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Contents

Front Cover - Sandefjord Norway-based Jotun is constantly striving to deliver marine coatings on several fronts. As well being one of the lead participators in the ISO 19030 initiative, a method of measuring the performance of hull coatings, the company is involved in Arctic research into the effect of extreme conditions on coatings in the light of climate change. A research centre was opened in Svalbard, as part of Jotun's GreenSteps initiative, which aims at providing sustainable solutions within its operations and through its suppliers and providing sustainable solutions to clients by way of new coatings. Jotun is also heavily involved in internal tank coatings, which is becoming increasingly important as the number of different wet cargoes grow (see page 44 of this issue).

Add piracy to the list!

As well as thinking about destructive sustainability, digitalisation, forthcoming regulations, political events, how to stay competitive in today's market and the threat of cyber attacks, owners and operators are still having to contend with the threat of piracy.

At a presentation in London earlier this month, Oceans Beyond Piracy (OBP) painted a worrying picture about the resurgence of piracy off the Horn of Africa and increased kidnappings off West Africa and in Southeast Asia's Sulu and Celebes seas.

The Gulf of Guinea and particularly the waters off Nigeria, continued to be an area of concern, as the number of piracy attacks almost doubled last year, compared to 2015.

The presentation centred around OBP's report on Maritime Piracy 2016, which for the first time, included events in Latin America.

Despite reduced activity in the Western Indian Ocean in recent years, pirate networks responsible for the original Somali piracy crisis have sustained themselves through small-scale attacks and involvement in many maritime crimes.

The spate of attacks over the last few months off the Horn of Africa, apparently triggered by perceived vulnerability in vessels transiting the area, may point to an increased risk of the pirates returning.

But while declining vigilance by the shipping community and reductions in naval patrols have allowed pirate networks to revive their activities, there are indications that counter-piracy co-operation has served to mitigate the recent string of attacks.

Another key finding of the report illustrates that pirate networks in West Africa and the Sulu and Celebes seas are increasingly employing the 'kidnap for ransom' model. "One of the reasons we are observing increased incidents of kidnap for ransom is that the model offers financial gain with less risk to the perpetrators than hijacking for cargo theft. Unfortunately, these kinds of attacks appear to have continued into 2017," said Maisie Pigeon, a lead author of the OBP report.

West Africa remained an area of concern. Overall, the total number of incidents off West Africa in 2016 almost doubled from 2015, affecting over 1,900 seafarers. "In the study of West Africa, we found that almost two thirds of all reported incidents took place off Nigeria, yet the majority occurred in international waters," said Dirk Siebels, another author of the report. "Most of these attacks were violent, putting seafarers at risk of being kidnapped or even killed."

A 35% decrease in overall attacks in Asia was credited to the effectiveness of increased patrols and incident reporting. But while some forms of piracy and armed robbery at sea are declining, other types of crime are on the rise, the report warned.

Violent kidnappings

For example, the Sulu and Celebes seas showed an increase in a particularly violent form of kidnapping incidents, which highlights the need for regional actors to remain on guard. "This demonstrates the importance of multi-stakeholder approaches to confronting the problem, especially joint work across coastal states," said Siebels.

With the world's navies seemingly gathering in the South China Sea, it would be difficult to raise a force of the size seen a couple of years ago in the Indian Ocean/Horn of Africa region.

We wonder if this will be touched upon at Nor-Shipping. Cyber security certainly is on the agenda.

Cyber crime is worrying many people by way of a perceived lack of effective barriers, coupled with the 'it won't happen to me' attitude. Indeed, Inmarsat is to launch a new initiative on cyber security in Oslo.

Turning to Nor-Shipping, those brainy people running the show have earmarked a complete hall to disruptive sustainability and hired an ex Maersk deep thinker to market it.

Before we continue, perhaps we should give the official definition of disruptive sustainability for those still in the dark. It is - 'Business development becoming a disruptive force that is not only reshaping processes, creating new resource flows, or systemically reducing waste and cost, but also growing new markets, rethinking business models and creating sustainable long-term profit streams.'

In other words, thinking completely outside of the box to come up with new ideas to move businesses forward and tearing up the rule book by which business has been conducted for centuries.

Open plan

Interestingly, the disruptive sustainability hall will be open plan with circular booths to enable those passing to engage better with people trying to put across their messages.

Of course, the new buzz word - digitalisation - will play a part, as will virtual reality, automation, smart data, novel energy production and storage, intelligent design, etc. Fortunately, it will be pointed out that data itself is not the key to success, but proper analysis is.

During the recent Nor-Shipping gatherings, the younger among us have been increasingly encouraged to come forward. This year, for example, there will be a 'Young Entrepreneur' award with the four finalists exhibiting in the disruptive sustainability hall.

The organisers have claimed to break with convention by mixing these entrepreneurs with global corporations, and inviting junior students. Here the Elvebakken High School will be exhibiting tank tests and 3D-printing projects.

After all, they and people like them, are the future of our industry.

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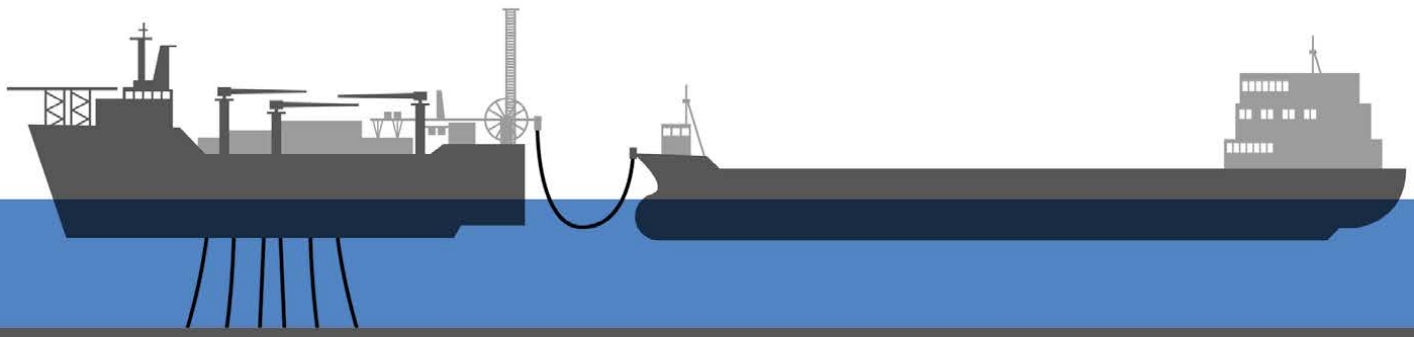

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Tanker owners must look after the supply sector

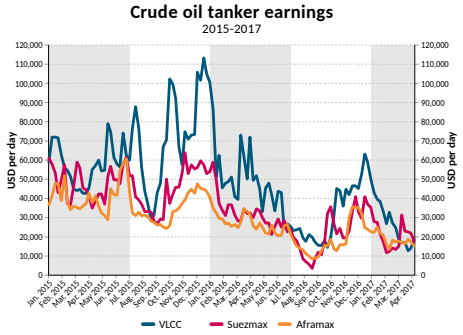
Tankers have experienced a tough start to 2017, as freight rates for both crude and product tankers continued to decline, following a brief lift at the year-end.

VLCCs may not yet have bottomed out, as by 7th April, 2017, average earnings stood at $18,853 per day, down from $63,284 per day on 16th December, 2016, BIMCO said in a report.

