MARINE & OFFSHORE TECHNOLOGY

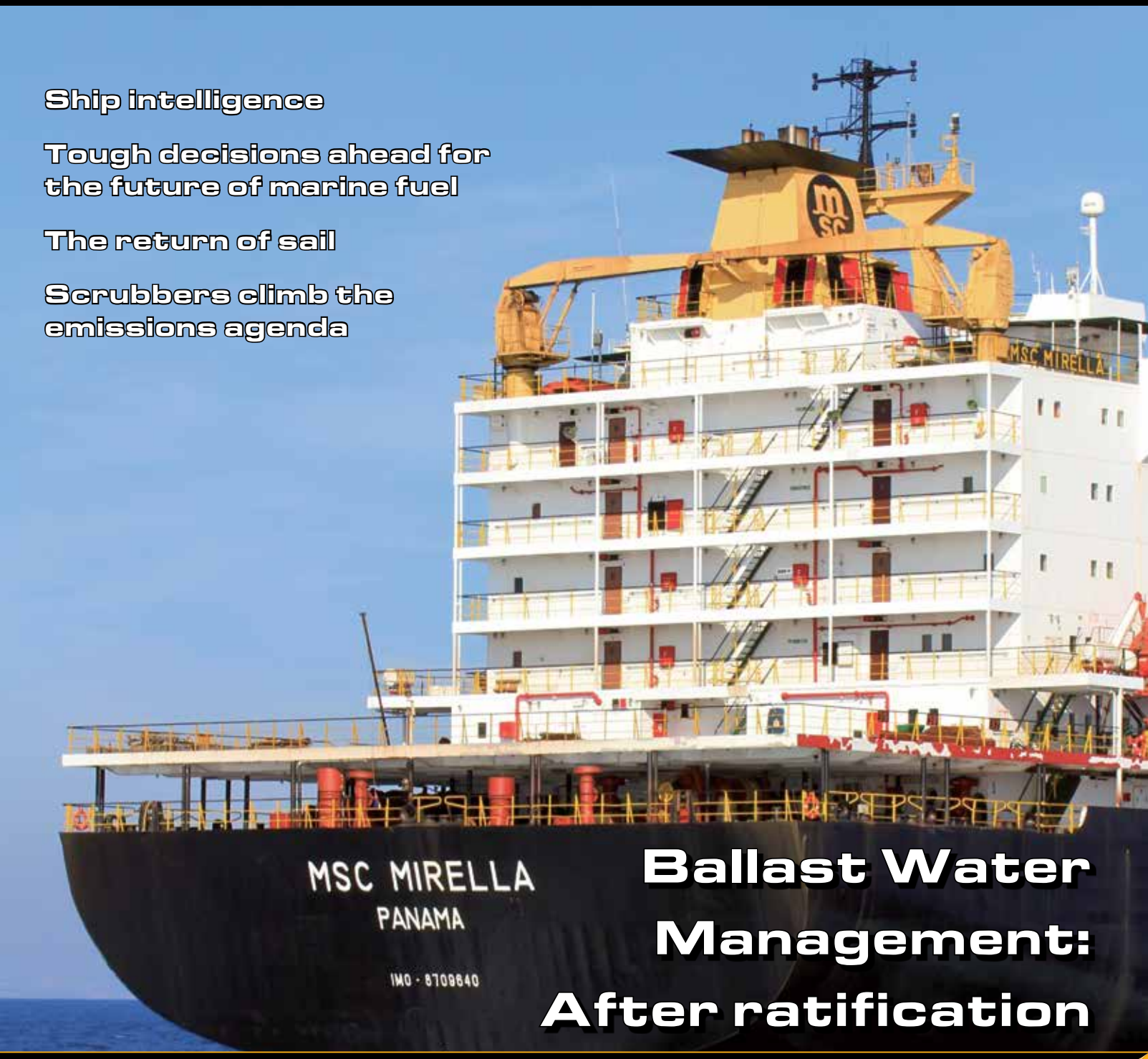
ISSUE 02 | SPRING 2015

Ship intelligence

Tough decisions ahead for the future of marine fuel

The return of sail

Scrubbers climb the emissions agenda



Ballast Water Management: After ratification

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When the IMO's Ballast Water Management Convention enters into force it will impose a number of requirements on shipowners. The waters have been further muddied with the recently introduced regulations from the US Coast Guard (USCG).

For many ships the most practical way to comply with these new regulations will be to install a ballast water treatment system. However, other alternative compliance options may be suitable for certain ship types and trades.

The uncertainty in knowing when the regulations on ballast water management will enter-into-force and how to plan for it mean it is difficult to make decisions to prepare ships ahead of compliance. To add to this, for vessels which trade in US waters, there are requirements to comply with US national regulations on ballast water management.

It is a complex and tangled outlook for shipowners to traverse, but it is something that they must get on top of. With the Convention likely to be ratified over the summer, or by the end of the year at latest, the clock is ticking; once ratified shipowners will have just 12 months to comply.

There have been doubts cast about the availability of drydock facilities, the readiness and reliability of the existing technology but those fears have in the main been dismissed. In general there is a choice of two generic process technologies used in ballast water management – solid-liquid separation or disinfection.

Solid-liquid separation is simply the separation of suspended solid material, including the larger suspended micro-organisms from the ballast water, either by sedimentation or surface filtration. All these processes produce a waste stream containing the suspended solids that comprises the backwash water from the filtering operation or the underflow from hydrocyclone separation. These waste streams require appropriate management. Disinfection removes or inactivates micro-organisms through oxidising biocides, physiochemical inactivation or asphyxiation.

Whatever route shipowners take, the time for contemplation is over. It is time to make plans and implement them or they run the very real risk of operating a fleet that is non-compliant.

Mark Venables

Editor

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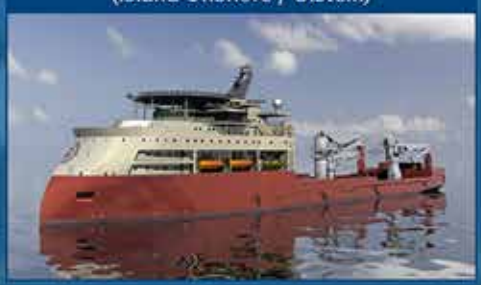

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Bellona Foundation and Damen to co-operate on low-emission design

The Oslo-based NGO Bellona Foundation has launched a three-year partnership with the leading Dutch company, Damen Shipyards Group.

The main goal of the partnership is to explore and develop concept vessels for the future. The Bellona Foundation and Damen both acknowledge that today's global shipping industry will need to undergo substantial change in order to achieve its own climate and environmental objectives. The NGO and Damen have joined forces to work towards reducing the impact on the climate of a wide range of commercial and leisure vessels, as well as fleets employed by the aquaculture industry.

"One of Bellona's goals is to make the ships of the future independent of fossil fuels," said Frederic Hauge, founder and president of The Bellona Foundation. "This partnership will provide us with new knowledge on innovative shipping construction that will contribute towards achieving that objective. Today the global shipping industry emits large amounts of CO_2, sulphur dioxide, nitrogen oxide and other gases harmful to the climate and environment, and the European fleet is large and in need of renewal. The next three years of partnership with Damen will make us better equipped to handle the challenges, both domestically and internationally."

Hauge believes that The Bellona Foundation, as well as Norway's maritime community as a whole, can learn a good deal from Damen when it comes to developing the next generation of low-emissions vessels. He sees Damen as an international trendsetter challenging the Norwegian mindset in a positive manner.

From his perspective this partnership will improve The Bellona Foundation's capability to influence both the Norwegian and European shipping industries. Bellona has a 29-year track record of working on maritime political matters at a high international level, from their offices in both Oslo and Brussels.
The partnership with Damen represents an important milestone for the organisation, giving it access to new knowledge and technology that will enable it to influence Norwegian and European politics even more than before. ■

Wartsila and Clean Marine Energy align to offer shipowners scrubber financ

Wartsila and Clean Marine Energy (CME) have announced the landmark signing of the shipping industry's first collaboration agreement that will provide a convenient funding solution to drive the uptake of exhaust gas cleaning technology. The move is intended to ease the financial burden on shipowners seeking to install scrubber systems in order to meet sulphur emissions legislation.

The financing solution, similar to those prevalent and proven in the building environment space, enables a shipowner to repay the cost of the scrubber system installation via a fuel adder, i.e. a fuel premium on the price of Heavy Fuel Oil (HFO) by which the shipowner repays the cost of installing the scrubber.

This provides a return from the differential between HFO and Marine Gasoil (MGO) for a period of four to six years, depending on price spreads. This means that shipowners do not have the burden of meeting the up-front capital expenditure, which is typically between USD3m and USD12m per vessel. This investment is often difficult to pass on to charterers, whereas with CME financing, the fuel adder charge can be easily passed on until such time as the scrubber system is paid for. The concept therefore minimises the impact on the owner's balance sheet, banking and security arrangements.

The International Maritime Organisation (IMO) introduced legislation that became effective at the beginning of 2015, restricting emissions of sulphur oxides (SOx) from ships operating in restricted Sulphur Emissions

Control Areas (SECAs) to 0.1 per cent. Sulphur levels of 0.5 per cent will be applicable globally when the broader legislation enters into force in either 2020 or 2025. The European Commission has mandated that the 0.5 per cent sulphur limit will be applicable in European Union waters from 2020.

There are currently three available options for owners to meet these regulations; by using low sulphur fuel, which is far more expensive than conventional marine diesel; converting to gas fuelled operation (LNG); or installing scrubber systems that enable conventional fuel to be burned. ■

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Oskar Levander, VP innovation, engineering & technology, Rolls-Royce Marine

Ship intelligence

Oskar Levander, VP innovation, engineering & technology shares his views on ship intelligence

The way ships will be operated in the future is part of a constant evolution, and one of the keys to lower operating costs is the ability to effectively harness the mass of operating data into a central system.

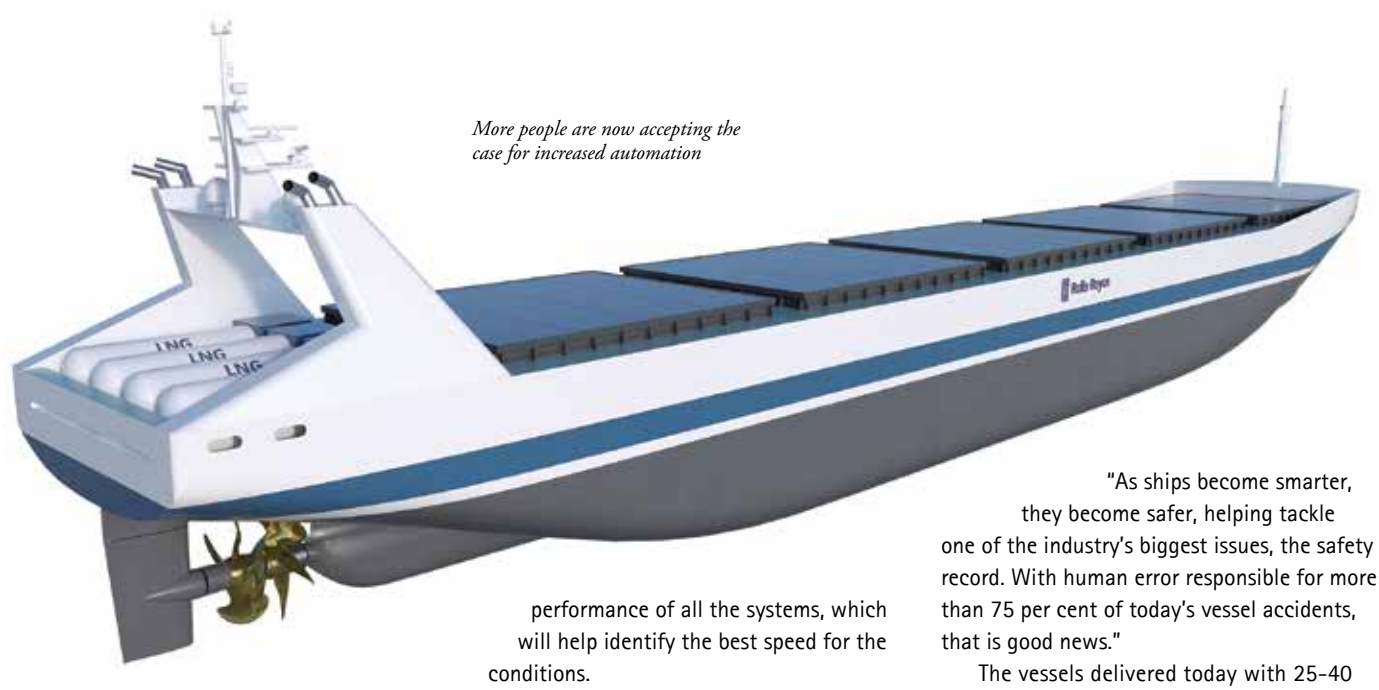
"We are now at the beginning of an era where we have the ability to look at the bigger picture, embracing everything that impacts on a vessels' ability to generate revenue - the era of ship intelligence," Levander says. "We are using many tools for different operations to measure, analyse, provide decision support and to automatically control different functions and services onboard, but they are not designed to work together, so the benefits one system can get from using the 'intelligence' from the others is not being utilised.

