comfort. Global ship hydroelastic vibration analysis is made to ensure that resonance doesn't occur due to any equipment excitation forces. Additionally vibro-acoustic analysis by the SEA method is carried out to prevent unwanted airborne and structure-borne noise onboard.

From an environmental and fuel-efficiency perspective, the design incorporates dedicated features that follow the philosophy of greener ships for a sustainable future. Classed by DNV this eco-friendly vessel conforms to a high environmental standard through its EEDI value which is below the present IMO baseline curve and exceeds the requirements of proposed restrictive air emission regulations through the installation of a scrubber system. The ship is also fitted with a 600m^3/h ballast water treatment system which uses electrolytic disinfection. *NA*

GA Plan for *T. Esra*



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Taking stock on ECDIS

As mandatory ECDIS becomes a reality, shipowners prepare themselves for the most profound change to navigation

ECDIS (Electronic Chart Display Information Systems) became mandatory for new passenger ships of over 500gt and newbuild tankers of over 3,000gt from 1 July 2012. However, from 1 July 2013 the rules extend to new cargo ships other than tankers of above 10,000gt, with the phase-in for existing ships running between 2014 and 2018.

Mandatory ECDIS presents shipowners with a number of key challenges. To a large extent these revolve around choosing the right hardware to install and specifying the optimum technical solutions which, best suit both the bridge layouts of individual owners and the owner's pocket. Refit requirements in particular can be complex and several manufacturers are already marketing ECDIS versions specifically for installation on existing ships.

Kongsberg offers its latest training to keep sailors ahead of the game

However, as Luuk Vroombout, of The Netherlands-based Alphatron Marine, points out: "Shipowners can buy the equipment needed to comply with ECDIS with no real problems. But, they have to remember they must have the training systems in place before they can use it, as the rules say all masters and watch keepers must be trained in both generic and type-specific ECDIS. I firmly believe that training is the main issue facing the industry right now."

Alphatron has a simulator-equipped training centre in The Netherlands which offers both generic and approved type specific courses for Transas and JRC ECDIS. Vroombout adds: "Given that these two companies have a significant market share I would have expected to see a much higher demand for ECDIS training courses than we have to date, which is worrying. Owners need to embrace the need to train their staff now and not leave it till the last minute. I believe Europort will be a perfect place for them to look beyond the technology which will be showcased at the exhibition and assess what training opportunities are out there as well."

Paul Elgar, OEM strategic business manager at the marine electronics firm Jeppesen, also highlights training as a key issue. "We recommend that companies purchase an ECDIS that is supported by the major training centres and also has computer-based-training (CBT) for the type-specific part of the requirements," he says. "Training should be completed as soon as possible to ensure availability, as training centres may be inundated with requests as deadlines get closer."

CBT providers are likely to have a key role to play in the ECDIS training process. Norwegian company Seagull says it expects to see a huge demand for onboard ECDIS courses over the next few years and is gearing up accordingly with the launch of a number of new CBT training products. Managing director Roger Ringstad says: "There are some significant advantages to undertaking ECDIS training onboard a ship. For example it avoids the need for seafarers to train during shore leave, which they are less likely to be motivated to do, and for shipowners to use relatively expensive training facilities ashore, with the associated travel and hotel costs."

Luuk Vroombout, of The Netherlands-based Alphatron warms shipowners that crew will need to have training for ECDIS

Seagull has teamed up with MARIS and Consilium Marine & Safety to release two new CBT modules to train navigators in the use of ECDIS from these two suppliers.

SAM Electronics, of Hamburg, has a partnership with Safebridge to promote e-learning as an ECDIS training tool. Safebridge has developed type-specific

SAM Electronics takes a new approach to ECDIS training

courses for a number of leading ECDIS suppliers. "The cost of training is proving one of the most significant factors determining shipping companies' approach to ECDIS familiarisation training," says Ulf Steden, managing director of Safebridge. "The complexity of modern ECDIS and the wide range of variations in individual manufacturer designs make the need for training more imperative if the desired safety benefits are to be obtained. Experience from onboard training has shown that 95% of the ECDIS being used for navigation have incorrect settings and that demonstrates very clearly that there is a massive knowledge gap."