The demand situation for both crude and product tankers in 2017 and 2018 is closely connected to the destiny of worldwide oil stocks. Thus far, we have seen supply cuts from OPEC, from their highest supply level ever at 33.9 mill barrels per day in October, 2016. However, we have also seen an increase of supply from the US, lifting US crude oil stocks to their highest level, while global stocks have sidestepped.

BIMCO said that it believed we must wait until the second half of 2017, when global oil demand picks up, to see an eventual drop in global oil stocks.

Focusing on the oil product tankers, March proved to be a relief. Handysize tanker earnings even surpassed that of crude oil tankers, reaching $23,984 per day on 24th March. On that day, Suezmaxes reached only $22,700 per day.



Source: BIMCO, Clarksons.

Since the removal of US crude oil export restrictions in December, 2015, the story has been developing. Shipping has certainly benefited strongly and quickly, not so much in sheer volumes, as US crude oil exports went from 465,000 barrels per day to 520,000 b/d (+11.8%), but exports started to flow to worldwide destinations and not just cross-border into Canada.

In 2015, 92% of US exports went north but in 2016, that share was just 61%. Other destinations found in the top five included The Netherlands, Italy and China. South Korea, Japan and the UK, which were all served by tankers. US crude oil imports have also grown, benefiting crude oil tankers even more.

In addition, US products exports keep rising, going both short-haul to Mexico, Caribs and South America and long-haul to Japan, China and India.

The total amount of tankers demolished was very low last year. Owners appeared more focused on taking delivery of new ships during the period.

This has to some extent now changed. In 2016, 2.6 mill dwt was sold for demolition. By end-March 2017, 0.9 mill dwt had left the fleet for recycling. Although slightly busier than 2016, thus far it has been a slow start to what BIMCO forecast will be a busy year for tanker demolition.

Freight markets and asset values are expected to have yet another year under pressure. Demolitions are forecast to rise fourfold to a total of 11.5 mill dwt, out of which 9 mill dwt is forecast to leave the crude oil tanker fleet.

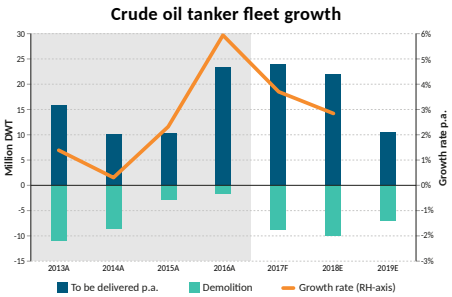
BIMCO expects this year's crude oil tanker deliveries to be on a par with 2016, which saw 23 mill dwt of new shipping capacity. This highlights the need to cope with the supply side, as demand growth will not support the market to the extent it did in 2016. By the beginning of April, 9.8 mill dwt had been delivered with just 0.7 mill dwt of crude oil tanker capacity being demolished – including one VLCC.

In terms of new orders, by the same date, there were 38 new orders totalling 5.7 mill dwt, including 16 product tankers with a total capacity of 1.3 mill dwt. The 12 VLCCs and other orders resulted in a rise in the crude oil tanker orderbook during the past two months, which is quite amazing considering the present challenges in the market, BIMCO said.

A record 12 VLCCs were delivered in January this year, which brought the VLCC fleet above 700 ships.

For product tankers, 2016 proved to be a six-year high for deliveries, with supply growing by 6.1%. By the beginning of April, 2017, the fleet grew by 1.3%, as it aims for 3.2% for the full year. BIMCO aid that it expected demolition of product tanker tonnage to be three to four times higher than 2016, at 3 mill dwt.

As cargo volumes are not expected to grow much this year, the increase in demand must come from longer sailing distances and changes to the volumes shipped from one country to the next.



Source: BIMCO estimates on Clarkson's raw data.

A is actual. F is forecast. E is estimate which will change if new orders are placed. The supply growth for 2017-2019 contains existing orders only and is estimated under the assumptions that the scheduled deliveries fall short by 10% due to various reasons and 35% of the remaining vessels on order are delayed/postponed.

China rules the crude oil tanker market, having been solely responsible for the increased crude oil tonne/mile demand growth since 2010. The country is set to repeat this in 2017. Thus far, Chinese car sales have supported this forecast. Although the subsidy was reduced in 2017, the numbers are holding up.

The US could spoil the party, however. As discussed above, US imports and domestic production have both contributed to rising crude oil stocks. A continuation could prove difficult to uphold.

This year is proving to be one of change for tankers, as was indicated during 2016, as freight rates softened. After two years of solid demand growth, 2017 will be a year of tepid demand growth of around 0–2%. As fleet expansion is also slowing down, though still at a higher pace than demand, shipowners will have their work cut out.

In May, BIMCO will extend its series of analysis on the 'Road to Recovery' for the shipping markets by looking at the crude oil tanker sector.

Offshore downturn hits Norwegian shipping

Despite challenging markets for shipping, Norway maintained its position as the world's sixth largest shipping nation, measured in fleet value, according to the Norwegian Shipowners' Association (NSA) 2017 Maritime Outlook Report.

The report said it is expected that offshore segment crisis will continue through 2017, while the short sea and deepsea segments will face the same tight margins that have characterised the industry since the financial crisis.

"Shipping is a global industry, and as such we are directly influenced by global trends and international developments," said NSA CEO, Sturla Henriksen. "The current situation is extremely challenging for many of our members, but we must not lose sight of the many opportunities that lie ahead."

Markets took a dramatic turn for the worse for shipowners from 2015 to 2016, with a drop in revenue of 16%, to NOK234 bill. Revenue was considerably weaker than shipowners expected going into 2016, when they predicted a drop of only 3%.

Shipowners are far more pessimistic this year, expecting a further drop in revenue of 10%. If this forecast proves accurate, total turnover for shipowners will be NOK210 bill in 2017.

Norwegian short sea and deepsea shipowners together reported revenue of more than NOK117 bill in 2016. For the first time since 2008, these two sectors combined now have higher revenue than the offshore segments.

Income for offshore service shipowners is estimated to have fallen by 21% in 2016. Forecasts indicate that they will experience a further decline in income of 11% this year.

Offshore contractors saw a decline in income of 28% in 2016, and companies expect a further decline of 43% in 2017. If these predictions prove correct, offshore contractors will have seen their income reduced by more than half in just two years.

Overseas income

Norway, including the Norwegian Continental Shelf, is the overall single most important market for domestic shipowners. Seen collectively however, foreign markets are still more important for the local shipowners.

NSA's Sturla Henriksen

"70% of shipowners' income stems from foreign markets," explained Henriksen. "Given this, we are naturally concerned by the current rise of protectionism in the world, not least in Norway."

The number of ships and rigs in layup has grown steadily since the autumn of 2014. As of February, 2017, 158 ships and 25 mobile offshore units belonging to NSA members were in layup. This is an increase of 57 ships and nine rigs, compared to the same time in the previous year. The report indicated prolonged tight markets with no significant changes in layups for 2017.

"The situation is dire for offshore service and offshore contractor companies. Of a total of 550 ships, more than one-fourth are now in layup, as are nearly half of our members' mobile offshore units," Henriksen said.

NSA member statistics showed that 8,300 employees in shipowning companies were either laid off or terminated in 2016, compared to 7,300 in 2015. Of these, 15% were laid off, and 85% terminated. The cuts were fairly evenly distributed between seafarers, mobile rig crew and staff and onshore employees.