"As systems have evolved we have become much better at equipment health and condition monitoring (CMS) and optimising on-board energy use. Systems that provide condition monitoring, energy optimisation, weather routing, interactive chart displays and power management are helping us sail and maintain vessels more efficiently. Individual vessels are benefitting and some fleet operators are rolling these systems out across the total fleet."

Ships now contain more and more equipment which is increasingly complex. Ballast water treatment systems and exhaust gas treatment are just two additions crews will have to manage in the future. "As crews get smaller they just will not be able to cope with everything," Levander adds. "Therefore automation levels are increasing, and the more complex systems are using smarter user interfaces. The unified bridge from Rolls-Royce is a good example.

"So there is a real need for intelligent systems that can run themselves, with the crew becoming supervisors, concentrating on managing the exceptions when they arise and reviewing decisions which human experience machines just don't have. The technologies that enable experts on land to be placed in the centre of problems on board are already with us, and developing technologies like augmented reality are also likely to play a bigger role."

Levander explains that ships are bombarded with information from multiple sources. Electronic Chart Display & Information Systems (ECDIS) and Automated Identity Systems (AIS), are just two of them. "Intelligent systems will move us from equipment level to system level and will be capable of differentiating between important data that will require some action, and routine data that is just building the operational picture," he says. "They can then make the decisions to the level programmed, managing the other events by exception."



More people are now accepting the case for increased automation

IBM's supercomputer Watson has already demonstrated how vast amounts of data can be used to make informed predictions better than humans in certain medical fields, and is now being offered to businesses to help with complex investment predictions. Ship intelligence will help bring this capability on board.

"But these systems will not develop overnight, it will be a step-by-step approach, and they will not develop themselves," Levander says. "Software parameters need to be set to select which data sets are deemed to be running normally and what gets identified for escalation. Therefore ship intelligence will be a key technology area for us in the near future. Not just the technology, but the role it can play in our products and systems."

Near term

There is a real possibility certain functions will move on shore. We are already becoming more reliant on pilotless drones and unmanned underwater vehicles; therefore the number of non-safety related tasks undertaken by crew is likely to reduce. "A logical start point would be payload systems, which could be updated in logical steps to reach unmanned operation, where all systems work together," Levander says. "Ship intelligence will make greater use of CMS and sensors located around the ship, to make the crew aware of what is happening around them, for example, hull stresses and the performance of all the systems, which will help identify the best speed for the conditions.

"Fatigue on board can also be a big problem as crews do not have much spare time. Therefore systems that monitor crew activities may well become more common place. Data will then be available for analysis and comparison, and can be utilised with discretion to improve crew effectiveness and identify training needs.

"More people are now accepting the case for increased automation, but some see it as a threat. As with any introduction it will be gradual, so the need for smaller crews will be slow. Many captains now at sea would welcome the chance of going ashore if they could continue to operate vessels, so it may well aid retention.

"As ships become smarter, they become safer, helping tackle one of the industry's biggest issues, the safety record. With human error responsible for more than 75 per cent of today's vessel accidents, that is good news."

The vessels delivered today with 25-40 year lives will be the training ground, with shore command a logical and attractive career progression for officers. The new intake will come from generations that have grown up with advanced simulations and video games. "Machine/control interfaces we see as acceptable today, will not be good enough for tomorrow's generation," Levander concudes. "The start point will be with smaller vessels, operating on short routes and carrying non-hazardous cargos – a series of small but sure steps."

Ship intelligence will be the enabler for machines to do some of the jobs done by humans today, and it may well do them better and safer. ■

Intelligent systems will move us from equipment level to system level

The Convention will enter into force 12 months after ratification

Results will speak louder than words

It has been a lengthy and tortuous voyage, but 11 years after the IMO Ballast Water Management Convention was adopted it is edging closer to ratification

Simon Bennett, director policy & external relations at ICS

It is expected that this year the target of 35 per cent of the tonnage of the world's merchant fleet will be passed, at present it is tantalisingly close with 32.86 per cent; the target of 30 states signing up to the Convention has already been passed with 44 countries already committed.

The Convention will enter into force 12 months after ratification. But if the regulators believe that it will all be plain sailing from there, they are in for a nasty surprise. There are certainly rough seas ahead with challenges around technology, type-approval, readiness and the cost of implementation to be overcome.

Until recently some of the biggest concerns had been voiced by the International Chamber of Shipping (ICS) but their stance has recently become more supportive. "ICS fully supports the objective of the Convention to address the problem of invasive species unwittingly being carried in ship's ballast water," Simon Bennett, director policy & external relations at ICS explains. "However, when adopted in 2004, it was a classic example of aspirational legislation. The technology required to comply simply did not exist and the regulators had little understanding of the enormity of the challenge involved or the huge costs to industry that would be entailed, perhaps over USD100 US billion in total.

"Frankly, inadequate time was dedicated to the drafting of the Convention, which was rushed through for political reasons, at a time when shipowners were making so much money the industry possibility had its eye off the ball. However, it is virtually inevitable that the Convention will enter into force, possibly within the next year, and ICS is committed to making it work as smoothly as possible."

Bennett explains that the industry is ready to comply as soon as the Convention enters into force, and ships already have to comply with similar, but slightly different requirements if they are trading with the US. "However, even if the equipment has been type-approved in accordance with IMO standards, shipowners still lack confidence that the equipment will actually work and

will be treated as compliant by the port state control authorities," he continues. "The US has yet to fully approve a single system. There may be problems with available yard capacity to permit the entire international fleet to be retrofitted, but at the direct request of ICS, IMO has agreed that the implementation period for existing ships after entry into force will be spread over five years rather than two or three as the Convention originally stated."

With profits in the shipping market being squeezed amidst the current financial downturn, it would appear to be a challenging proposition to invest in compliance. "It will certainly be a challenge for smaller companies, and there is little finance available for retrofitting," Bennett says. "It may be the case that installing the equipment, at costs ranging from USD1-5m a ship, will mean that many older ships will go to the recycling yards much earlier than their owners anticipated."

But according to Bennett the biggest challenge is still whether or not the equipment will work. "This is why ICS has persuaded IMO to revise the type-approval standards to make them more robust, and to agree in principle that early movers will be penalised if the equipment they have already installed in good faith has been type-approved," he says. "In short they are not robust enough. Tests conducted in laboratory conditions are not the same as real life at sea.

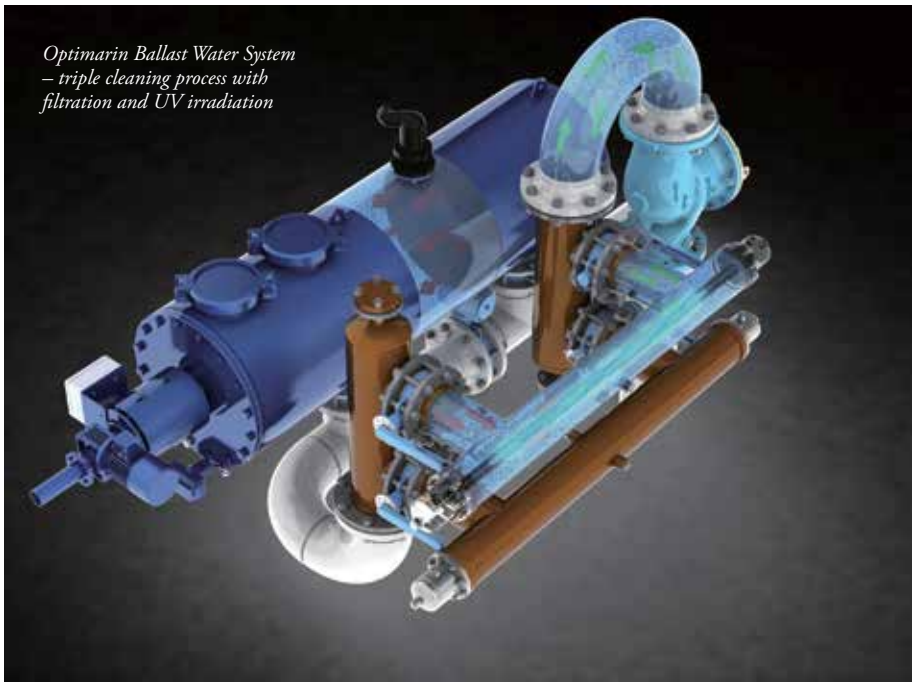
"ICS has persuaded IMO to revise the G8 type-approval guidelines and this work has now already started so that the Convention can be amended as soon as it enters into force. Also at the request of ICS, IMO has now agreed guidelines on port state control that are reasonable and pragmatic, provided they are adhered to by governments.

"However, there is still a lot of work to be done at IMO to make the new regime fit for purpose."

Market view

Since the problem was first recognised around the turn of the century, suppliers have been working hard to deliver robust and cost effective systems that meet the type approval standards

To achieve type approval, ballast water management systems need to be tested in a land-based facility and on-board ships to prove that they meet the performance



Optimarin Ballast Water System – triple cleaning process with filtration and UV irradiation

standard contained in the regulations. The regulations also requires that ballast water management systems which make use of active substances need extra approval to ensure that the system does not pose unreasonable risk to the environment, human health, property or resources.

The decision on whether a ballast water management system makes use of active substances or not remains the prerogative of the IMO.

"As a pioneer within the ballast water treatment industry, Optimarin has been developing its ballast water treatment systems since 1994 and installed the world's first ballast water treatment (BWT) solution upon the cruise ship Princess Regal in 2000, even before the Convention was on IMO's agenda," Tore Andersen, CEO Optimarin explains. "Since then the company has sold more than 350 ballast systems, 25 per cent of these being retrofits. 250 of them are already installed and more than 50 in operation – by far the biggest number of ballast water technology in operation worldwide.

"So there is already considerable interest. Many ship owners have already equipped their ships with BWT systems or are dealing with the issue now. But without the ratification and the binding legislation the market still remains somewhat reluctant. Most of the equipped ships are newbuilds.

"Nevertheless, 12 months after ratification by 30 states, representing 35 per cent of world merchant shipping tonnage, the

Optimarin Ballast Water System (here a solution for 1,000 m3/h) with flexible and easy to implement system components

Convention will enter into force. By this time, presumably in early 2016, all newbuilds need to comply on delivery; existing vessels have to comply at the first scheduled drydocking. This means as soon as the BWM Convention enters into force, serious installation bottlenecks are to be expected. About 50,000 vessels in the existing global fleet – including newbuilds – will have to install a BWT system to match IMO standards.

"In order to be flexible to react to the enquiries and wishes of our clients, we have signed an exclusive partnership contract with Zeppelin Power Systems for the planning, design, engineering, customisation and supply of the Optimarin Ballast System in Germany, Poland, Russia and all CIS countries, excluding Ukraine. Zeppelin Power Systems' comprehensive portfolio includes the supply with individual components, through mounted skids and complete turn-key solutions to handling of all after sales services worldwide. Zeppelin is renowned for its marine competence, relies on a long-term experience in worldwide technical customer service, has the needed manpower, a global logistical network and profound engineering know-how."

From the technical standpoint, the existing world fleet will have to meet the challenges of retrofitting a mature ballast water system without sacrificing too much of its cargo area. "Next to design issues there are the issues of time and experience," Klaus Dammann, head of sales for Ballast Water Treatment Systems at Zeppelin Power Systems explains.

"The process of detailed and reasonable planning, engineering and installation normally takes six to 12 months.

"This will be a problem as soon as the Convention is ratified and the industry is confronted with a surge in demand for systems, especially for systems with a track record of successful operation. That is why we advise ship owners to contemplate the installation of a BWT system now to be ready in time.