Kongsberg Maritime has shown a new approach to ECDIS training. The company has responded to the need to deliver effective training while keeping costs down with its latest ECDIS Instructor Training course, which is designed to allow Captains and senior personnel to train their own officers and crew. Offered in Norway and Singapore, it is described as representing a unique approach to type-specific ECDIS training.

The course includes both technical ECDIS training on Kongsberg systems as well as 'train the trainer' components. Tommy Evardden Hvidsten, product manager training, Kongsberg Maritime, says: "The course enables Masters to train their own crew, which significantly reduces training and travel costs compared to a situation where each crew member attends separate ECDIS training courses."

SAM Electronics takes a proactive role in the training process relating to ECDIS and plans to blend shore- and internet-based approaches. As marketing director Ulrich Rohl points out: Proper training remains crucial and is met in part by our own specialist NACOS Platinum training facilities in Hamburg. This is supplemented by its new e-learning courseware for training and certification under an agreement with Safebridge. The internet courseware provides particularly cost-effective ECDIS familiarisation while meeting standard training requirements."

ECDIS is a fast-moving area of the shipping industry and doubtless more new solutions and initiatives will come forward. However, the training issue is unlikely to shift from centre-stage. As Vroombout concludes: "Shipowners need to take action without delay. Some are investing in hardware, which is good, but they may be neglecting training and this could prove to be a big problem in years to come."

This year's Europort 2013 that will be held in Rotterdam 5-8 November will see navigation companies and shipowners discuss the issue of ECDIS further. *NA*

Navtor goes global

Norwegian-based Navtor will get global coverage after signing a distributor agreement with the UK Hydrographic Office

The distribution agreement with the United Kingdom Hydrographic Office (UKHO) is for the supply of the Admiralty Vector Chart Service (AVCS) for the global professional maritime market. Navtor will also offer the total package of Admiralty Digital Publications as a part of the agreement.

Navtor managing director, Tor A. Svanes comments: "Up to now, the market has been slow to use Electronic Navigation Charts (ENCs), primarily due to today's cumbersome solutions. However, when we have proved an easy handling of ENCs for the navigators, we experienced a swift uptake of the service."

The ECDIS (Electronic Chart Display and Information System) will be the central navigation console aboard ships once the IMO mandate comes into force during the period from 2012 to 2018. ECDIS manufacturers, data and information providers will meet the growing demand from the maritime industry to supply equipment and navigational data. Navtor will be joining forces with the major players to jointly develop and supply a fully automated, cost-effective and user-friendly electronic maritime navigation service. *NA*

Raytheon Anschütz keeps up to date

The introduction of IMO's new Performance Standards for Integrated Navigation Systems (INS) is something Raytheon Anschütz has kept its eye on along with further environmental updates

There is an interest to learn more about the new rules and the solutions provided by the industry for both shipowners and integrated bridge system (IBS) suppliers.

"A compliant navigation system of course offers a series of benefits; above all it increases safety and simplicity in operations. With its higher degree of integration it raises flexibility and empowers the crew in conducting their wide-ranging tasks in a more efficient way," says Martin Richter, marketing manager, Raytheon Anschütz.

The feature of the IBS includes the latest intelligent alert management that the company has highlighted as contributing to a significant decrease in stress and allows the crew attention to be directed to the critical situations and take the appropriate actions.

Raytheon Anschütz received approval for its Synapsis Bridge Control, which was the first navigation system which has been type approved according to IMO's new Performance Standards for INS by Germanischer Lloyd (GL) in 2012.

The INS Performance Standards are specified in 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.

By requiring additional functions and a higher degree of system integration, the new standards are expected to make navigation safer and bridge operations more efficient and simple. 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 new 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 the Synapsis Bridge Control is its Multifunctional Workstations, which can replace stand-alone displays like automatic radar plotting aid (ARPA) Radars, electronic chart display and information system (ECDIS) or Conning displays. Standardised hardware and software allows the bridge system to be customised for any ship's requirements in a standardised, but flexible matter. A newly developed software framework controls all configurations, functional tasks and displays of the bridge workstations and also provides flexibility for system upgrades and extensions.