"Local communities, owners, seafarers and suppliers along Norway's coastline are all uneasy about the future. They know better than most, though, that life on the sea is one of ups and downs. Now it is critical that we maintain our core competencies, and continue to build on the strengths that have made Norway a leading shipping nation," Henriksen stressed.

Capital access

Shipowners' access to capital has been gradually weakened since the price of oil began to fall in 2014. Five out of 10 shipowning companies surveyed said access to capital was tight or very tight in today's market. This was essentially unchanged from 2016, but a slightly higher percentage of companies said access to capital was good.

"Companies are doing whatever they can to survive," Henriksen said. "Many are concentrating on refinancing. Some are looking to adjacent markets, while others are selling older ships in order to be ready when markets recover. We are also seeing consolidation and structural changes, in both ownership and organisation."

The Norwegian-controlled fleet was valued at $51 bill in 2016, a decline of $65 bill from 2015, or 21%. At the same time, changes in trade area limitations have led to more shipowners flagging home more ships from foreign registries.

"This is proof that active maritime policies work," Henriksen said. "A significant number of ships sailing under the Norwegian flag is a welcome development, and it is vital if Norway is to maintain its position as a leading international shipping nation."

Six out of 10 member companies kept training positions, making up nearly 2,100 positions in all, up from 1,860 at the same time last year. The number of training

positions is expected to remain stable this year.

"The competence and experience of Norwegian seafarers is critical for innovation and development in the maritime cluster, and it is important for companies to maintain training positions and continue to introduce young people to the opportunities in shipping," Henriksen concluded.

According to the report, Norway's maritime industry had a value creation of NOK175 bill in 2015, employing 100,000 people. This was a significant decrease from 2014, when value creation reached a record high of NOK190 bill.

Norwegian shipping Segments:

- Deep sea shipping – tankers, drybulk, LNG, chemical, containers, cargo and car carriers engaged in intercontinental trades.
- Short sea shipping – the same segments as for deepsea, undertaking regional freight trade in Europe, and including passenger ships sailing on European routes.
- Offshore service – platform supply vessels, anchor handling vessels, construction vessels, seismic and other offshore-related specialised vessels, plus subsea support vessels.
- Offshore contractors – mobile rigs, drill ships, accommodation vessels, plus FPSOs.

Sustainability report

In another report, compiled together with DNV GL, the NSA has addressed how the shipping industry can contribute to achieving the United Nation's sustainability goals. "The ocean represents life on earth, and is essential for prosperity, growth and well being. We need to increase our knowledge of the ocean and make use of the resources in a more sustainable manner, " Henriksen explained.

Sustainable Development Goals (SDG): Exploring Maritime Opportunities comes on the back of the adoption of SDG by the UN in 2015 and is a joint work plan and call to action to protect the planet, ensure a dignified life for all people and achieve inclusive economic growth, peace and prosperity.

The ocean provides food for billions of people. The seabed contains large amounts of minerals and metals. Offshore oil and gas currently supplies a third of the world's demand for oil and gas. New technology also makes it possible to use more renewable, emission-free energy from offshore wind, waves, currents and tides.

The report was published to provide inspiration and guidance to a maritime industry in transition. It outlines measures for a better and more sustainable world, the NSA said.

"DNV GL is very proud to have contributed to this report. With this report, several companies and organisations find practical and actionable steps to promote their businesses in a way that directly supports sustainable development and the UN Agenda 2030," said the report's project manager Dr Maria Gjølberg of DNV GL.

The report was handed over to HRH Crown Prince Haakon and head of the UN Global Compact Lise Kingo, on 28th March, 2017 in Oslo.

DNV GL - the environment

In a presentation given by DNV GL, the class society outlined the need for a study 'Low Carbon Pathways for Shipping - 2050.'

Principal researcher Christos Chryssakis said that scientists and policy makers generally agreed that it was critical to limit the average global warming to no more than 2 deg C.

To achieve this, emissions need to peak very soon and then decline sharply, he said continuing that at COP21, we saw a clear call for action and partly as a result, CO2 emissions reduction was firmly back on the IMO's agenda.

He said DNV GL's project objectives was to evaluate greenhouse gas emissions from shipping from today until 2050. The main questions to be addressed were - how much can shipping reduce CO2 and what are the fuels & technology available, at what cost and which technologies would fit which shipping segments?

During Nor-Shipping week, the class society will be addressing these issues at a conference on 29th May and at forums scheduled for 30th and 31st May.

The methodologies to be used were AIS data as a baseline, trade growth assumptions going forward and an assessment of the technologies available, plus shipowners' economic decisions. The report would examine the scenarios whereby trade growth was strong or weak and the fuel price will be high or low. Customer input would come from Norway, Germany and Greece.

DNV GL's environmental director, Eirik Nyhus addressed the IMO's global sulfur limit

The sustainability report being handed to HRH Crown Prince Haakon

Norwegian fleet facts and figures

At the beginning of January this year, the total number of vessels in the Norwegian controlled fleet of all types was 1,716 of 43.4 mill dwt, compared with 1,764 vessels of 40.3 mill in 2013 - five years ago.

The January, 2017 figures were broken down into 200 in the NOR registry, 578 in NIS and 938 flying a foreign flag.

Taking tankers as an example, there were 109 chemical tankers in NIS and 126 flying a foreign flag; two shuttle/storage tankers in NOR and seven in NIS, plus another 53 flying a foreign flag. For all the other tanker types there were 41 in NIS and 29 flying a foreign flag.

Norway is also strong in the gas tanker segment with 51 of all types in NIS and 75 in overseas registries, according to figures produced by the NSA.

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2020 – implementation and enforcement.

Although the global 0.5% sulfur limit will apply from 1st January, 2020 implementation and enforcement were still under discussion at the IMO and was expected to run for several meetings.

He said that the possible outcomes could include MEPC resolutions, notification mechanisms, new guidelines, plus others, eg a carriage ban. He outlined the options for owners and operators as switching to distillates, HFO with a scrubber solution, LNG as a fuel and a 'dark horse' - hybrid fuels.

Like most pundits Nyhus thought that distillates would be default option in 2020, while at most, a few thousand scrubber equipped ships will be in operation by 2020 and just a few hundred ships burning LNG, while hybrid fuels would only be a niche option.

This will lead to a demand surge for distillates, supply glut of HFO, strong immediate price incentives for "anything but distillates", plus of course long term implications for the investment choice made. There will be fuel price volatility and regional differences in the fuel's quality.

Turning specifically to CO2, the EU and IMO difference over monitoring, reporting and verification (MRV) rules will need harmonising. At present, the EU is due to enforce its system next year, while the IMO's legislation (fuel data collection system) will come into force in 2019.

The EU MRV system is almost finalised, while the IMO system should be finalised at MEPC71. There are similarities, but also key differences between the systems, Nyhus said.

He thought that it would be politically difficult for the EU and the IMO to harmonise their systems so several years of overlapping systems are expected. Nyhus also stressed that IT systems for MRV applications would become a necessity.

Addressing, the IMO strategy on GHG reductions, Nyhus asked - what will it be and will it be enough? A roadmap has been agreed to develop an initial strategy at MEPC72 in spring 2018, which should contain an action plan with measures and timelines.

The strategy will be assessed in the period up to 2023 when a revised strategy should encompass further measures for reducing GHG emissions. This strategy will have requirement implications for ship operational- and design energy efficiency.