"Another concern is the need of experience on-board a ship. By dealing with the regulations and the technology now, ship owners, crews and shipyards will gain practical experience with the system, its specifications, operation etc., so that they will be well prepared when the Convention enters into force." ■

Damen has designed and engineered a 20ft container with a BWT system

Ready and waiting

With ratification of the BWM Convention fast approaching, the baton is handed over to system suppliers and shipowners to implement the regulations

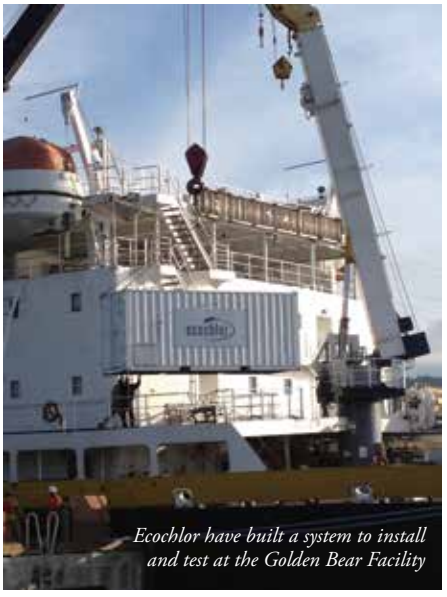
Despite voices of concern being raised, the BWM system vendors are of one voice; we are ready. Regardless of apprehension from associations and shipowners that the technology was unproven, the industry already has a wide variety of options, taking different technological paths.

Ease of retrofit

Lack of capacity to retrofit the world's fleet of shipping is a concern often voiced and is a theme taken up by Lars Nupnau, director global business development marine at Evoqua Water Technologies. "Often the fear voiced by ship owner associations is that there will be not enough installation capacities to meet the demand once the IMO BWM Convention is ratified," he says. "In response to this Evoqua Water Technologies has established a partnership with Damen Shipyards that comprises the whole value chain from delivering the SeaCURE BWMS to installation, commissioning and class approval.

"The service provided to the shipowner starts with the first survey on board the vessels, followed by engineering and class approval steps and can include the installation of the equipment in a Damen yard. However, if the shipowner decides to use a non-Damen shipyard for installation, the engineering service and installation supervision can still be contracted. With the use of a flying squad an installation whilst afloat is also a possible option.

"It is important to note that the shipyard capacity is generally available. The total amount of dry docking events is not changed by the implementation of the Convention. The challenge is therefore to include the installation of the ballast water treatment plant to the ship during the short dry-docking period. This is only possible if the event is well planned in advance by experienced professionals who are familiar with the equipment that they are installing. This only comes with a history and proven expertise within the market."



Ecochlor have built a system to install and test at the Golden Bear Facility

There are specific technical features that can make a retrofit a complex operation or a system specifically suitable for retrofit purposes. "The SeaCURE system has the advantage that only the ballast water filter needs to be integrated into the ballast water main," Nupnau adds. "The electrochlorination process itself happens in a small side stream of about one per cent of the ballast water flow. The components are modular, can be placed where space can be allocated and are, due to small pipe sizes, easily connected."

Containerised solution

"With the Ballast Water Management Convention on the verge of ratification as early as mid-2015 if reports are to be believed, it is still questionable as to how ready the global fleet is," Gert-Jan Oude Egberink, manager Ballast Water Treatment at Damen Shipyards explains. "As an international shipyard group we are doing our best to help customers get prepared with a range of ballast water treatment (BWT) solutions. These include one-stop retrofit and new build solutions, as well as a pioneering new mobile port solution called InvaSave."

To give one example of the efforts of the BWT team, Damen recently undertook a pioneering study considering containerised BWT unit integration. Over the years Damen itself has designed and built several 800TEU container vessels and there are several

hundred similar vessels sailing along the world's coastlines.

The ballast water pump capacities of these vessels are typically up to around 600m3/hr, but these vessels generally don't have much space in the engine room for fitting a treatment system.

Damen has considered these vessels in relation to the ballast water regulations and focused on finding a solution for the installation of a treatment system, which will on the one hand easily fit into the vessels and that will also mean the least downtime for the vessel operator.

Experts from Damen's BWT Department carried out the survey on board one the vessels, which included 3D scanning. The 140m, 9,300dwt container vessel has a draught of 9.5m and is classed by GL.

Based on the on-board survey results, Damen found that the best solution is to fit a BWT system in a container in a hold close to the engine room bulkhead. Therefore, Damen designed and engineered a 20ft container with a BWT system from one of its three BWT partners, Trojan Marinex.

This design - named Damen BalCon - has now been launched into the market. The 20ft Damen BalCon containers are available with treatment capacities ranging from 150m3/hr to 750m3/hr. The containers are CSC and Class approved and include all the equipment and materials that are necessary for operation: lamps, filters, power and control cabinets and when necessary a booster pump can also be part of the scope of supply.

"Making use of a containerised BWT unit gives several advantages, particularly the reduction in installation time, which is vitally important for operators," Oude Egberink adds. "As all the parts belonging to the plant are already connected the only connections that have to be made are between the container and the vessel.

"Another major advantage is that an extensive factory acceptance test can be run, and this reduces the risk of errors during commissioning and start-up and again, reduces the risk of delays. And because everything is standardised, delivery times can be optimised.

"Once the vessel is scheduled for a repair period or special survey the container can be ready at the shipyard just ahead of the vessel's arrival. Then the yard has to run the piping between the container and existing ballast water system and the cabling between the two. One control cabinet is already installed inside the container, but a remote control unit can be supplied and installed at a location that suits the owner."

Once the BWM Convention is ratified all ships will need a BWT system

In addition to container vessels, the Damen BWT team has also surveyed several chemical and gas tankers, which can also benefit from the BalCon system. Therefore the Damen Balcon system is also available in an explosion-proof version.

Alternative approach

Ecochlor holds a unique position in the shipping industry as the only company utilising chlorine dioxide (ClO2) treatment technology for ballast water because it is patented by Ecochlor. ClO2 has been used safely and economically for over 60 years in land-based applications and is unique in its effectiveness against all organisms regardless of water temperature, salinity or organics.

Unlike elemental chlorine, ClO2 does not form unwanted chlorinated by-products, even in highly contaminated water and can be safely and economically generated in a dilute solution on commercial vessels. Its effectiveness and the flexibility of the system in terms of ease of installation and lifecycle costs provide the company a strong position in the market based on its technology.

The system exceeds IMO requirements and the treatment efficacy is not affected by turbidity, salinity, or temperature. Also no ballast water treatment or neutralisation is required at discharge. It also enjoys a small footprint; a system capable of treating 6000m3/hr has a filtration system footprint of ~5m2, and a treatment system footprint of ~18m2.

The marine industry already has a wide variety of options for BWT systems

The company became one of the first to receive acceptance as the USCG Alternate Management System for its full line of BWTS and is actively pursuing USCG type approval. This process can take anywhere from 12 – 24 months from beginning to end and depends on many variables such as the amount of testing needed, the proper biological conditions for testing, and the time required for the review process of both the independent laboratory and the USCG. To date, no BWMS has received USCG type approval. Ecochlor has submitted its existing IMO type approval testing data to review for the gap analysis.

Ecochlor have built a system to install and test at the Golden Bear Facility and have just begun testing with DNV-GL as the independent laboratory.

The system targets vessels with high ballast water flow rates, typically 1,000m3 per hour or more. The higher the flow rate, the better. For vessels with ballast water flow rates of 3,000m3/hr up to and including 16,000m3/hr, the advantages of the design (small size, low power) become more obvious. Because the system does not need treatment on discharge it has one of the lowest power consumption technologies, if not the lowest, on the market today. Operating costs are based on the minimal power requirements for pump operation and chemical consumption. Cost of minimal power requirements will vary and are dependent on cost of fuel. The main cost of operation will be cost of chemical. ■

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The marine industry is undergoing a transformation

Tough decisions ahead for the future of marine fuel

Shipowners face tough decisions about their current and future fuel choices. Marine & Offshore Technology looks at the options available and likely future scenarios

With tougher fuel standards set for the marine industry, the search has been on for fuels that will reduce emissions. There are numerous options available but at present there appears to be no clear winner.

"The marine industry is undergoing a transformation," Tom Boardley, marine director at Lloyds Register Group, explains. "As well as managing today's rising operational costs and achieving cost-effective environmental compliance, ship operators are faced with tomorrow's big decisions. Decisions about fuels, technology and whether it is possible to future proof their fleet and assets.

"The future fuels big decisions are not isolated to the marine industry. As a society we need to consider the risks we want to manage and how to balance future demand for sustainability with our lifestyle ambitions. The marine industry can perhaps benefit from some external perspective and utilise lessons from other industries."

In shipping today the alternative fuels debate has been dominated by the potential of LNG. But will there be other, potentially viable options? "If we extrapolate the past experience, single engine combusting fossil fuel for the last century, to the future, then perhaps it is not a surprise to anticipate that ships built in 2030 may not be dramatically different than the ships of today," Boardley adds. "If, however, this steady technological progress was to be somehow accelerated or overturned, then some amazing technology could be around the corner.


The liquefied-natural-gas (LNG) ship Independence in Klaipeda port

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The declining share of HFO will be offset by low sulphur alternatives

"The marine industry has before demonstrated the ability to make the right decisions in times of uncertainty – through a combination of past experience, intuition and talent. What is perhaps different today are the rapidly changing environmental challenges, new regulatory policies and the fuel/technology choices available to address the challenge and comply with regulation.

"There is a whole new layer of complexity in the decision making process for shipowners, a whole new set of signals to watch for. But there are also likely to be new opportunities."

This sentiment was borne out in a report, Global Marine Fuel Trends 2030 (GMFT), released last year by Lloyd's Register Marine and University College London's Energy Institute that explores the drivers for the future energy mix in shipping in 2030.

The report presented three possible future scenarios and in each, heavy fuel oil remains the main fuel for deep sea shipping; LNG develops a deep sea bunker market share of 11 per cent; low sulphur heavy fuel oil and hydrogen emerge as alternatives in certain scenarios.

In the most optimistic scenario for a more sustainable world, called Global Commons, global greenhouse gas emissions from shipping decline from 2025 despite significant growth in shipping.

The study shows that the combination of growth in trade and reduced emissions would require a reduction in fossil fuel dependency and the commencement of a transition to a zero carbon fuel like hydrogen.

Shipping is the enabler of world trade – if world trade grows then so will seaborne tonne miles of cargo. The GMT 2030 report indicates we can expect strong growth for shipping. With emissions regulations and rising energy costs, shipping decision makers will benefit from a clearer understanding of the potential scenarios for marine fuel demand.

The three scenarios it presented were Status Quo, Global Commons and Competing Nations. In Status Quo the world will continue its current growth momentum with some booms and busts over the next twenty years.

In Global Commons a shift to concern over resource limitation and environmental degradation will see a desire for a more sustainable world being developed and fairness in wealth distribution. Governments will find common ground and accelerated economic growth, within a framework of sustainable development, which will follow.

In the third scenario, Competing Nations, states act in their own national interest. There will be little effort to forge agreement amongst governments for sustainable development and international norms. This is a self-interest and zero-sum world with a likely rise in protectionism and slower economic growth.

So what does the marine fuel mix look like for containers, bulk carriers and tankers by 2030? In two words: decreasingly conventional. Heavy fuel oil (HFO) will still be very much around in 2030, but in different proportions for each scenario: 47 per cent in Status Quo, to a higher 66 per cent in Competing Nations and a 58 per cent share in Global Commons, the most optimistic of scenarios for society. A high share of HFO, of course, means a high uptake of emissions abatement technology when global emissions regulations enter into force.

The declining share of HFO will be offset by low sulphur alternatives (MDO/MGO or LSHFO) and by LNG, and this will happen differently for each ship type and scenario. LNG will reach a maximum 11 per cent share by 2030 in Status Quo. Interestingly, there is also the entry of Hydrogen as an emerging shipping fuel in the 2030 Global Commons scenario which favours the uptake of low carbon technologies stimulated by a significant carbon price.

Technology is not the barrier to alternative fuels

"I think that the report underlines that any transition from a dependency on HFO will be an evolutionary process," Project Leader, Dimitris Argyros – LR's Lead Environmental Consultant, says. "LNG is forecast to grow from a very low base to a significant market share by 2030 - even if there is no major retro-fit revolution – most of the LNG take-up will be in new buildings. But it is important to note that an 11 per cent share in 2030 is the equivalent in volume of about 20 per cent of the bunker market today.

"What we can say is that the uptake of engine and alternative propulsion technology and the emergence of non-fossil fuels can only be driven by a society's ability to create a world with lower GHG emissions – the technology is not the barrier. Key will be policy and markets. Shipping can control its own destiny to some extent – but shipowners can only focus on compliance and profitability. If society wants lower GHG emissions and cleaner fuel, change in shipping has to be driven by practical regulation and market forces so that cleaner, more efficient ships are more profitable than less efficient ships with higher GHG emissions."

Report parameters

GMFT 2030 boundaries are wide, but not completely inclusive: it examines the containership, bulk carrier/general cargo and tanker (crude and chemical/products) sectors, representing approximately 70 per cent of the shipping industry's fuel demand in 2007.