Various versions of Synapsis Bridge Control are available: Low budget solutions for small ships as well as complex solutions for cruise liners and offshore support vessels. In all versions the navigation system fully integrates with Anschütz gyro compasses, autopilots and manual steering systems.

New K-3000 heavy lift carriers for Jumbo Shipping

Contract Management for Offshore Vessel 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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20th - 23rd May 2013, London, UK

DM Consulting's Basic Dry Dock Training is a 4-day course that covers the fundamentals and calculations of dry docking.

The course begins with the basics and safety concerns, and progresses through all phases of dry docking: preparation, docking, lay period, and undocking. The course ends with a discussion of Accidents and Incidents.

It's designed to be relevant to Dock Masters, Docking Officers, Engineers, Naval Architects, Port Engineers and others involved in the dry docking of ships and vessels. The course is presented through classroom lectures, student participation in projects and practical application exercises. The course addresses the deck plate level of practical operation needed by the dock operator and the universally accepted mathematical calculations required to carry out operations in accordance with established sound engineering practices.

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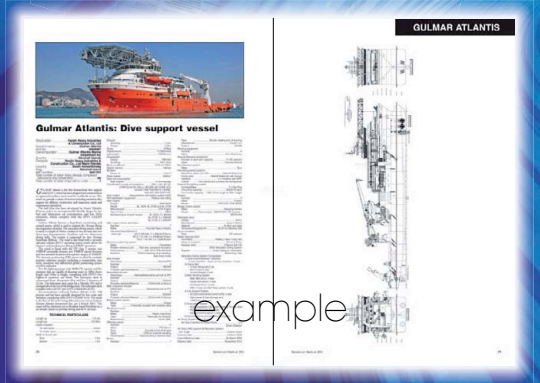

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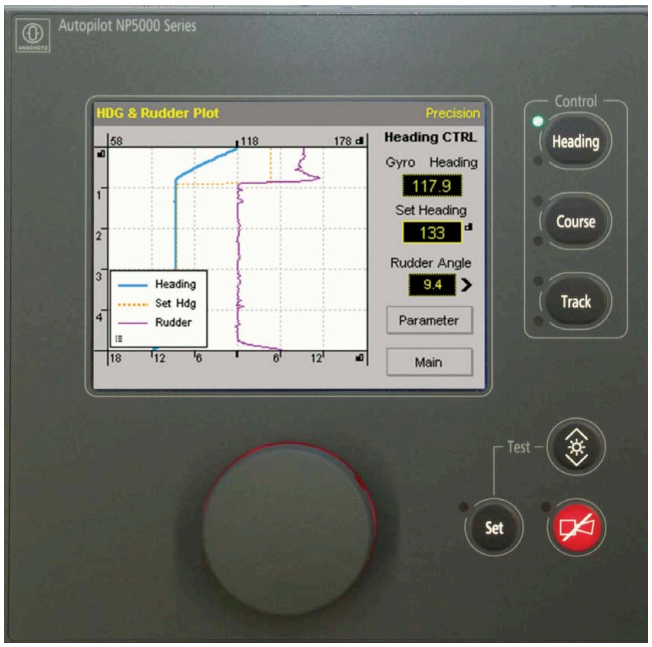

NautoPilot 5000 with Integrated heading and rudder plotter

Raytheon Anschütz, meanwhile, has been awarded several contracts for the supply of Synapsis Bridge Control. Among them are four 15,000dwt Asphalt Carrier newbuildings for Swedish operator Wisby Tankers AB at 3.Maj Brodegradiliste shipyard in Rijeka, Croatia, various offshore supply vessel newbuildings in Singapore and China and a number of megayacht newbuildings at leading European shipyards.

More recently the Dutch operator Jumbo Shipping has ordered Synapsis INS solution, which specified a bridge system to fulfil the highest performance requirements with regard to redundancy, safety and ease of operation, says the company. The vessels are being built at Brodosplit shipyard in Split, Croatia with delivery dates in 2013 and Jumbo Shipping holds an option for a third newbuild. The 152m long vessels are designed for operation even in icy waters and intended to service international transport and offshore installation programmes with a lifting capacity of 3,000tonnes.

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 is supplied for route planning purposes. Additionally, the bridge is equipped with two fixed-role Conning displays.