EU might include shipping in ETS, unless IMO market-based measures are in place by 2021. This is likely to complicate and delay the IMO process if it happens. The EU's decision is expected this year.

DNV's Eirik Nyhus

Finally, he said that the expected key outcomes of MEPC71 (3rd-7th July, 2017) includes the consideration of 0.5% sulfur requirement implementation and enforcement, a decision on ballast water implementation dates, which are uncertain, finalisation of fuel consumption data collection verification guidelines and discussions on a GHG draft strategy, which should be finalised at an inter-sessional meeting to be held the week before.

TO

Nor-Shipping continues to broaden its horizons

Nor-Shipping 2017 will continue to evolve the theme of an exhibition, together with conferences and seminars, which is aimed to show where shipping is going next.

Every two years, the event tries to hit upon areas that the industry is discussing or could even be about to change the way it thinks and acts with an ever increasing leaning towards the younger generation.

This year is no different, as in a complete departure from the norm, one hall is entirely dedicated to 'disruptive sustainability' (see below).

As has been the case in the more recent Nor-Shipping events, the talks, seminars and conferences will be given by leading industry figures drawn from all segments of not only the shipping industry, but also other major sectors from which ideas can be exchanged.

There are several key issues giving the shipping industry sleepless nights at present, most notably cost control, emissions, ballast water and digitalisation, among others.

Norway is not short of expertise for such a small country in terms of population, as it has always relied on ships and the sea for its much of its livelihood.

Nor-Shipping facts and figures

Nor-Shipping 2017 (30th May-2nd June) is expected to attract 35,000 visitors with nearly 1,000 exhibitors taking space within its five halls.

The five themed halls will display-

Hall A - Disruptive Sustainability

Hall B - IT & Navigation

Hall C - Safety & Rescue

Hall D - Shipbuilding & Repair

Hall E - Maritime Services & Logistics plus Propulsion & Machinery

The organisers said that the exhibition would take a pro-active approach to the challenges facing the industry, adopting an overall theme of 'Catalyst for Change'.

DNV's Remi Eriksen will be a key speaker

In a new initiative this year, they have invited the next generation to find solutions to this generation's challenges through a 'Problem to Profit' idea. This idea marks another move against convention, tapping into fresh talent while building bridges between established players and future leaders, the organisers said

"Shipping is a driver for world development and prosperity, but the industry faces mounting challenges and needs to develop a more sustainable path forwards," explained Nor-Shipping director, Birgit Liodden. "This new concept will engage a broad spectrum of young people – from those already working in the industry to business entrepreneurs, students and those simply interested in sustainability – in a search for ideas and solutions that established shipping actors may not have considered.

"We believe this is an exciting opportunity for the industry to reach out beyond its traditional borders, mobilising the potential of talented young individuals it wouldn't otherwise be able to connect with. This is a unique opportunity for new ideas, across new platforms, and a new type of conversation. We'll be working hard to realise its full potential," she said.

Nor-Shipping is basing its initiative on the United Nation's 17 Sustainable Development Goals, utilising them, and its next generation advisory network, to identify a number of relevant key problems.

Industry figures will contribute to videos on the various issues, which will be posted on the Nor-Shipping website and YouTube. Educational institutions and young people from the industry and beyond (including those from the fields of technology, finance and communication) will be invited to participate in sharing solutions and submitting videos of their ideas.

The best submissions received will be shared through Nor-Shipping's online channels, with stand out contributors invited to the event's 'Ocean Opportunity Talks' in Oslo. Five individuals will be invited to participate in 'Ocean Opportunity' pitching sessions during Nor-Shipping week, competing for cash prize, mentors and summer internships.

Liodden added; "It will be very interesting to see the perspectives from universities, colleges and young individuals who are perhaps considering these challenges for the very first time. We encourage our network to share details of relevant maritime universities and colleges, as well as organisations for young professionals and entrepreneurs, to ensure we can engage and involve young talents and change-makers worldwide.

"By connecting the industry with tomorrow's talent we know that both sides will learn new things and build bonds with mutual benefits. The output of 'Problem to Profit' will be an open, sharing initiative available for the global industry.

"Nor-Shipping is excited to initiate this campaign promoting our industry's broad span of opportunities for the next generation and, we hope, engaging audiences worldwide in finding solutions that can be catalysts for positive change within the maritime industry," she concluded.

To add to is offering, Nor-Shipping has recruited Sofia Fürstenberg, formerly innovation portfolio manager with Maersk Maritime Technology, to push the theme of disruptive sustainability. As mentioned, Hall A will be dedicated to this theme, which aims to

drive development by challenging convention and embracing innovation.

At a presentation in Oslo, she described 'disruptive sustainability' as being about business development becoming a disruptive force that is not only re-shaping processes, creating new source flows, or systematically reducing waste and cost, but also growing new markets, re-thinking business models and creating sustainable long term profit streams.

With over a decade of shipping experience, Fürstenberg has spent the last five years with AP Moeller Maersk. Her role centred on designing and developing a 15-year technology vision for Maersk Line and building Maersk Maritime Technology's innovation capability.

This involved leading the company's industry wide collaborations while developing and promoting, radical innovations to benefit the business and all its diverse stakeholders. High profile projects included securing success for the Danish collaboration consortium BlueINNOship, and pioneering disruptive ship concepts for Maersk Line's newbuilding department.

Hall A will feature shipping innovators alongside leading companies and initiatives from the wider business scene. This will create a unique environment for a sharing of insights and cross-fertilisation of ideas – unlike anything else in the industry exhibition calendar, she claimed.

Game changer

Fürstenberg believed this idea has the potential to be a game changer. She explained: "Hall A will be a melting pot of innovation, collaboration, talented individuals and future-focused companies. It's a different way of approaching the industry and marks a fresh way of thinking. The opportunity is huge, for myself, as well as for Nor-Shipping and shipping as a whole."

She added: "My network, knowledge and experience of working in an international and collaborative context within the maritime space provides an excellent foundation for developing this bold concept and hall. I believe I'm well placed to effectively motivate, guide and facilitate the creation of what will be a dynamic, interactive and exciting showcase of new ideas and opportunities."

The Disruptive Sustainability Hall will be dark and immersive, creating an 'Enter the Ocean Space' experience and featuring an intimate 'Disruptive Room' for new insights, which is dedicated to lectures and talks where radical technologies and solutions can be explored.

At least seven of the key players in the Norwegian Centres of Expertise (NCE) Maritime CleanTech cluster had signed up for the Disruptive Sustainability exhibition hall. For example, Bostek, Corvus Energy, NorthSea Container Line, Servogear, The Switch Norway, Wärtsilä and Westcon Power & Automation will all showcase their abilities.

According to Fürstenberg, NCE Maritime CleanTech is the perfect partner for this new philosophy. "This cluster, situated on the West Coast of Norway, is a global leader in developing energy-efficient and environmentally friendly technologies that have the potential to transform sea transportation. Through a unique collaborative approach, where there is a cross fertilisation of ideas and opportunity, they arrive at solutions that impact upon every link in the maritime value chain, from subsea, to marine and throughout the energy sector.

"They will deliver a range of memorable takeaways for the 35,000 people that visit Nor-Shipping, showcasing green hybrid and electric solutions, alongside technology that enables increased digitalisation and the shift towards autonomy. For us, this cluster, which won the prize as Norway´s leading innovation environment in 2016, encapsulates the concept, opportunity and huge benefits of Disruptive Sustainability," she said.