It include fuels ranging from liquid fuels used today (HFO, MDO/MGO) to their bio-alternatives (bio-diesel, straight vegetable oil) and from LNG and biogas to methanol and hydrogen (derived both from methane or wood biomass).

Engine technology includes two or four stroke diesels, diesel-electric, gas engines and fuel cell technology. A wide range of energy efficiency technologies and abatement solutions (including sulphur scrubbers and Selective Catalytic Reduction for NOx emissions abatement) compatible with the examined ship types are included in the modelling. The uptake of these technologies influences the uptake of different fuels.

Regulation is aligned with each of the three overarching scenarios to reflect business-as-usual, globalisation or localisation trends. They include current and future emission control areas (ECAs), energy efficiency requirements (EEDI) and carbon policies (carbon tax). Oil, gas and hydrogen fuel prices are also linked to the Status Quo. ■

Yildiz Williams, senior environmental consultant at Lloyds Register and Smart Green Shipping Alliance's Diane Gilpin

The return of sail

Lloyd's Register is inspiring change with renewably powered hybrid cargo ships

Lloyd's Register (LR) together with the Smart Green Shipping Alliance (SGSA), Humphreys Yacht Design and University College London are on a journey to inspire change with 100 per cent renewably powered hybrid cargo ships.

These innovative vessels will feature sails able to deliver a significant proportion of the propulsion power. The design has the potential to reduce fuel costs and CO_2 emissions by 50 per cent compared to an equivalent conventional ship of the same size.

LR is the only classification society involved in this project and is currently providing technical support during the design development and assisting with the commercialisation of the concept.

SGSA's concept is to develop sailing ships (up to 15K dwt) that feature a specialised hull form combined with an automated square rig sail system. These are freestanding, rotating spars that carry canvas sails.

The system is fully automated and has no rigging on the deck or mast, allowing free access to decks for loading and discharge. A famous example of a vessel using this system is the DynaRig on the 88m superyacht Maltese Falcon. For this vessel, high-end carbon composite materials were used. In an industrialised sailing hybrid merchant vessel, LR and SGSA are developing cost efficient solutions combining existing and novel materials. Steel/carbon combinations may prove to be the optimal design.

While traditional square rigs were limited in how they were positioned to the optimum angle of attack, the SGSA design overcomes this by having a rotating spar. Although the lift coefficients may be lower than wingsails, this is compensated for by the larger surface (sail) areas, resulting in large forces being generated.

Yildiz Williams, senior consultant for Environment and Sustainability and Naval Architect, LR, said: "Shipping has been adopting technologies that offer small incremental efficiency improvements or efficiency through scale (larger ships). This project is challenging the perception that ship design has reached its peak in efficiency. What is being developed is revolutionary in terms of its proposed efficiency gains, yet is based on established technology and principles."

Towing tank tests were run in 2012 with Hampshire-based offshore racing and leisure yacht designers, father and son, Rob and Tom Humphreys. Technology crossover between yacht and cargo ship designs is a leading feature of the work and Rob provides insight into the challenges they faced in optimising a sail powered cargo ship: "The fundamental issue is can it go upwind? This will be a big issue regarding viability, but the automation of the rig allows us to turn much more rapidly to squeeze the maximum potential from any given wind direction and speed." As for performance, he was talking about potential speed through the water of around 20 knots although most sailing would be at far lower speeds. "It's fascinating, great fun and we're scratching the surface of what's possible. There's a whole world of untapped potential in motor-sailing – using the engine to achieve optimum operational speeds and forecast weather data to maintain schedules whilst minimising fuel use." he adds.

The need for lower energy consumption and reduced carbon emissions

Commercial and regulatory challenges are driving the development of new technologies and strategies for the design and operation of ships. To date, most improvements in ship fuel efficiency have been realised through changes in behaviour, such as slow steaming, and reductions in installed power, to meet the Energy Efficiency Design Index (EEDI) requirements. New fuels – mainly LNG – and hybrid technologies have been adopted by North European and North American operators of niche, small or specialised tonnage – such as ferries. Meanwhile, mainstream cargo shipping has yet to make significant technology or operational step changes.

And the dramatic decline in the price of oil and ships' bunkers during 2014 has reduced the operators' incentive to reduce energy consumption – for now.

Diane Gilpin, founder and CEO of SGSA, points out: "Volatility in operating costs cause challenges whichever way they go. The key advantage of wind is that it's the primary fuel/energy source, but the price doesn't change over the vessel's lifetime."

To meet potential demand for lower energy consumption and to reduce carbon emissions, an increased number of energy saving and new technology concepts have been emerging. Many of these concepts are not fundamentally new, but benefit significantly from new understanding, materials and methods. One of these old concepts with a new lease of life is sailing-hybrid ships

The concept design for the B9 ship

A brief history of wind power

Sailing merchant ships reached their technical peak during the 1840s. Clipper ships were superior to early steamships, which were considered inefficient and slow, and sacrificed cargo space for machinery and bunkers. The introduction of the triple expansion engine and, later, the diesel engine, combined with the exponential growth of the merchant fleet (and the need for larger ships), made sailing merchant ships obsolete.

Renewed interest in wind-assisted propulsion in the 1980s was driven, similarly to today, by the oil crisis of the 1970s, but now we are also driven by the need to reduce CO_2 over and above fuel costs. But back in the '70s, by the time the technology was showing promise, fuel prices had stabilised and put a brake on further development and adoption. A sailing-hybrid ship called the Atlantic Clipper was built and operated for several years between Plymouth and the Caribbean and in fact still operates off the Great Barrier Reef.

It can be argued that, in 2015, wind-assisted propulsion technology faces the same threat – reduced incentive from falling bunker prices – despite its potential double-digit fuel savings. But today, we live in a different world, one where many organisations see additional benefits in reducing their carbon footprint and dependence on fossil fuels – benefits beyond reducing operational costs. In this respect, wind-assisted propulsion offers one of the few realistic options for introducing renewable power into shipping.


The DynaRig onboard Maltese Falcon

While merchant shipping abandoned wind more than a century ago, the technology never stopped developing in the racing yacht sector, to the extent that Americas Cup yachts (the equivalent of Formula One cars) can sail faster than the wind.

For sailing-hybrid, the challenge, perhaps, is not developing new technology but taking existing technology in an advanced form and adapting it to merchant shipping. In order to do that, there are commercial, technical and regulatory challenges that need to be addressed, and barriers that need to be overcome.

Lloyd's Register's new report on wind-powered shipping describes and considers these challenges and barriers, and will generate a debate about how wind-assisted propulsion might reach its unfulfilled potential. Download it now at www.lr.org/windpower. ■

Scrubbers climb the emissions agenda

With IMO-designated Emission Control Areas (ECA) coming into force at the start of this year shipowners are faced with difficult choices on how to handle their emissions, namely to install Exhaust Gas Cleaning Systems (EGCS) or utilise alternative fuels

Emission limits can be met by burning fuel with lower sulphur content or by fitting an exhaust gas scrubber

From January this year ships navigating in designated areas globally have faced very tight limits on how much sulphur can be emitted from the ship's exhaust. Most shipowners will be affected and need to make difficult choices.

The new limits can be met by burning fuel with lower sulphur content or by fitting an exhaust gas scrubber. There are different regulations in different areas and a number of scrubber technologies.

In simple terms, ships in IMO-designated Emission Control Areas (ECA) and Sulphur Emission Control Areas (SECA) can only burn fuel with sulphur content less than 0.1 per cent mass per mass. There is currently an ECA around the US coastline and parts of the Caribbean Sea and a SECA around The North Sea and The Baltic. There is currently a 0.1 per cent limit in EU ports and around the Californian coastline. A global limit of 0.5 per cent will apply from 2020.

The IMO MARPOL regulations, the EU regulations and the US EPA regulations are aligned except on some points of detail. They all allow for equivalents and so permit the use of Exhaust Gas Cleaning Systems (EGCS) which are called scrubbers. They have to achieve the same limits on Sulphur Dioxide (SOx) content of the exhaust whatever fuel is burnt as if the ship was burning fuel with a sulphur content less than 0.1 per cent. Each scrubber also has to be approved as an equivalent by the flag administration of the vessel so some different flag state requirements may apply.

The list of questions arising in relation to EGCS is long and intricate. Long – since this involves new technology of which the yards, operators and owners have little experience. Intricate – since the issue is inherently multidimensional and includes factors such as novel technology, operational issues, compliance regimes and local and international authority enforcement strategies, to name just a few.

A wet EGCS works by allowing water to be intimately mixed with the exhaust gas, which leads to several chemical processes taking place between the water and the sulphur in the exhaust. The sulphur is transformed and captured in the water phase, ultimately as sulphate. The waste water is cleansed, removing particles and rudiments, before being discharged into the sea. Seawater has a natural buffering capacity that neutralises acid by-products of the chemical processes, whereas fresh water needs to have chemicals added to allow the same process. The chemicals most often used are caustic soda or magnesium oxide. The sludge rinsed out from the waste water is stored in tanks for later delivery in port.

In a dry EGCS, the exhaust gas is fed through a packed bed of calcium hydroxide granulates, forming gypsum (calcium sulphate). The produced gypsum (in granulate form) is stored in on-board containers. This means the containers must be replaced during ship berths. For a smaller vessel, typically short sea shipping, the exchange must usually be done once a fortnight. The dry EGCSs' main advantages over wet EGCSs are:

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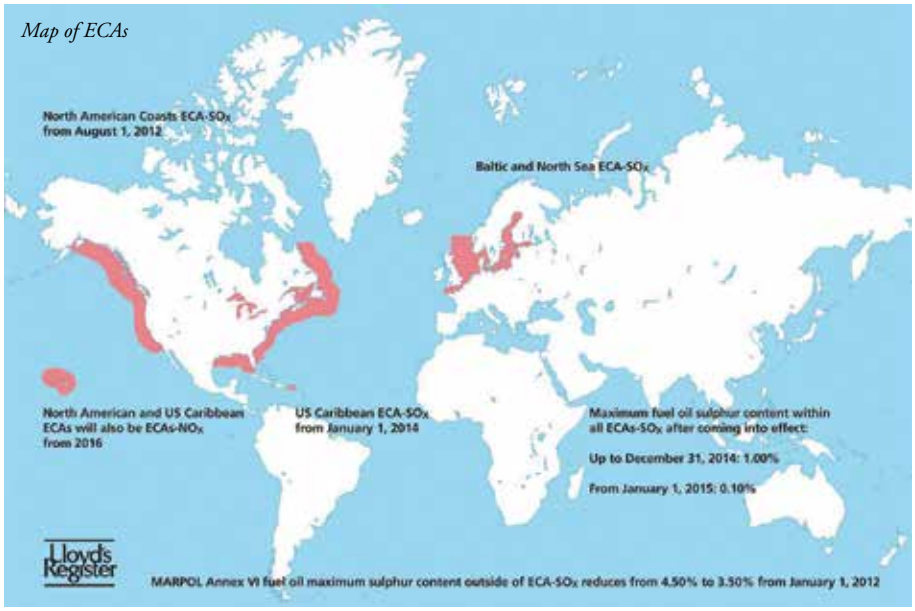
simpler systems, no sludge production and no discharge water. The systems will become rather heavy and large for power plants of around 20MW and bigger.

There is some concern that the discharge of sulphate will be harmful for the oceans but Tomas Tronstad, principal at DNV GL is quick to quell that fear. "Studies and in-field testing done to date show that the increase in sulphate due to exhaust gas scrubbing will be insignificant when compared with the quantity already in the oceans," he explains. "As to the content of other substitutes in the discharge water, special concern should be paid to Poly Aromatic Hydrocarbons (PAHs). MEPC Guideline 184(59) states that further research into the effects of PAHs on the environment may require the future tightening of requirements, possibly with retroactive effect."

Aside from wet and dry there are two further differences in EGCS, they can be open or closed loop. An open loop EGCS utilises seawater as a scrubbing agent, pumping seawater up into the funnel and discharging the same amount of water after cleaning out debris. A closed loop system utilises seawater or fresh water with added chemicals in a closed loop. A certain amount of water is regularly tapped from the closed water loop and then cleaned and stored in a tank. An equal amount of new replacement water is added to substitute the tapped water. A closed loop system is only able to operate in completely closed mode for as long as the discharge water tank volume allows – usually a few days' operation.