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

On all Conning displays within the INS, the operator can access the 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 helps to avoid unnecessary multiple alerts on the bridge and thus reduce stress for the operator.

For manual and automatic steering control, Raytheon Anschütz provides equipment from its NautoSteer AS series and the adaptive NautoPilot 5300. The new NautoSteer AS steering control series is based on CAN-bus technology and provides advanced functionalities such as integrated steering failure, wire-break monitoring and a simplified steering mode selector switch. All controls share the same user-oriented design and allow take-over from any steering position on the bridge.

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.

As a consequence of recent IMO regulations, shipowners are required to improve the energy efficiency of their ships' operation with regard to various factors that drive fuel consumption and emissions. Raytheon Anschütz has said that it can address these requirements with its autopilot series NP 5000.

The US-based Overseas Shipholding Group (OSG) has contracted Raytheon Anschütz for retrofitting existing autopilot systems on their fleet of oil tankers with the newly developed Anschütz NautoPilot 5300. The first autopilot system was installed onboard Overseas Fran in October 2011.

The NP 5000 helps by optimising rudder movements with its integrated ECO-Mode. In Eco-Mode, the autopilot automatically adapts to the current sea-state and weather. Instead keeping a heading with frequent rudder actions with high amplitudes, the rudder's sensitivity to periodical yawing movements caused by roll and pitch is reduced. Subsequently, less rudder action is required, which leads to lower levels of speed reduction and less fuel consumption.

The first voyage of Overseas Fran with NP 5000 was from Skagen to New York. To investigate the actual effect of NP 5000 on rudder steering, the heading and rudder plot of this voyage was compared with the results of the last voyage on the same route with the old autopilot system, under similar weather conditions during both voyages.

Capt. Dmitry Shatrov, Master of Overseas Fran, explains: "We can see on our print-out that rudder movement is more economic and gentle with the new autopilot system."

The effect of ECO-Mode is further supported by the new integrated heading and rudder plotter, which provides a graphical indication of heading changes and the resulting rudder angles. This graphic display instantaneously indicates the steering performance of the vessel due to the effects of changes to parameter settings such as rudder, counter rudder and yawing. The operator benefits from simplified adjustments of the autopilot's settings to gain optimised steering performance, which further minimises rudder action and thus increases fuel efficiency.

The relevance of optimised rudder movements for fuel savings has already been highlighted by IMO as a "best practice" for efficient ship operation when developing a Ship Energy Efficiency Management Plan (SEEMP). "Since we all know that less rudder movement significantly contributes to reduced fuel consumption and emissions, we have developed and implemented unique features such as the Eco-mode and the heading and rudder plotter into the new NP 5000 autopilot series", Olav Denker, product manager at Raytheon Anschütz, explains.

In addition to its fuel-saving potential, NP 5000 is also equipped with advanced functions for high precision course keeping, for example for safe navigation in challenging sea areas near coastlines and shallow sea areas, platforms or archipelagos. Besides heading control and track control the new autopilot features a course control mode. When steering in this mode, the autopilot automatically compensates for drift and keeps the vessel on the defined course over a ground line. An optionally integrated acceleration monitor provides a warning if a pre-defined cross acceleration limit is exceeded. This helps to avoid damage to cargo or discomfort to passengers due to high acceleration stresses that might occur for example during a heading change at high speed. *NA*

Cobham keeps a weather eye open

Cobham (originally Thrane & Thrane) is to launch its latest Sailor 6390 Navtex that will expand the company's portfolio in communications

The Sailor 6390 Navtex joins the Cobham satcomm's Global Maritime Distress Safety Systems (GMDSS) portfolio, which is based on the Sailor 6000 GMDSS series VHF and MFHF radios, mini-C terminals, Emergency Position Indicating Radio Beacon, Survival Craft Radar Transponder for Search (SARTS), consoles and accessories.

The Navtex system, which is part of GMDSS, consists of coast stations transmitting navigational, meteorological, search & rescue, ice warning messages, on predetermined frequencies in predetermined time slots. It provides along-range information service for international shipping.