Hege Økland, CEO of NCE Maritime CleanTech, said; "This concept is perfect for our cluster. We intend to showcase sustainable solutions that disrupt industry norms, pointing the way towards new possibilities for the future maritime sector.

"Cluster collaboration is decisive for green innovation. We represent companies that have developed the first zero-emission car ferry in the world, the first hybrid-OSV, and, later this year, a new solution for inductive charging. And that's just mentioning a few of our collective achievements. Seeing is believing and at Nor-Shipping we aim to present our ground-breaking solutions in a way that will inspire, engage and connect with today's, and tomorrow's, key maritime players." she said.

World economies will also be among the themes of talks, conferences and country pavilions. For example, African economies are growing, and becoming more connected to the world than ever before.

Once again Brazil will be highlighted. Brazilian activities were also highlighted at Nor-Shipping in 2013 and 2015.

Norway and China resumed diplomatic ties late last year. "This is very good news for maritime co-operation between China and Norway, and truly great news going towards Nor-Shipping 2017," said Liodden. "We launched our new strategy on Chinese New Year earlier this year, featuring a key note by Huawei, and we have already made China a specific focus area. Our upcoming 'Agenda Ocean Conference' features a 'One Belt, One Circle' session, with insights on the One Belt project combined with the Chinese plans for the Northern Sea Route."

Sofia Fürstenberg is responsible for the Disruptive Sustainability hall

Denmark will also be strongly represented. "Norway is one of the main markets for Denmark's maritime equipment and service suppliers," explained Mark Lerche, head of the Danish Marine Group, in charge of the Danish pavilion at Nor-Shipping 2017. "Norwegian shipowners and shipyards value high-end quality solutions, products and services, which makes for a perfect match with Danish suppliers."

As for the high level talks and seminars, Rear Admiral Paul Thomas of the US Coast Guard (USCG) has agreed to speak, as has Thomas Wilhelmsen, CEO Wilh. Wilhelmsen, global strategist and intellectual Parag Khanna, Kongsberg CEO Geir Håøy, DNV GL CEO Remi Eriksen, and Peggy Liu, the Chairperson of Joint US/China collaboration on clean energy.

Others due to speak, include Leif Høegh, chairman of Höegh Autoliners, Mike Utsler, COO Woodside Energy, Elisabeth Grieg, co-owner of the Grieg Group and CEO of Grieg International, Rashpal Bhatti, vice president freight at BHP Billiton, and Peter Justesen, Chief Shipping Officer at ENGIE.

HRH Crown Prince Haakon of the Norwegian Royal Family will also be attending the opening conference and he will be handing out awards to the winners of Nor-Shipping's Energy Efficiency Award, Young Entrepreneur Award and Next Generation Ship Award.

Major repairer exhibits at Nor-Shipping

Although there are too many exhibitors to highlight in *Tanker Operator*, one of the major companies taking part offering services to the tanker sector is Nakilat-Keppel Offshore & Marine (N-KOM).

Strategically located at Ras Laffan, Qatar, at the heart of oil and gas activities in the Arabian Gulf, N-KOM claimed to combine a wealth of experience and expertise from its parent companies - Qatar Gas Transport Company (Nakilat) and Singapore's Keppel Offshore & Marine (KOM) - to offer repair, conversion and construction services for marine, offshore and onshore structures.

Spanning over 50 hectares, N-KOM boasts a team of experienced industry professionals, extensive infrastructure and a strong track record of safe, quality and timely project executions. The shipyard is equipped with three VLCC-capacity docks (two graving docks, one floating dock), 15 cranes of varying capacities from 30-100 tonnes lifting capacity sited on the docks and quays, berthing capacity of 3,150 m and comprehensive workshops and facilities.

There are also a growing number of maritime service providers at the shipyard, such as Goltens, Wärtsilä, Wilhelmsen Ships Service, Turbo Technik and Cargotec, plus others.

To date, N-KOM has completed more than 600 marine and offshore projects, with a significant number of drydocking and repairs undertaken on various types of tankers. About 70% of the tanker repair business last year was from repeat Greek clients, such as Dynacom, Euronav, Maran Tankers, Eurotankers, and Marine Management. Other major tanker companies docking at N-KOM in 2016 were Odfjell Management, the Shipping Corporation of India (SCI) and Qatar Shipping Company, among others.

For example, N-KOM completed repairs of two Odfjell chemical tankers in 2016. Both sisterships underwent drydockings, including propeller blade renewal, cargo and ballast tanks steel renewal, water ballast tanks hydroblasting, rudder bulb installation and modifications to the vessel's nine-tonne chain locker. Other jobs undertaken were grit blasting and application of three coats of phenolic epoxy in four cargo tanks covering an area of around 5,000 sq m.

N-KOM saw a steady increase in new clients this year. Repairs were undertaken for Zen Shipping, Zodiac Maritime, Dorian (Hellas) and MOL Tankship Management. This led to a a notable increase in the number of tankers undergoing repairs at the yard during the first half of the year, compared to previous years.

A Thenamaris VLCC can be seen docked on the right

For example -

- Singapore's MOL Tankship Management put a VLCC in the yard for repairs this year. The project involved the vessel's side shell plating steel renewal, as well as fabrication and supply of hydraulic pipes.
- N-KOM's repeat client, Euronav Ship Management (Hellas), also sent a VLCC to the shipyard this year. General drydocking repairs were undertaken, including hull high pressure washing, rudder repairs, including the fabrication and welding lugs in way of rudder position and propeller polishing.
- Major dry docking repairs were carried out on a VLCC for Chandris (Hellas). The vessel underwent hull treatment and painting, cargo and ballast valves repairs, bottom plating steel renewal, overhauling of main engine fuel pumps and main engine turbocharger, among others.
- The Shipping Corporation of India (SCI) awarded N-KOM three vessel dockings this year. A product tanker underwent hull blasting and painting, coating of deck pipelines and structures on main deck, repairs of windlass, mooring winches, chain locker and void space eductors, overhauling of main engine fuel pumps and main engine turbocharger, propeller polishing, and dye checking.

Aside from the routine drydock repairs, N-KOM has completed a number of Schneekluth and MEWIS duct installations on VLCCs, Suezmaxes and Aframaxes. Known to significantly reduce vibration and fuel consumption of vessels , thereby enhancing their propulsion efficiency and voyage performance, Schneekluth and MEWIS ducts are especially popular with the yard's Greek clients and were installed by N-KOM within a very competitive timeframe.

Equally important is the IMO Ballast Water Convention, which comes into force this year. In support of this sustainable effort, N-KOM continued to promote its capabilities in ballast water treatment systems (BWTS) installation to shipowners. Thus far, the yard has carried out two BWTS installations – Samsung and OceanSaver respectively.

N-KOM continues to grow its partnerships with both local and international clients.

The shipyard has in place a number of fleet agreements, as preferred shipyard in the region for vessel repairs, from Samos Steamship Co and the Angelicoussis Shipping Group of companies (for all vessels managed by Maran Gas Maritime, Maran Tankers Management and Anangel Maritime Services).

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Waterfront Shipping celebrates first birthday

April 2017 marks one-year since Waterfront Shipping (WFS) welcomed seven of the world's first deepsea vessels capable of running on methanol into its fleet.

The first three vessels were delivered in April, 2016 and the remaining four later that year.