One problem that shipowners encounter is the sheer size of the EGCSs



Map of ECAs

One problem that shipowners encounter is the sheer size of the EGCSs. For a 10MW power plant, covering main engines, auxiliary engines and boiler, the rough physical size requirements of the goose-necked EGCS body (in the funnel) are 7–10m in length, 3.5-5m in breadth and 5-8m depth, depending on the manufacturer. Columnar designs may be slimmer and longer (a diameter of 2.2m and length of 12m for a 10MW plant), and these tend to be fitted on each engine or boiler. The main space-demanding parts of the EGCS plant are the main EGCS body, process plants for water treatment and fluid storage tanks. For dry EGCS systems, there are no water-treatment-system considerations to take into account.

"The chemical processes required need a certain amount of time to take place," Tronstad adds. "Consequently, the EGCS body diameter is dimensioned to reduce the speed of the exhaust gas and the length is dimensioned to allow the necessary contact-duration period. Moreover, the lower the temperature of the exhaust, the greater the SO2 solubility, which is also why the process is space demanding, since the water spray also functions as the cooling media. For

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the reasons stated above, it is questionable that EGCSs will become considerably smaller in the future, although the manufacturers are working on this issue.

"In DNV's experience, commercial projects will require up to a month's time in the yard, although shorter periods have also been reported. For multi-engine plants, typical of cruise ships and to some extent container ships, some suppliers are able to perform parts of the retrofitting of pipes and systems during normal operations, thus reducing yard time. Naturally, such a solution is stressful for the normal crew as well as for the installation team. The installation of an EGCS during ordinary docking is also known to be a challenge due to the already busy time plan."

The adoption of EGCSs has been slow to date

CR Ocean Engineering (CROE), has recently been awarded the design and supply of two open loop exhaust gas cleaning systems from Stena RoRo. The two systems will be installed to reduce SO2 from two main engines aboard the Stena Forerunner. The Stena Forerunner operates primarily in the European ECA where new low sulphur fuel regulations that came into effect on January 1, 2015.

The CROE scrubbing systems aboard the Forerunner are scheduled to be on line in the first half of 2015. Once installed, the scrubbers will allow the vessel to meet the low sulphur ECA requirements even when burning high sulphur heavy oil.

The systems reduce the SO2 content of

engine flue gas to below that found in 0.1 per cent Sulphur fuel (the equivalency standard) even when burning high sulphur fuels. This advanced scrubbing technology can be used on new ships or as a retrofit to existing ships. The system is available in three standard configurations, customisable to the ship's needs: as a once through scrubber, open loop; as a recirculating scrubber, closed loop; and as a combination of both designs, hybrid.

The system is designed to replace the existing silencers and does not require a bypass. Its small size minimises ship modification and makes this technology an excellent choice for cruise ships, ferries, bulk carriers, containerships, RoRo and others.

"We are very proud of our success in the maritime industry," Nick Confuorto, chief operations officer of CR Ocean Engineering, says. "We strongly believe that scrubbers will become the most widely used alternative solution to low sulphur fuel worldwide.

"We plan on being a major player in the marine scrubber market as we have been for the industrial scrubber market since the 1950's. Our company has had a proud history of success with our scrubbing systems and we plan on bringing that success to this emerging market.

"We know that fuel costs take a big bite out of the shipping company's operating profits. Therefore, we bring forward our extensive experience and advanced technology to provide shipowners with a reliable and cost effective alternative to the higher ECA compliant fuel costs."

As for the industry's readiness and adoption of this important scrubber technology Confuorto is less sanguine. "I think the shipowners have taken a wait and see attitude," he explains. "Only a few have started to proceed with scrubbers Through the entire year of 2014 there were only about 400 scrubbers sold in the marine industry, and when you consider how many ships there are in the global fleet, that number is very small. Some of these were looking at alternative fuels such as LNG but I believe they are now turning away from that option and will be looking to scrubbers; for a while it looked as if LNG might take off as a fuel.

"But they are now starting to seriously look at scrubbers and their uptake should climb quickly." It is hard to argue with that attitude. Emission standards are here to stay and will only tighten over coming years. So unless there is a much higher uptake of low sulphur fuels or alternative fuels such as LNG, scrubbers are a commercial imperative for the world's shipping fleet. ■

A new paradigm for fuel emulsions

Ship owners are exploring all avenues in their quest to reduce emissions, with the use of fuel emulsions gaining credence as a credible option

Emissions Control Areas (ECAs), which have seen allowable limits of sulphur plummet since 1st January, 2015, will be followed by further exhaust emission pollution legislation by next year.

"With this in mind, the shipping industry would be wise to assess all prospective solutions to facilitate affordable compliance" Rod Weinberg, a director of SulNOx Fuel Fusion (SulNOx), specialist fuel emulsion technologists, explains. "Ship owners

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and operators impacted by the new 0.1 per cent sulphur restrictions within ECAs in Northern Europe and North America have had to rethink not only their fuel procurement strategies, but also adjust to new operational, technical and financial challenges associated with being complicit with the IMO MARPOL Annex VI regulations."

This regulation requires adhering to 0.1 per cent sulphur levels, significantly lower than the 3.5 per cent global sulphur cap. While the impact of necessary changes made to ensure compliance continue to be observed, the industry has no time to rest on its laurels. As long as pollution has such a detrimental effect on human health and health costs, regulators will keep pushing all industries, particularly the marine sector.

In European Union waters from 2020, stringent 0.5 per cent sulphur limits will be implemented, while the industry currently also has to comply with Tier I and II NOx regulations, which require ships constructed from 2016 to emit NOx emissions of not more than 2.0g and 3.4g per kWh in ECA areas.

"More legislation is bound to be enacted with particulate matter, especially smaller particles below PM2.5, and further down the line, restrictions on black carbon could be introduced," Weinberg explains. "Many respected academics argue that without curbing black carbon, which when deposited on ice limits the 'albedo' effect that restricts the sun's impact on ice cap melting, the effects of global warming will be significantly accelerated."

Notwithstanding that the shipping industry has made huge strides in lowering its emissions, in the eyes of many international regulators beyond the halls of the IMO, shipping perhaps unfairly stands out as a 'villain to be taken to task'. Take sulphur as an example, ships in international waters beyond ECAs have a cap of 3,500ppm. In the EU, there is a sulphur cap of 15ppm for automobiles.

More is already happening in shipping. Russia has already successfully lobbied the IMO to extend the NOx regulation deadline on the basis that the technology required to reduce NOx to compliant levels has not been sufficiently developed. Additionally the IMO, at subcommittee level, has approved a definition of black carbon that will now be proposed to the Marine Environment Protection Committee (MEPC) at the group's 68th meeting in May, with the aim of developing ways of measuring black carbon to support data collection and potentially reduce emissions.

While the continued efforts of ship builders, engine manufacturers, class societies and manufactures to assess and attempt to resolve the challenges of fitting compliant equipment in vessels should be applauded, SulNOx believes the solution to NOx compliance and significant wider reductions in many other negative environmental impacts caused by all types of hydrocarbon fuels, for both combustion and burning, lies in the use of multi-fuel/water emulsions.

"Ship-owners and operators will be aware that fuel/water emulsions are not a new concept, having been known about for over 100 years, but one which has suffered notable reputation issues due to an inability to provide economy, efficiency and most importantly, stability; no separation of the fuel and water," Weinberg explains. "However, our research and deployment provides compelling evidence of a solution to these previously unresolved issues. Our environmentalists and entrepreneurs, supported by a team of impartial third party researchers, have been testing SulNOxEco Fuels since October 2012 and have found the technology to be entirely stable; no stratification and able to maintain a stable shelf life for more than two years. Indeed, specimens statically stored since the start of the trial remain safe, usable, homogenised fuels.

"For the shipping industry - where SulNOx has operated a commercial vessel using its SulNOxEco Fuels since April 2014 - this means significant reductions in NOx and particular matter, including carbon monoxide (CO), carbon dioxide and black carbon solids (soot).

"The solutions are accessible to vessels using a readily available technology that requires no upfront investment other than an initial license fee, which covers the cost and installation of the hardware required. There is no further cost to the ship owner or operator's bottom-line financials as we recoup the ongoing costs of emulsification from a share in the fuel savings generated by its technology, which can be a significant percentage, depending upon factors including vessel type, speed and age."

Such is the potential of this technology to overhaul the environmental performance of any vessel with a combustion engine, that the powerboat sector has accepted the fuel to power Team Britannia's £2.9 million record attempt for the fastest powerboat circumnavigation of the globe, planned for November, 2015.

"With so many facets to consider in the part shipping has to play in reducing harmful emissions, there is ample room for technology developers with robust and proven innovative solutions to support the industry's transition to less pollution, especially when easily mobilised and negligible upfront investment is taken into consideration," Weinberg says. "Surely environmentally differentiated vessels that make notable efforts to support cleaner shipping will be rewarded, whether through regulation or through market drivers such as charterers seeking to comply with CSR objectives or consumer pressure."

While the technologies are applicable to any type of use where multi-hydrocarbon fuels are used (fossil or synthetic), the company particularly understands and prioritises the shipping industry. "We also understand that with the high asset value of vessel engines, vessel owners and operators will be extremely cautious in adopting new technological solutions into their fuel mix," Weinberg adds. "However, through third party research and technical expertise, we are confident any concerns can be allayed and we can bring a new paradigm to fuel emulsions, providing potential fuel efficiencies and tangible solutions to technically challenging legislation, contributing significantly to emissions reduction." ■

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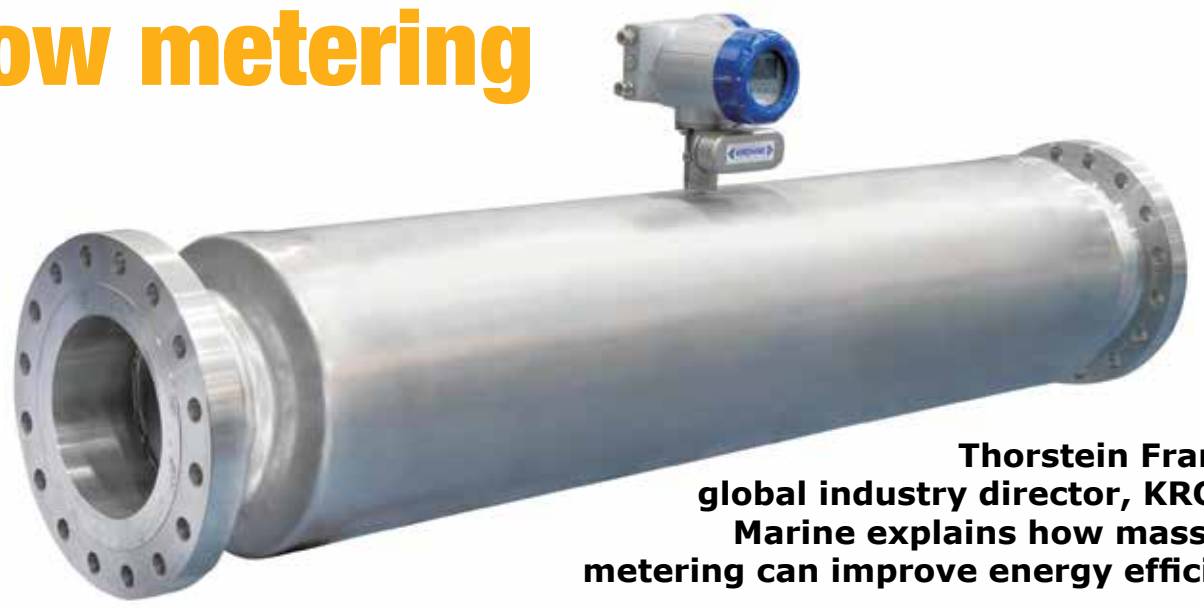
Ship energy efficiency management with mass flow metering



Thorstein Franche, global industry director, KROHNE Marine explains how mass flow metering can improve energy efficiency

Fuel consumption of ships is currently a topic of significant importance to operating costs and profitability and with the amendments of MARPOL Annex VI Regulations for the prevention of air pollution from ships, which entered into force on 1st January 2013, the monitoring of ship energy efficiency is mandatory.

The two areas of the regulations of interest to the operator for ship energy efficiency are the Ship Energy Efficiency Management Plan (SEEMP) and the Ship Energy Efficiency Operational Indicator (EEOI).

How can continuous measurement help in supporting the operating company and the crew in meeting their obligations of the regulations?

Ship Energy Efficiency Management Plan (SEEMP)

The guidelines advise that the SEEMP is a living document, developed and maintained by the ships' masters, operators and owners. The SEEMP should be an integral part of the ship safety management system and the environmental management system under ISO 14001. And as a living document the process of maintenance should be driven by continuous improvement.

The establishment of the SEEMP requires planning to develop a relevant, effective plan which can be implemented to minimise the onboard administrative burden and identify staff responsibilities.

Record keeping and the responsibilities for documenting are clearly required in order to implement the SEEMP and generate a base line of performance and record changes.