"These systems are very regulated, where we have to follow a strict set of standards. This system is also linked to the Thrane & Thrane land network," explains Niels Peter Agdal, business manager, Maritime Radio Communications, Cobham.

The Sailor 6390 Navtex expands Cobham's services

It is designed to be used as a standalone navigation aid or a component of any GMDSS installation. In the future Cobham expects to be able to integrate all its solutions, allowing information to be viewed where needed on the bridge and also being able to access information through apps.

"We want to be able to integrate all communications and be able to move the applications around. What we have with VMF, VHF we are bringing to AIS systems. It will have one service point area that will make operations and servicing easier," says Agdal.

The system is still going through the approval process which is expected to be completed by the end of May. *NA*

Free roaming for Stena Line passengers

Stena Line has announced that it will be providing free internet access for its Scandinavian passengers

The implementation of CoastalRoam by Marlink follows a recent user trial, aboard ferry *Stena Danica* which operates on a route between Sweden and Denmark. The customised and least cost routing solution is expected to help the ferry operator to meet customer expectations for free connectivity.

Stena Line is using a customer-specific solution from Marlink to provide improved free Internet connectivity for passengers on seven ferries serving Norwegian, Swedish and Danish routes. The CoastalRoam solution has been a specially developed in addition to the Marlink Sealink customised VSAT services already in use aboard the ferries.

"Internet connectivity is vital in this day and age, but provision of free Wi-Fi onboard for hundreds of users is very hard to achieve cost-effectively. With CoastalRoam, we are able to confidently offer the service and balance the cost versus the high levels of customer satisfaction we get from it, says Calle Sedelius, IT support specialist, Stena IT.

CoastalRoam is specifically designed for Stena Line and integrates satellite, 3G and 4G for Norway, Sweden, Poland, Germany and Denmark. Whenever the vessels are within range the public Internet onboard switches automatically to the fastest service available using a lower cost carrier for free passenger connectivity. 4G is also being implemented on CoastalRoam for another customer in Norway and the system is prepared for other carrier technologies such as Wi-Fi and WiMAX.

"Internet connectivity is vital in this day and age, but provision of free Wi-Fi onboard for hundreds of users is very hard to achieve"

"Stena Line aims to continue the CoastalRoam roll out for more routes as fast as we can find telecom providers with good 3G and 4G coverage and competitive prices," adds Raimo Warkki, commercial ship communications & systems at Stena IT.

Tom Erling Hansen, head of sales North Europe, Marlink, says: "Because CoastalRoam enables automatic switching between VSAT and 3G, the system is able to find the fastest and least-cost connectivity available at any time. This makes it cost and time effective for Stena Line to offer a high value customer service for free, which helps them to stay competitive in the market." *NA*

SAM Electronics gets aboard *Viking Grace*

SAM Electronics has equipped Viking Line's 57,000gt *Viking Grace* passenger ferry with a NACOS Platinum integrated navigation control system together with a Valmatic Platinum integrated automation system from L-3 Valmarine.

Designed for cruising the shallow waters of the Finnish and Swedish archipelago, *Viking Grace* is the world's largest LNG-fuelled ferry and the most environmentally friendly and energy-efficient vessel of its type and will comply with stringent 2015 Baltic regulations on gas emissions.

The L-3 NACOS Platinum bridge system comprises four S- and X-band radars linked to a series of five Multipilot, Chartradar and Ecdispilot multifunction workstations for control of all main radar, ECDIS and conning operations, in addition to those for automatic steering and voyage planning.

Supplementary workstation consoles and displays are located in starboard and port wing areas, as well as the captain's cabin. Secondary sensors, consisting of AIS, VDR, DGPS, doppler log and echosounder navaids, will additionally include SAM's new Bridge Navigational Watch Alarm System (BNWAS).

L-3 Valmarine's similarly advanced VALMATIC Platinum integrated automation system for control of all machinery includes added capabilities for vessel power management and emergency shutdown. Complete management control is achieved through a dedicated communications network connected to multifunction workstations in the engine control room and on the bridge. In addition, the system includes four control/monitoring workstations around the vessel and a ship wide network for monitoring access via portable multifunction workstations.