These innovative vessels have achieved accolades from the marine industry for their use of clean-burning methanol as an alternative marine fuel, WFS claimed. Over the past year, the seven 50,000 dwt methanol tankers – powered by 2-stroke dual-fuel engines capable of running on methanol, fuel oil, marine diesel oil or gas oil – have been operating safely and reliably across the globe.

"It has been exciting working with our shipping partners over the last few years to advance this new, clean technology," said Jone Hognestad, former President of Waterfront Shipping, who retired in March, 2017. "Investing in methanol-based marine fuel is an important step in the right direction and reinforces our commitment to sustainable proven technology that provides environmental benefits and meets emission regulations.

"In 2012, we were looking to renew part of our fleet as timecharter vessel contracts naturally expired and to add new vessels to the fleet to meet increased product transportation needs. As an innovative and leading global marine transportation company and a wholly owned subsidiary of Methanex Corporation, the world's largest producer and supplier of methanol, it was only natural that we investigated methanol as a future fuel for our vessels,"he explained.

WFS invited three shipping companies - Marinvest/ Skagerack Invest (Marinvest), Mitsui OSK Lines (MOL), and Westfal-Larsen Management (WL) to collaborate on the project and in December, 2013 announced plans to commission the dual-fuel vessels.

Partnership

The shipping company partners, engine manufacturer - MAN Diesel and Turbo and the two shipyards building the vessels, South Korea's Hyundai Mipo Dockyard and Japan's Minaminippon, worked closely to bring this innovative project to life. Since then, it has demonstrated and verified the potential to move the shipping industry forward, the company said.

Rolf Westfal-Larsen Jr, CEO Westfal-Larsen Management, explained: "As we were evaluating our investment in this technology and having the 'Leikanger' and 'Lindanger' built with an engine that can run on a fuel such as methanol, it was important that we assessed its adaptability and use.

"Now with our vessels in operation and in the waters, we have found methanol to be one of the best alternative fuels, due to its wide availability, the use of existing infrastructure and the simplicity of the engine design and ship technology. Methanol shares similar characteristics with other marine fuels with respect to storage and handling and can even be bunkered by trucks if required.

"Using methanol as a marine fuel is a feasible and practical solution that supports the shipping industry and regulatory requirements. With the recent announcement by IMO for a global 0.5% sulfur cap for vessels worldwide effective 2020, methanol will soon be one of the very

few fuel alternatives to MGO that can be utilised by existing modern vessels after relatively minor and cost effective retrofit modifications compared to, for instance, LNG, " he said.

In April 2017, Marinvest celebrated two of its vessels together attaining over 3,000 running hours on clean burning methanol, and estimated that the use of methanol rather than conventional marine fuel had prevented more than 80,000 kg of sulfur oxide emissions. Results like this speak for the environmental benefits of using methanol as an alternative marine fuel by significantly reducing the emissions of sulfur oxides, nitrogen oxides and particulate matter, the company said.

Patrik Mossberg, chairman, Marinvest/ Skagerack Invest, said: "With the growing demand for cleaner marine fuel, methanol is a promising alternative marine fuel and helps the shipping industry meet increasingly strict emissions regulations with relatively minor and cost-effective modifications to existing vessels.

"We are proud to invest and have two of our joint venture vessels, 'Mari Jone' and 'Mari Boyle', built with the first-of-its kind MAN B&W ME-LGI 2-stroke dual-fuel engine. Our overall focus in the development of the dual-fuel system concept has been safety and engine reliability. We have found the technology for handling methanol is well developed and offers a safe dual-fuel solution for low-flashpoint liquid fuels.

"Safety measures include all methanol fuel equipment and distribution systems double-walled and ventilated with dry air, ensuring there is no direct contact with methanol and safe for operators and engineers. Any operational switch between methanol and other fuels is seamless and records a slightly better efficiency compared to conventional HFO-burning engines. Our vessels have regularly been running on methanol and we foresee this continuing going forward," he said.

Akio Mitsuta, MOL's senior managing executive officer, said; "Investing in technology that encourages the use of a fuel like methanol that significantly reduces emissions is a step forward for both our company and the shipping industry. This is the reason we were very pleased to partner with Waterfront Shipping and others to have three of our vessels - 'Cajun Sun', 'Taranaki Sun' and 'Manchac Sun'- built with the first of its kind MAN dual-fuel technology."

Jone Hognestad seen on board Marinvest's 'Mari Jone'

"Tests in blending water with methanol also show promising results in terms of meeting the IMO's NOx Tier III requirements. Such a new Tier III solution could become a game changer. Further tests are scheduled in the near future to conclude if this could be a new way forward," added René Sejer Laursen, sales & promotion manager, MAN Diesel & Turbo.

Delivery of MOL's 'Taranaki Sun'

Methanol tanker timeline

April, 2016 - Waterfront Shipping (WFS), Marinvest, MOL and WL announce the world's first ocean-going vessels capable of running on methanol.

Delivery of the first three South Korean and Japanese built methanol-fuelled tankers - 'Lindanger', 'Mari Jone' and 'Taranaki Sun'.

June, 2016 - WFS and WL take delivery of the 'Leikanger'.

August, 2016 - WFS and Marinvest take delivery of the 'Mari Boyle'.

September, 2016 - WFS and MOL take delivery of the 'Manchac Sun'.

October, 2016 - IMO's announcement of a 0.5% global sulfur cap on marine fuel as of 1st January, 2020

November, 2016 - WFS and MOL take delivery of the 'Cajun Sun'.

April, 2017 - Marinvest celebrates two of its vessels together attaining over 3,000 running hours on clean burning methanol.

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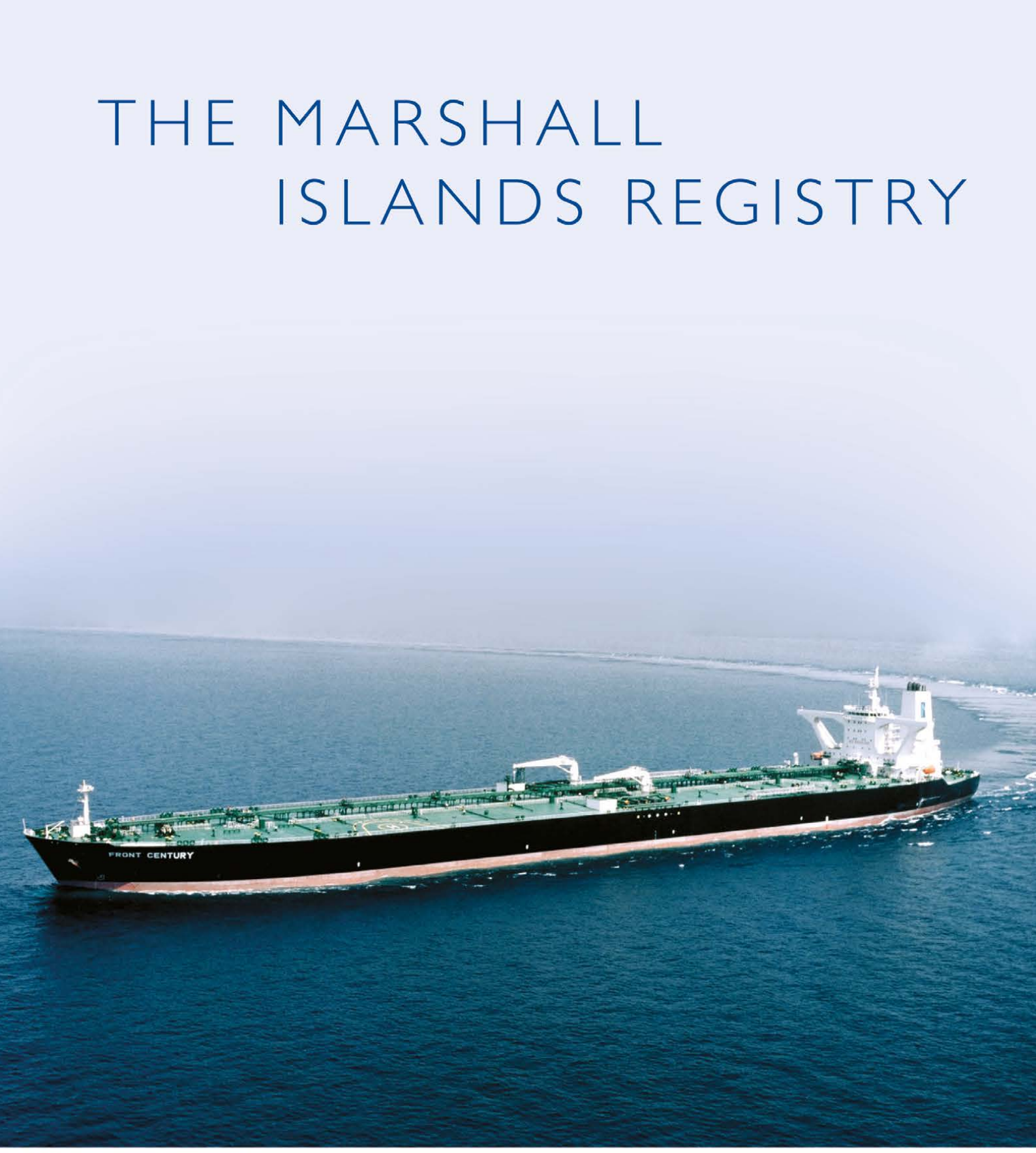