These recorded changes need to be monitored to show the effect, both advantageous and detrimental. This can only be achieved by quantitative measurement and this directly relates to the Ship EEOI discussed further below.

The fourth step, self-evaluation, closes the loop and instigates the next planning phase of continuous improvement. This objective evaluation of the data collected and the measures implemented deepen understanding of the individual ship and highlight the possible areas of investigation for the evolution of the SEEMP plan.

Ship Energy Efficiency Operational Indicator (EEOI)

The monitoring section of the SEEMP implementation requires quantitative measurement; the EEOI defines a simple indicator for the highest level of monitoring. EEOI = mass of CO_2/transport work

The quantity of CO_2 can be calculated from the fuel(s) consumed both at sea and in port for main and auxiliary engines, generators, boilers and incinerators using the conversion factors defined in the IMO guideline.

The transport work has two components; firstly the cargo carried, the unit of which must be derived consistently for the vessel and depends on the nature of the cargo and allows for comparison between vessels in a working fleet.

The second component of transport work is the distance of the voyage or the distance travelled per day.

The transport work is generally the quantity of cargo carried multiplied by the distance. For special vessels other measures of transport work may be more appropriate.

Caution should be taken when collecting

data for EEOI and monitoring the value, the EEOI is only the highest level indicator.

Secondary indicators used to calculate the EEOI should also be monitored and reviewed to understand the influences on those. Below we discuss the monitoring of fuel consumption and its influences and also consider cargo. These second level indicators are the ones the operator and crew can influence.

Fuel consumption monitoring as part of your SEEMP

The SEEMP requires that data is collected to monitor the efficiency of the vessel and to calculate the EEOI, this can of course be collected manually on a voyage basis or day to day basis, dipping tanks and estimating the fuel used. This may be relevant and practical in an initial SEEMP, but three factors quickly take effect.

The data collected is collected on voyage by voyage or better on a day by day basis, but in both cases the data is collected and can only be acted on after it has been analysed. If the data for that period is wildly different from the previous period, often the reason for the change is lost. Or if we take an action we do not know the effect until we have made the next series of data samples.

As we want to find out more we need to collect more data at shorter time intervals and the burden of data collection increases onboard and for shore based staff to analyse.

For operational reasons we do not collect data at the specific time or analyse it in a timely manner and the trend is lost or we must average and back-calculate, losing the accuracy of the real data collected.

Mass flow metering offers the opportunity to automatically collect data; this reduces the operation burden of onboard personnel in collecting data and allows for data to be available in real time. Data is collected consistently in a way which is not possible by any manual method.

But collecting data is only the beginning; a meter system only gives data. That data must be represented and displayed in a consistent way where it provides information which can be understood and acted on. This can be done by shore based staff, but the real time advantage of the data collection is lost.

To provide this functionality, dedicated software visualisation tools such as KROHNE's EcoMATE collect the real time data and represent this in a visual form which can be easily interpreted by the onboard staff responsible under the SEEMP. The data can also be made available to operational shore based staff.

Using EcoMATE to achieve your current and future SEEMP's

The IMO SEEMP guidelines refers to the use of computer software, EcoMATE is proven proprietary solutions specifically designed for real time fuel consumption monitoring of marine fuel systems.

The investment in any new equipment on board is always difficult, justification for the purchase and installation of mass flow metering and monitoring software on its own to deliver savings is seen as especially difficult to quantify. But in other sectors that have a long established experience of implementing energy efficiency monitoring can say monitoring as part of a commitment to the efficiency plan will on its own create awareness and yield a two per cent efficiency saving. Two per cent of the fuel you use in 12 months is a significant justification for the capital expenditure and return on investment.

But going forward the advantage of real time monitoring becomes clear when you conduct studies as part of your SEEMP, such as:

Speed optimisation – finding the optimum speed for the vessel and the propulsion system, validating the engines and propeller curves.

Optimum trim – finding the optimum trim conditions at a specific draft for the cargo on board.

Optimum ballast – validating cargo planning and supports optimum trim above.

Hull and propeller maintenance – optimise cleaning regimes and validate the use of coating systems.

Propulsion systems – maintenance schedule optimisation and monitoring degradation of performance pre-empting possible equipment failures.

EcoMATE can provide data for the EEOI calculations and can provide directly the CO_2 tonnage and can transmit all data to shore for land based performance monitoring.

Using CARGOMASTER to support your current and future SEEMP's

KROHNE CARGOMASTER system offers complete solutions for tank monitoring and alarming. The system sends readings from all tanks and lines on.board to leading edge, user-friendly software which runs on all standard marine computers.

The CARGOMASTER system provides measurements also relevant to the EEOI such as: trim and actual draught; ullage/level; volume (based on volume tables); weight and cargo density. ■

A small error can lead to disaster on a vessel

How to navigate away from claims

Poor lookout and a lack of situational awareness are likely to continue to be the main causes of navigational claims

How can a manager ensure that officers actually do look out of the window, plot traffic, don't agree on passing arrangements over the VHF, have a lookout on the bridge, follow the agreed passage plan and that the bridge team actually communicates with each other?

It seems that many navigational claims still occur due to procedures not being properly followed by crew members, and officers not communicating properly with each other. In addition poor communication between vessels and bridge team members, as well as a lack of situational awareness, all play a part.

According to The Swedish Club, half of the costs of hull and machinery claims handled by the Club have arisen due to navigational errors such as collisions, contacts or groundings – a figure that has remained steady over recent years despite improved technology and the widespread implementation of SMS (Safety Management Systems).

Implementing procedures

The immediate cause is usually not the root cause of a casualty. But to be able to identify the root cause, the immediate cause has to be established and rectified. When sailing in congested waters, dense traffic, or close to land, risks are increased that need to be acknowledged. To be prepared, it is imperative that the Officer on Watch (OOW) is aware of errors and the limits of his navigation equipment. Making assumptions about information displayed and being complacent by not verifying the information contributes to accidents.

"We can see that many navigational claims happen because the manager's procedures have been ignored," Joakim Enström, loss prevention officer at The Swedish Club, says. "But just having procedures is not enough, if they had been followed, most likely the accident could have been prevented and would have saved both costs, the environment and sometimes even lives,"

However, it is essential that the procedures make sense and are there for a reason – not just to comply with regulations. Managers need to ensure that

Many navigational claims happen because the manager's procedures have been ignored

their superintendents and safety departments inspect and verify that the correct action is implemented and followed, and if an accident has occurred, identify why the procedures were not followed in the first place.

"There should always be a number of officers on the bridge during critical operations, then the chance of detecting a mistake is higher and thereby it's more likely to be rectified in time," Enström adds.

There are several issues that are still recurring and contributing to collisions: poor lookout; lack of situational awareness and complacency. The Club's recently issued report, 'Navigational Claims', also stresses that implementing an effective training programme for officers is vital, especially in relation to effective communication and risk assessment.

Safety culture is key

The main reason why causalities occur is a problem with the safety culture. This can be because it not clearly or properly defined. It might be stated in the Safety Management System, but for some reason is not followed on board or shore-side.

"In all casualties shown in our report, communication somehow failed," Enström concludes. "The purpose of a bridge team is to work together. If the team does not communicate effectively with each other it will just be a couple of individuals on the bridge doing their separate jobs,"

The bridge team has to include the pilot and ensure everybody has a specific job in the team. The importance of defined roles and using closed loop communication is to stop misunderstandings and assumptions immediately.

Joakim Enström, loss prevention officer at The Swedish Club

SUGGESTED PREVENTATIVE MEASURES:

Have a detailed navigation policy which includes descriptions and suggested settings for the bridge equipment

Carry out a thorough audit of the navigation policy during the internal audit

Implement a specific navigational audit

The Master needs to understand the consequences of not following procedures. It should be clearly defined what the consequences are if the procedures have not been followed

All crew members should be accountable for their own actions

The superintendent in co-operation with the Master has to ensure that the vessel has proper charts and other essential information for the vessel to complete the voyage safely

Have detailed familiarisation procedures which also verify that the officers have sufficient knowledge after completion

Instructions on how the VHF should be used

Implement a career plan which defines what training has to be completed for each position

Training for all officers on how to communicate effectively

Specific pilot training on how to incorporate the pilot into the bridge team

All officers should receive training on how to identify risks and ensure they understand how to use risk assessments

All officers should be trained on how to complete the passage plan correctly and know the risks of deviating from the plan

MANY NAVIGATIONAL CLAIMS ARE CAUSED DUE TO LOSS OF ENGINE POWER, WHICH EMPHASISES:

- importance of following manufacturer's instructions
- only use original spare parts
- complete maintenance as required
- make sure to check that all steering is fully operational before entering or leaving port

A small error can lead to disaster on a vessel. An important tool for ensuring the crew communicate with each other is Maritime Resource Management (MRM). To reap the benefits of MRM it is best if the entire organisation is trained in these principles. The manager should focus on having a culture on board that encourages the crew to be assertive. The importance of following procedures should be emphasised during training, in newsletters and evaluations. They should also be verified during internal audits, which are effective at identifying areas to focus on.

It is difficult to prevent casualties and it takes a lot of effort for the entire organisation. Looking at companies that have improved their loss ratio, it seems that the best prevention is to have a good safety culture. One of the first steps in establishing this is to take short-term action, some of which is described in the 'Navigational Claims' publication. This is likely to enhance the commercial operations, improve safety for the crew and minimise environmental damage.

If you would like to read more on navigational claims, you'll find the publication on our website: www.swedishclub.com ■

The dangers behind the electrical revolution of marine technology

With ever more control of ship's functions being handed over to PLC's and microprocessors, the operation of the vessel relies on software that very few in the industry can understand

Over the past 20 years we have witnessed a revolution in the way that marine equipment is being controlled. In the past, this was achieved by simple control circuits, with some analogue control cards or relay logic, all supplied with a detailed connection diagram, enabling the electrician to repair any faults in the system.

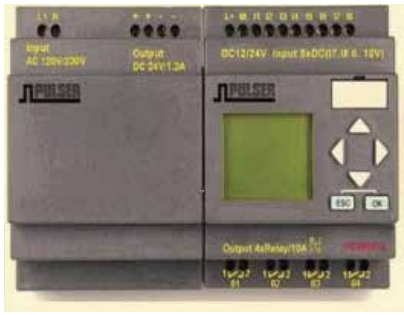
Due to the changed price picture, PLC's and small microprocessors (MP) based control circuits have been replacing the old circuits. "This change calls for a total change in the way systems are being developed, maintained and how they are tested," Kare Hoglund, business development manager at Hoglund Marine Automation, explains. "The owners do not have a clue about what they have bought anymore.

"I have a number of concerns, and what worries me the most, is that these concerns are not shared by the ship owners." Hoglund points to two disquieting problems. First that a 100 per cent test of a MP system is not possible. And secondly, that traditionally engineers have been used to run a test to verify that the systems are working as intended; this is not possible with a MP system,

"The reason for this is that a MP programme may contain an infinite number

of combinations," Hoglund says. "So if you test one combination, there is no guarantee that it will react the same way during the next test, or during operation. Some people tend to believe that a so called HIL test is the solution, but it does not do anything else than performing additional tests without taking into consideration that a number of possible combinations may occur during operation. In addition to this, the system cannot be repaired without the supplier's source code, special tools and training. This code is often not supplied and the necessary tools are normally not available for crew.

"This situation is scary. Every day we see new groups of equipment where the control is provided by a proprietary, cheap MP-based system. No one is able to identify the number of MP's in a vessel today and it has become impossible to try to resist installing equipment without them.