Also interfaced via redundant connections to the VALMATIC Platinum system's communications network is an Emergency Shutdown System (ESD). An independent facility based on the same platform, it operates its own process control station communications network, remote IO units, hard-wired control panels and associated workstations. *NA*

Design & Construction of Super and Mega Yachts

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2nd Notice

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. Papers include:

- A HUMAN FACTORS' APPROACH TO MEGA YACHT CONCEPT DESIGN, Tineke Bosma, University of Strathclyde, UK
- PLATFORM ENGINEERING FOR PRODUCTION AND SEMI-CUSTOM YACHTS, Lee Archer, James Roy, BMT Nigel Gee Ltd, UK
- NUMERICAL AND EXPERIMENTAL ANALYSIS OF THE DYNAMIC BEHAVIOUR OF LARGE YACHT SUPERTRUCTURES, Stefano Dellepiane, Cantieri Navali Benetti, ITALY, Dario Boote, Tatiana Pais, Università di Genova, ITALY
- IMPROVING THE EFFICIENCY OF THE MEGA-YACHT WORLD THROUGH FLEET MANAGEMENT SOFTWARE, Lefteris Maistralis, Regional Director, EMEA, ABS Nautical Systems
- RINA SAILING RIG GUIDELINES AND CERTIFICATION, Paolo Moretti, RINa, ITALY
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Transas sees more orders in 2013

Russian-based bridge system provider has been seeing more of its bridge hardware being ordered by Scandinavian customers

Tanker operator TORM has chosen Transas Marine to supply ECDIS systems, Navisailor 4000 Dual ECDIS, which will be installed on five TORM tankers. Transas marine will also supply and install a 'Back of Bridge' station on each of the five vessels that will thereby obtain three fully operational ECDIS stations.

Navi-Sailor 4000 ECDIS Multifunction Display (MFD) is a flexible and redundant solution providing the mariner with a convenient task-oriented environment. Every Transas MFD workstation (WS) can be equipped with a standard set of software such as ECDIS, Radar, Conning, Chart Assistant utility and SPOS weather module giving the mariner the ability to switch between applications at the touch of a button. All these applications run simultaneously as part of the MFD.

Dual ECDIS means a system is supplied in Master + Backup configuration with the backup requirements for ECDIS and meets the chart carriage requirement. In case of ECDIS Master failure, the backup system automatically takes over as the master system in accordance with the ECDIS back up arrangement requirements.

The Navi-Sailor 'Back of Bridge' planning station has a 24inch panel PC which includes Navi-planner with full voyage plan functionality and ECDIS software.

Installation was completed on the vessel *TORM Louise* late last year. The remaining four vessels will be equipped in the following months. In addition, Transas Marine has upgraded eight other TORM vessels to the latest hard- and software versions.

Transas Marine Denmark has also signed an agreement with the Eitzen Chemical A/S to supply ECDIS systems to its fleet. According to the contract, Transas will supply and install the Navi-Sailor 4000 Multifunction Display Dual ECDIS on 28 vessels and upgrade Transas Dual ECDIS on six vessels.

TORM chooses Transas Marine dual ECDIS

The package for each vessel includes two 26" Hatteland monitors, RS6B computers, radar overlay and Firewall enabling a direct connection between the vessel's satellite communication equipment and the Transas ECDIS.

After the installations, all vessels will run the unique "Pay As You Sail" chart concept from Transas. With Transas PAYS solution Eitzen Chemical fleet will have a license and access to install, view and pre-plan using official (S) ENC's without additional cost and will only pay for the "best scale charts" actually used for navigation monitoring. With Transas PAYS solution the vessel has a license and access to install, view and pre-plan using official (S)ENC's without additional cost.

"What's unique with Transas "Pay As You Sail" solution is that recording and reporting of charts used is done with extraction from Transas Navi-Sailor 4000 ECDIS logbook. Vessels only pay for charts actually used for navigation monitoring. In other words, only charts that have been displayed on the screen together with ships position or generated navigational alarms. In principle, this is "best scale charts only", not all charts and scale bands under the keel," explains Lidia Selivanova, corporate communications & marketing manager, Transas.