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Evoqua gears up for the BWTS ordering rush

As the banks appear to remain uninterested in shipowners requests for finance to cope with the recently ratified IMO Ballast Water Management Convention (BWMC), how can shipowners optimise their installation projects?*

Since the 2008 financial crisis, many banks now consider small to medium sized shipping companies, particularly those involved in the bulk trades, to be high risk, despite a retrofit market that analysts have suggested will be worth about $60 bill between 2017 and 2022.

Nevertheless finance for BWMS installations, which will deliver zero return on investment (ROI), is available.

"Whether it's from a bank, a private equity investor or the shareholders, shipping companies will have to make a strong financial case for their ballast water plant installations," explained Ian Stentiford, global vice-president, Electrocatalytic business, Evoqua Water Technologies (EWT). "They cannot expect to receive funding simply because the equipment is now a mandatory requirement, as no one will provide finance if it cannot be financially justified.

"Of course, the larger shipowning groups will be able to invest equity themselves, but those small to medium sized shipowners that don't have equity or struggle with cash flow will need to really evaluate their operations before they approach any prospective lender or investor. Above all they will need to proffer a realistic expectation of future revenues and provide confidence that any investment will be amortised or repaid in a given period of time," he stressed.

Although there remain arguments about the exact number of vessels requiring a retrofit installation, with Clarksons Research pointing to a projected demand of around 30,000 ships, shipowners do need to consider whether the sums stack up. "The age of the vessel, trading patterns, oil prices and operational efficiency are all extremely important considerations," said Stentiford. "Say, for example, you have a 14-year-old bulker facing special survey at a cost of about $2 mill, the $1 to £2 mill needed for a BWMS installation could make scrapping a more commercially attractive option."

Bulk carriers and tankers account for nearly half of the estimated BWMS retrofit demand, with over 80% of the current tanker fleet and about 65% of the bulker fleet. EWT's patented SeaCURE electrochlorination-based BWMS is geared towards the larger vessels in both of these market segments, the company said.

"There are other options available for smaller shipping companies struggling to fund a ballast water plant installation," said Stentiford. "As a multi-billion-dollar organisation operating in all areas of water treatment, we do offer leasing and financing schemes in other areas of our business portfolio, so we can roll out similar schemes for SeaCURE BWMS, if there is a demand."

Although commercial viability must be taken take into account when developing strategies to meet the regulatory requirements, equipment selection, operation and service support are also import, especially since there are currently 37 manufacturers and about 90 IMO-approved systems to choose from. "But this will retract," he said. "I don't think there will be this many manufacturers or systems in the market in, say, five years' time."

Robust testing

Stentiford thought that the revised IMO G8 Guidelines, the rules governing BWMS approval procedures, which will be revised to include more robust testing and performance protocols during MEPC71, later this year, will result in some companies and technologies pulling out of the race if the G8 more closely matches the more stringent testing regimes implemented by the USCG, as anticipated.

Matt Granitto, Evoqua's ballast business manager, agreed: "There is likely to still be a couple of differences between the IMO and USCG requirements, but they're not expected to be dramatic. What this means though is that there will be a degree of treatment standardisation, which delivers greater confidence to shipowners, of course. So in time

Evoqua's Ian Stentiford

only those systems that, like our SeaCURE BWMS system, have passed the most stringent testing regimes in all water salinities will be selected.

"Closing the gap between USCG and IMO testing is not the big issue for us. From the outset we have taken the philosophy that the testing, passing and receiving US Coast Guard approval is only one step along the way. It's not the complete picture," he explained.

Challenging tests

Stentiford revealed that Evoqua "deliberately selected" independent laboratories (IL) because it wanted to "challenge SeaCURE BWMS" as part of the approval process. "We did not want to be a company that has all the certificates and badges in place but whose equipment fails in real time. We want to deliver a system that performs as we and our customers would expect a BWMS to operate in real life conditions.

"We knew the challenges that NSF would place on the system. We knew it would test our system under real water conditions, with real organisms in local environments. So we knew that if SeaCURE BWMS could pass these very tough tests then it is going to work in the real world. I am not going to put a system out into the market without being completely confident

EWT has reduced its BWTS footprint and expanded its production facilities

that it's going to operate at sea in the harsh environments ships encounter. That was our philosophy. It was a deliberate strategy," he said

While the number of different BWMS technologies has been whittled down to three or so, Granitto believed the debate about the type of technology shipowners should select has ended. "We're not competing against other technologies anymore. The market is changing and I think shipowners have now made the decision on what technology best suits the specific requirements, vessels and operations. Most shipowners know what they want now; it's just a question of which manufacturer within that category supplies it."

Stentiford concurred: "I think everyone will agree that the feasibility studies, the technological development, the bids, the kind of activity that has hitherto been dominating the market, is now dissipating; it's real now.

"You can see that the whole industry has stepped up a gear in terms of the amount of real interest and real motivation to act. Certainly, from our point of view activity has gone up dramatically and it's real activity. The tidal wave hasn't hit yet in terms of actual installations but it is coming. I think 2018 will be the year we get the first wave. My sense is that the market's a lot more mature now than it was 18 months ago," he said.

Footprint reduced

To be ready for the first wave, Evoqua has developed its technology to reduce the BWMS footprint to meet customer requirements. "We've drastically improved the life of the system, which is now one of the smallest electrochlorination-based ballast water units on the market. We have adapted it as a modular system, reducing components and installation time and complexity," Granitto explained, adding that operation and service simplicity has been the key driver behind the optimisation.