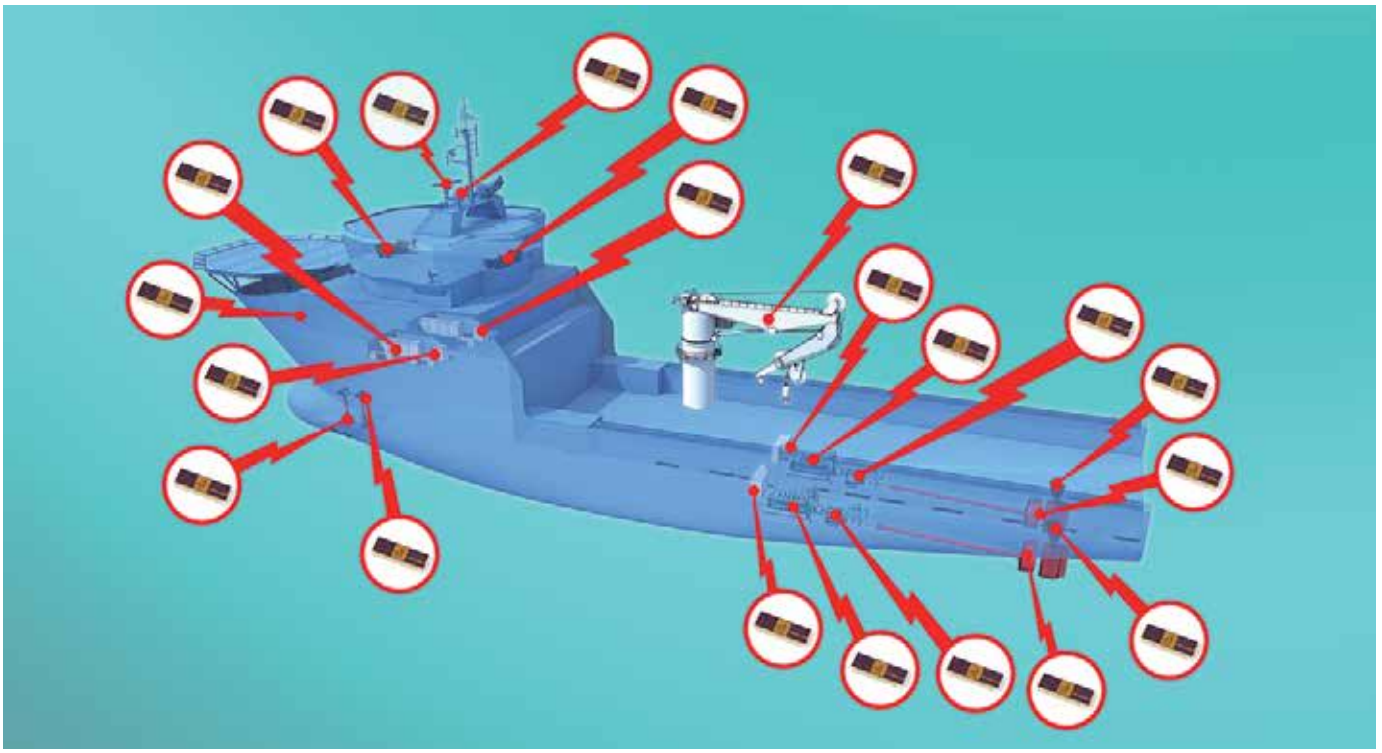


"As the vessel is controlled by a number of MP's we have seen a number of MP incidents where a USD100 PLC has put a USD100m vessel out of operation."

Lack of understanding

It seems that a common problem is the lack of understanding of these kind of systems by the crew members. "They tend to believe that they can trust a test of the system, and do not understand that other values in the system can change the logic in the system, and that a faulty action might be impossible to re-create in the investigation part after an incident," Hoglund continues. "Another problem is the huge number of parameters in mother systems. In order to be able to change the functionality in the MP software, there are a number of parameters in almost all these systems; these may reach 50,000 in a single vessel. If one of these parameters are changed, it may set the entire vessel out of operation.

"And the shocking fact is that there is no way that the crew on board are able to maintain and verify that these parameters are 100 per cent correct at any time. These parameters are not necessarily protected from change, and may be altered by the crew, service engineers, or simply due to a power failure."



Another concern is that not all of these MPs/PLCs run on a common control and communication platform. There are not any definite standards controlling the communication and software standards in any of this equipment. "There are some commonly used protocols and programming languages, but all suppliers may install whatever they please, as there is no specification for this kind of equipment," Hoglund adds. "One of the reasons for this is that there are a huge amount of players in this market and they would have to collaborate on any standard, which is difficult when they are all competitors.

"Each equipment supplier is simply developing the cheapest and most flexible control on the market, which is a MP based system. Often these suppliers are not professionals dealing with MP systems, as the threshold of making a simple MP programme is today very low. Often we have seen that many of these new control systems are made by people lacking the software background and detailed knowledge in developing a robust MP system.

"The shipyards are only interested in installing the cheapest equipment, which is easy to start up, and then use a local supplier to provide the control system. Often it is cheaper for the yard to let the equipment supplier include the control system, as it is often very inexpensive, and it is also easy for the yard to administrate the commissioning of the system, as it can be started by the same local supplier, independent from all the other systems on board.

"Yards often do not have the knowledge of interfacing the different equipment, and tend to avoid these problems by purchasing the different systems separately in small packages. Remember that the yard is responsible for the vessel in the guarantee period, and does not care about the long term cost of maintaining the systems."

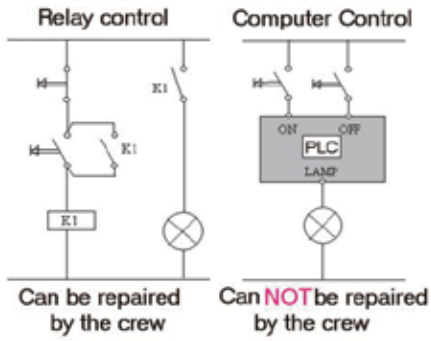
Armed with that information, it is clear that the emphasis should be on the ship owners, but Hoglund believes they do not pay this issue enough attention. "If you study the specification of an offshore vessel today, the specification is very detailed when describing steel, hull, mechanical equipment, cabin and painting, but when it is comes to the electrical installation and control of the engine equipment, it is often just a copy of standard phrases covering a half page. A specification is often copied from a previous vessel, and when it is written by people without the knowledge of electrical systems, this is not prioritised. We also have to mention, that if the owners have special requirements, the yard often increase the price, as they are uncomfortable with the specified standards."

With such trouble looming in the electrical systems it seems perverse that the ship owners are not focussing on the problem. Hoglund points to several reasons for this seeming lethargy. Lack of reporting from both the crew and vessel manager, a reluctance from the owner to admit there may be a problem as that would necessitate taking the vessel out of operation, and the lack of

understanding for MP based problems, and how to deal with those suppliers. "In the end, there is a lack of cost control systems, that indicates the nature of the problem on board," he says.

So where do we start to eradicate any chance that ship operations may be plagued by MP or software problems in the electrical system? "It has to start with the owners, and in some cases the charters, as they also make specifications for vessels," Hoglund says. "Another problem is the fact that many of the vessels are sold a short time after the delivery from the yard which does not raise the interest of the owner to increase the cost of the vessel. Due to the lack of understanding, the purchaser of the vessel never focuses on the equipment installed, but rather the main vessel data.

"The classification societies are slowly reacting, but as the consequences are mostly financial we cannot look this way for a solution. But, it is a paradox, that there are special certificate rules for a lot of suppliers, like welders, electricians, but none for the software programmer, supplying the backbone code for a passenger vessel with 5000 passengers."



For those ship operators who feel a test is sufficient, Hoglund has a chilling warning. "Do you believe the software functions are 100 per cent verified after a test?" he says. "If you think yes, you are wrong!" ■

It's good to talk

Phil Nicholas, a former commercial seaman and chief engineer talks about the need for careful consideration when selecting a marine communication supplier

Communications in the marine industry have come a long way since the flags and semaphore of Nelson's day. Even from my first days at sea in the early Seventies when 30 words on a telegram home to mum was our privilege on a three to four month voyage. Today's crews on foreign going ships get many more benefits and, of course, the owners of the ships now rely heavily on these systems for the management on board, not only for routing, but for communication with all departments and the future smooth running of the ship.

Since the advent of the internet, shore based personnel have relied more and more on the instant response that can be received from vessels on the other side of the world. However specific branches of the industry have forced the vendors of this style of communication to forge forward and develop both the hardware and the product almost exponentially.

Whilst this document is to look at how far this development has come in a relatively short time, it's also here to promote interest in the future of this side of the industry and to help owners and operators to understand a little more about how it works.

Having been on both sides of this coin, first the ship operator crew and now the provider of the service, I can see how it can be hard for current operators to try and dig their way through the mass of information that is given to them to try and find the best, in both cost and usability, service for the ships they manage.

Firstly, the product is known as VSAT (very-small-aperture-terminal). In very broad terms, first developed for distribution of TV signals for the 1965 Olympics and over the years developed shore based by Hughes Net, who to date allegedly have over one million active terminals. The marine sector was originally developed by Sea Tel who still hold the major share of sales of the hardware components.

It's important to point out that what we are talking about here is not the typical Inmarsat system that is found on board. These, whilst satellite based, operate in a different way and as such have drawbacks. However, limited to the written word, it's safe to say that Inmarsat is a great fall back tool and in the end the only approved safety related product that operates via satellite.

The product has a hardware component (antenna, controller and modem) and then the unseen component is the carrier of the data from ship to satellite and then to the land earth station.

Marine systems, for obvious reasons, need to be stabilised to counter for the ship's motion and need to know where they are on

the surface of the earth in relation to the satellite, nowadays this information gets given to the controller from GPS, and the ship's Gyro compass and is updated constantly as the ship moves around the world.

Hardware is a reasonably simple choice from the operator's side once the details of where the ship is going to go is known. Keep it local and the chances are that you can opt for a reasonably small Ku antenna. Going global it's more likely to be a much bigger C Band antenna that is required.

Now comes the tricky bit when decisions are needed to be made. What bandwidth or speed does the ship's operator need to purchase? Shore based we are used to all the advertising for 30 - 50Mbps from the cable and high speed providers and of course we have grown used to it over the past ten years.

Satellite has its drawbacks and cannot, as yet commercially anyway, provide these sort of speeds. But the unscrupulous retailers will jump on the back of this and sell what appears to be the biggest number, such as 4Mbps download, but what really happens is that the supplier then splits this up between ships, this is called contention ratio and the operator ends up with a CIR (committed information rate) or in other words a lesser operating speed than he thought he bought.

In essence all ship's operators need to be very specific about exactly what they require and how it is to be used. In today's market, current air time suppliers are like their counterparts in the cell phone industry of ten years ago, with contracts and no flexibility. However there are one or two suppliers, lesser known of course, but who have made inroads into offering flexibility in the airtime contracts.

The final part of the equation and in fact one of the most important ones when it comes to getting your bang for your buck, is the onboard control of what the client needs. Again there are some of the smaller, specialised and personal companies that are happy to help give the onboard network some assistance for a very reasonable cost. This small investment at the beginning can save both money on bandwidth, frustration on board from users and lengthy renegotiations of contract. The bigger operators are of course simply interested in selling more unrealistic bandwidth and thus increasing their bottom line as opposed to working with the operator to assist in what is really required; increasing profitability and bottom line for the ship owner.

Phil Nicholas is a former commercial seaman and chief engineer who has been involved in the marine industry for 41 years, working in commercial, military and leisure sectors in deck, engineering and management positions. He is a current holder of a MCA marine engineering licence, with numerous expired deck and engineering and aviation licenses. For the past 12 years he has been the managing partner of an international company focusing on both satellite and internal communications, networks and refits. He is available to consult with clients. ■

Crew expect to use the same apps that they enjoy at home

Is VSAT the future?

Adonis Violaris, Managing Director of Telaccount Overseas explores the current and future trends in the maritime communications industry

Adonis Violaris, Managing Director of Telaccount Overseas

For a long time now the maritime communications airtime service providers have been looking for a way to increase the demand for bandwidth, and airtime providers set out to prove that higher bandwidth brings the ship closer to the office. The ship owners and ship managers are also asking for constant, uninterrupted connections with reasonably flat monthly rates that can accommodate both the needs of commercial traffic and the private needs of the crew.

Until the beginning of this century we were still using Telex and Fax for the transfer of data to and from the vessel. The presence of a personal computer onboard to compose fax messages and prepare letters was novel. The network system onboard was so very simple, in fact, it did not even exist. Only during the last ten years has internet onboard the vessels emerged, and by internet we mean only email.

When the internet was introduced on vessels, the people involved with communications in the shipping industry were satisfied and impressed with this technological miracle, mainly because the differences in technology were not as obvious as they are these days.

Although nowadays the network structure is very similar to what we have in a small office ashore, shipping is still years behind the rest of the world with regards to technology, whether this is communications or software, and this gap cannot be easily bridged. The problem has been that software developers are blaming the communication providers for not being ready to support the software they already provide ashore and have thus forced them to create different applications to suit the ship communication's low transmission speeds.

Planned Maintenance Systems or Condition Monitoring Systems only use database updates when synchronising data between the vessels and shore. The same applies in Electronic Charts. They provide the whole bunch of charts preloaded on the vessel and only gain the necessary licence from an e-mail to unlock the pre-loaded chart as required.

The demand to transfer high amounts of data to and from the vessels is growing day by day. The Inmarsat price increase for narrowband terminals over the last two years made it almost unbearable for the ship operators to retain this technology, making the switch to a broadband terminal the only option.