Transas PAYS is a service for accessing chart licenses and corrections online together with the ECDIS. 'Pay As You Sail' communicates via Transas Gateway firewall for licensing, corrections and sending chart reports. Transas Gateway works via a secure online internet connection from the vessel's Navi-Sailor 4000 ECDIS to the Transas Chart Server. It also allows remote support and maintenance on the Transas ECDIS which increases safety onboard. *NA*

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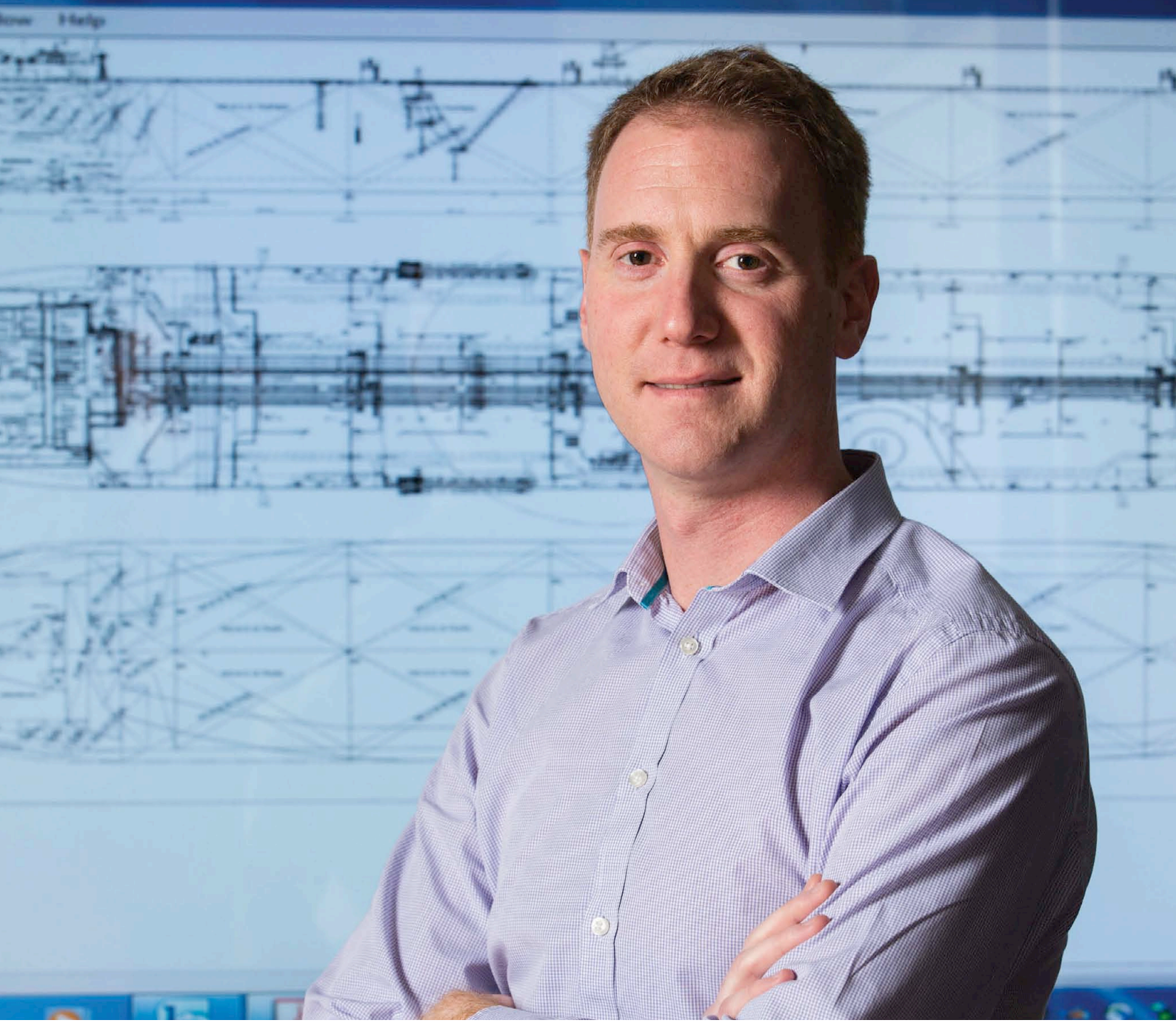

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