The increasing pressure on ship operators to provide a better overview of the vessel's operation: cargo status and containers temperature, fleet tracking and reporting with real time updates, bunker fuel consumption and paperless vessel is another reason to opt for volume of data or even to unlimited data.

Safety, and other regulatory requirements, and new enterprise applications that require higher bandwidth, such as ECDIS, e-Navigation, VPN, Intranet and SharePoint are increasing the need for connectivity at sea with average data consumption growing rapidly. Crew welfare is pushing the need to have internet cafes onboard with Maritime Labour Convention (MLC) 2006 - regulatory

focus on crew welfare and training.

Everything is moving fast on land and if we are not using 'always on' connection, the technology gap will become wider. The whole world is turning to the web for information and applications and much of this was talked about for years, but the vessels never had the bandwidth connection to work with.

Most of the companies are looking into different solutions for internet onboard, but why is internet so important? Communications should not be a luxury on vessels. We all know that crew should be entitled to access the internet onboard the vessels, and without browsing, chatting and email with attachments they feel disconnected from shore. Crew problems will only be accelerated by this, seafarers will be discouraged to go onboard these ships that mean losing touch with their homes and their families, with the result that crew shortages will increase. In particular, seafarers from developing countries are trying to catch up with personal communications while at sea.

The new generation of seafarers has been born with a mobile in their hands, they are experts when it comes to new technology and when they go on a ship that is equipped with low bandwidth technology terminals, then the access to all the above mentioned facilities is of course, impossible. This makes the seafarers look for employment elsewhere, where the ship owners are providing such facilities or are looking into the possibilities to have such systems on board their vessels.

Crew do not go ashore for long periods and the current communications that exist on board are still far behind what we have enjoyed in our homes for at least seven years. For them communication is very important and it is very important that ship owners and ship managers do their utmost to enhance crew morale and welfare on board, as recruitment challenges will become again a hot point on their agenda and crew will want to move on, making the crew retention rate more difficult and definitely not cheap.

Recent estimations about the number of crew using internet say that 68 per cent of ratings and 28 per cent of officers have no access to email on board. 97 per cent of ratings and 86 per cent of officers on board have no access to the internet for social media, email and web surfing. While on leave and at home 39 per cent of ratings and 82 per cent of officers have daily access to the internet.

The existing systems that we have now on board our vessels can provide internet access for all the facilities that we use ashore such as instant messaging, social media (Facebook),

There are various competing technologies for marine broadband

status update (Twitter), video sharing (YouTube), web surfing and email, but the speed provided through these satellite systems has nothing in common with what we have ashore and are between 128Kbps and 430Kbps.

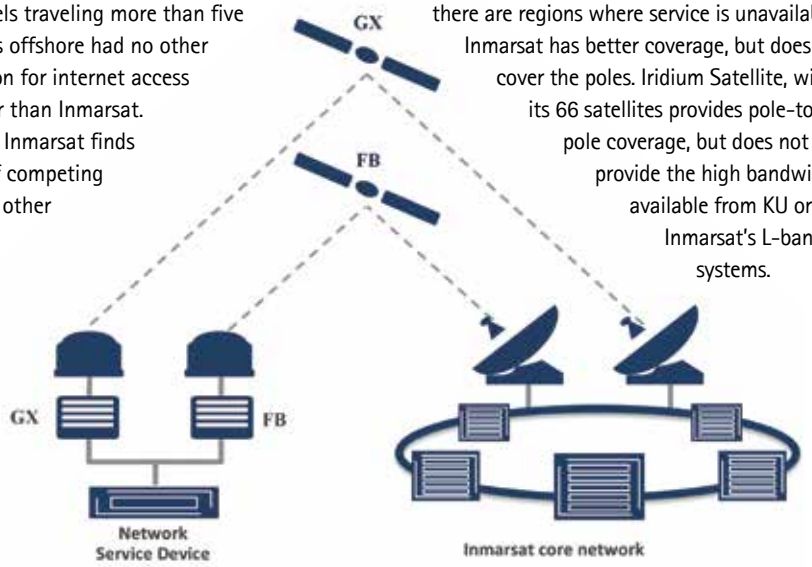
For a vessel to have unlimited data and a decent connection of 2Mb, the ship owner needs to pay something between $3000-$4000 per month, while ashore with ten or twenty times faster connections and unlimited data, we only pay some tens of dollars. As you can understand, this technology gap between sea and shore will increase year by year especially in an industry that is responsible for the transfer of goods from one country to another.

Recent technological advances have put broadband-at-sea within reach of even the smallest vessels. Until some years ago, vessels traveling more than five miles offshore had no other option for internet access other than Inmarsat. Now Inmarsat finds itself competing with other technologies, like VSAT and Iridium.

Unlike Inmarsat, which owns its own satellite network, VSAT relies on satellites operated by others. While Inmarsat service is generally based on usage charges pay per MByte, VSAT providers usually charge a flat monthly fee for unlimited internet access.

VSAT offers a number of advantages at a fixed monthly rate, but unfortunately so far for the Ku-Band antennas these only work within limited coverage areas especially the southern Atlantic and southern Pacific. To achieve the global coverage offered by Inmarsat you will need to install a C-Band 2.4m antenna like those on passenger vessels.

Ku-VSAT satellites, which until now are the most interesting to our community, cover most well-travelled areas of the globe, but there are regions where service is unavailable. Inmarsat has better coverage, but does not cover the poles. Iridium Satellite, with its 66 satellites provides pole-to-pole coverage, but does not yet provide the high bandwidth available from KU or Inmarsat's L-band systems.



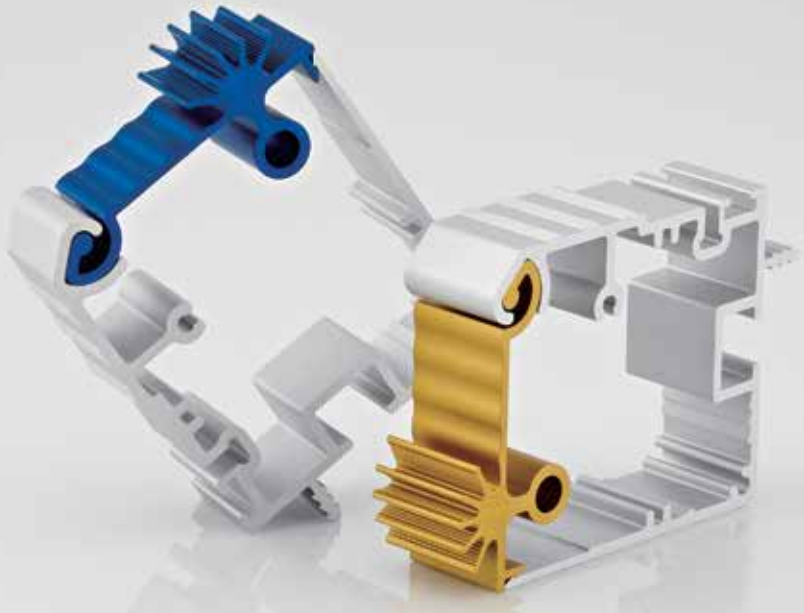
The Inmarsat system

The Iridium Next which is scheduled to be launched in 2016 will utilise 66 new satellites that will replace the current systems in 2015, and will be able to provide 1.5Mbps connection through L-Band to our vessels. Iridium has also applied for GMDSS certification through IMO, and it is expected that they will achieve this in 2016. Although 1.5Mbps will not be as fast as VSAT or Inmarsat GX, Iridium is expecting to see a large number of vessels transferred away from Inmarsat to utilise Iridium Next.

Inmarsat has signed an agreement with Boeing for the delivery of three Ka-band VSAT satellites which, through a new network, will deliver speeds of up to 50 Mbps to our vessels. With operations expected to start in 2015, the Inmarsat-5s will support a next generation global service named Global Xpress.

It is obvious that the future will be VSAT for the majority of the vessels, but it is up to the needs of each ship owner to decide which system to go for. Those that want to bridge the technology gap and bring the vessels closer to their office and also provide internet access to the crew will need to have higher bandwidth and unlimited data, and a VSAT/GX solution is the most appropriate, for the time being.

The shipping industry now has the chance to make use of the advanced communications technology that is used ashore. We hope that the quality of services will be of an equally high standard to what we use in our daily lives, at work and at home, in a way that will allow the industry to conduct its operations more efficiently and cost effectively. ■



Many features displayed in the Sapa Idea Profile

Shaping a lighter future

Optimise your business with extruded aluminium profile solutions

With the oil and gas industries moving deeper offshore the need arises to transport more equipment, more supplies and more crew on larger vessels and to larger structures. With these demands Sapa strives to provide the right solutions.

People often say that time is money. This is true, but it is also the case in the offshore and marine industries that weight is money.

If there is a possibility to reduce the weight of a structure while maintaining all the specifications and requirements, these weight savings are gains in other ways such as increased payload, improved service speed, improved fuel efficiency, ease of construction and assembly, reduced crane costs at sea and improved stability. One answer to this conundrum is aluminium.

Another main feature often overlooked with aluminium is the improved corrosion properties. With this come the benefit of reduced maintenance and painting cost

Value added possibilities

The only restriction with designing functions into extrusion is your imagination. A simple standard profile can be easily transformed into a component that includes screw ports, nut tracks, heat dispersant through thermal technologies, joint connections and weld preparations.

The possibility to incorporate functions into the extrusions and various joining techniques creates extra value in the delivered product that reduces the amount of manual labour required in the construction process.

The Friction Stir Welding method results in a superior joint, reduced distortion And a totally flat surface in the weld area

The main areas where value adding can be applied to extrusions in the offshore and marine industries are through Friction Stir Welding (FSW). This welding technique has superior qualities to traditional arc welding practices. As the welding technique does not melt the material (still in a plastic state) the heat affected zone is significantly reduced. The welding set up and the improved welding speeds also contribute to reduced distortion and buckling in the joint area.

Other value added possibilities are easily attained with aluminium because of its high malleability. Standard forming applications include bending, rolling, stretch forming and hydro forming.

The final aspect in considering aluminium is its recyclability. Aluminium is considered the Green Metal. The current level of recycled material in production at Sapa is in excess of 40 per cent. Of all the aluminium produced in the world to date, 55 per cent is still in use.

At Sapa we can easily and accurately demonstrate the saving possibilities from our solutions. We have saved thousands of man hours and tonnes in various applications in the offshore and marine industries over the past 25 years. ■

2015 Professional diary

Essential dates for professionals working in the Marine industry

21st - 23rd April, 2015

Sea Asia

Marina Bay Sands, Singapore

Since its launch in 2007, Sea Asia has firmly established its place in the marketplace as the platform for industry to do business, network and unveil new products and services in the Asia Pacific region. A record number of attendees in 2013 further reinforced the exhibition and conference as the region's leading shipping and maritime event, paving the way for another edition in 2015.

http://www.sea-asia.com/

21st – 23rd May, 2015

Bari Ship

Imabari, Japan

Bari Ship was first launched in 2009 and it is only maritime exhibition which takes place in West Japan. Bari Ship 2013 hit a record high both the number of the exhibitors and visitors since it was first launched. It gets visibility in an industry not only for the domestic market but also for the international market.

http://bariship.com/en/#

2nd – 5th June, 2015

Nor Shipping

Oslo, Norway

Nor-Shipping is the leading maritime event week. Its top-quality exhibition, high-level conferences and prime networking opportunities attract the international maritime industry to Oslo every other year. The year 2015 – the 50th anniversary – will be a special year for Nor-Shipping.

http://www.messe.no/nor-shipping

16th – 18th June, 2015

Seawork International

Southampton Harbour, UK

Seawork International is the largest international commercial maritime and workboat exhibition and business forum held in a European working port environment. It takes place over three days, every year, at the Port of Southampton, UK. Attracting more than 7,350 high calibre visitors from over 53 countries across the globe, Seawork is where buyers, sellers, innovators and legislators come together for three invaluable days at one incomparable location.

http://www.seawork.com/

11th – 13th August

Marintec South America

Rio de Janeiro

As part of the UBM/Seatrade portfolio, the global leader organizer of maritime events, Marintec South America is s a must attend trade-show for anyone who wants to stay ahead in the maritime market. The event is the most efficient tool for your branding and go-to-market strategy, providing personal interaction with your current customers, partners and potential buyers.

http://marintecsa.com.br/en/

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MTU. Going the >EXTRA MILE<.

Our robust and reliable engines, integrated by MTU's system expertise, meet your individual demand.
With these IRONMEN engines – backed by customizable service solutions from over 1,200 authorized locations worldwide – we are here to keep you working.
extramile.mtu-online.com

MTU Generator Set Series 4000

Power. Passion. Partnership.


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On a steady course
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As the true mutual company we are, we provide additional strength to our members and always put their interest first.
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