Another development is a dual functionality offered by SeaCURE, which Evoqua believed can offer shipowners (and financiers) an ROI on their ballast water plant investments. Based on the company's 50-year experience developing electrochlorination technologies, SeaCURE BWMS can be configured to also act as a vessel's marine growth prevention system, protecting against the build-up of biofouling in seawater cooling systems. This means that some vessels will not need two separate electrochlorination systems.

"I don't know of any other system that combines ballast water treatment with marine growth prevention," said Granitto. "It's a nice optional extra. Another bonus is the side stream technology that's inherent to the system. You only need the one system to treat a number of different tanks, which is a real boon if you're a tanker operator. With an in-line system you need to have a separate system for each tank, so the side stream system does offer a lot of flexibility. We've made tremendous steps."

EWT's SeaCURE BWMS is expected to receive USCG type approval this summer, the company added.

Production expansion

To cope with the expected rush to fit BWTS, Evoqua is upgrading its SeaCURE system production facility in Caldicot, Wales.

The upgrade will enable Evoqua to expand production of fully assembled SeaCURE BWTS skids. Additional production capacity will also be provided by partners who will be licensed to build the SeaCURE system.

"Over the next five years, ballast water system suppliers could struggle to meet demand if they fail to invest in their production and supply lines," said Chris Thomas, Director of Operations, Evoqua (UK). "The investments will mean that shipowners and shipyards will not have to worry about long lead times, which could delay installation and commissioning schedules, resulting in vessel offhire."

The investment in Evoqua's production plant includes a new compressed air system, dedicated welding bays and upgraded testing facilities, while component and assembly lines and warehouse capacity have been optimised utilising LEAN processes to streamline production and delivery.

Granitto explained: "Roughly 4,000 vessels have been fitted with a treatment system to date, leaving about 30,000 vessels needing to retrofit an effective solution within the next five years. With concerns having already been raised about a potential supply and installation bottleneck, shipowners and yards do need to plan ahead and make sure that suppliers can deliver on time. The investments we have made will allow us meet the market requirement."

To be ready for the first wave of BWMS orders, Evoqua has streamlined its technology to reduce the systems' footprint to meet customer requirements.

"We've drastically improved the size of the system, which is now one of the smallest electrochlorination-based ballast water units on the market. We have adapted it as a modular system, reducing components and installation time and complexity," said Granitto, adding that operation and service simplicity was the key driver behind the optimisation.

Evoqua recently signed a sales agency agreement with Duwel Group to market its BWTS to Northern European countries.

Roger Duwel, Duwel Group's founding managing director, said: "We prefer to work with companies with high environmental credentials and technologies fit for the future. The SeaCURE ballast water treatment system fits that model perfectly. The small feed electrohlorination technology at the heart of the system is proven technology capable of effective, compliant operation in real at-sea environments. For owners with large pumping capacity, SeaCURE ticks all their boxes."

Mats Bjorkendahl, Evoqua's regional sales manager, SeaCURE, said: "Duwel has achieved a solid, industry-wide reputation and considerable success representing manufacturers of equipment at the highest end of the technical and environmental protection spectrum.

"By providing sales and marketing support for the SeaCURE system, Roger and his team will strengthen and support our sales teams in European territories. With a high proportion of shipowners operating in the tanker, bulk and LNG vessels segments, these geographical and market areas offer important opportunities for both parties.

"The shipping industry remains a very personable industry so it is vital any supplier has local people, with local knowledge on the ground in daily contact with local shipowners, fleet managers and superintendents," he stressed.

**A Ballast Water Treatment System feature is planned for Tanker Operator's June issue.*

TO

How your ship has probably been cyber attacked

You have been either hacked... or just didn't know you have been hacked!*

I predict that the first catastrophic maritime cyber incident will not be the result of a direct attack on a safety critical specific piece of equipment. It will be the result of an infection on a random PC, perhaps an unassuming email to a crew member, whose PC is either connected to the vessels internal 'super highway' or he or she transmits the infection internally whilst it lies dormant.

Crypto locker, or Ransomware software (used by thousands of hackers) are both easily available to download on the dark web, neither of which may necessarily attack the equipment they infect, they can lie dormant and infect connected equipment when nobody expects. You have been warned!

Cyber attack is the current buzzword. It is known by some as an industry killer and even as the potential cause of the next world war, but thought by others to be a myth. So where does the maritime industry stand?

In the main, the maritime industry has a dismal record in its slow and painful transition from paper and analogue methods of shipping to new innovative technologies when compared to industry rivals like aviation. But why is this and how could it affect cyber security in the maritime arena? Have some seafarers not evolved enough to be talking about it yet, let alone implementing new cyber procedures on board ship.

Whilst the maritime Industry doesn't seem to have been strategically targeted in terms of the vessels themselves, there is now plenty of talk of `accidental` or naive seafarers accepting a generic phishing email that goes on to attack their computers.

Major corporations like Google and Yahoo have release statements stating they were deliberately hacked. The question is - what will be first for the maritime industry, the deliberate or strategic hacking of an individual ship, or the shipping corporation as a whole? There has been a call for cyber specialists to come and give answers to the potentially very real dangers facing the industry that could not only damage reputations, but cause disruption to trade

ECDIS Ltd's George Ward

worth billions of dollars to the industry. Not all is lost, as long as we can move the industry forward to cope with the digital world we live in today.

Cyber security was a hot topic in 2016, however, we now are in 2017 and the seafaring community is becoming more aware of what can potentially happen. There is a real threat for cyber activists to start gaining and changing sensitive shipping data from on board equipment, such as changing the vessel's route to causing a grounding, gaining access to digitally controlled engine rooms and causing alarm mute whilst an engine fails or even catches fire due to a 'manual' overload by the hacker.

With more and more companies looking for insight into how to stop attacks from occurring, the main area of concern is the lack of security awareness by both companies and employees, as they have been taken aback by the swift rise in the industry's threat level from cyber security; almost non-existent just a few years ago to today's high alert.

It is expected that shipping companies and independent vessels could be next on the list for major cybercrime activity, as it is as yet mainly unexplored territory for hackers who are only now starting to realise its huge potential as a target. Attacks now have the capability to obtain sensitive ECDIS, AIS and GPS data, to name but a few, so it is vital that the correct procedures and processes are in place to stop the worst from happening.

The scary part; 51% of US adults suffered some kind of data security incident between December, 2015 and December, 2016. In 2015, there were 781 reported major company data breaches in the US alone due to cyber attacks, which combined cost companies $400 bill. These are only the reported data breaches. Sadly, there is often an element of 'sweeping under the carpet' in all industries. This total will continue to rise if the maritime industry, where the proportion of those of digital native age is far lower, do not adapt to ever changing technology and the major security threats it brings with it. Overall, the predicted cost of cyber attacks in 2019 is estimated at a colossal $2.1 trill.

Speed of development

The issue, alongside a lack of awareness by employees and users of operating systems, is the development speed of technology. This digital age of super computers, 4D printing and nano technology is like no other and is proving to be self-accelerating, ie one technology is put into operation while the next generation, more powerful and innovative, is being produced, thereby creating an always expanding, developing and aggressive cycle. But, due to the speed of production, this process can lead to an unstable, unsecure and untrusted platform, as it is not able to keep up with ever changing threats.

After years of this development, technology companies are starting to adapt to the issue by developing and applying software updates weekly, which try to manage security flaws within the software, while changes to future developments can help manage the constantly increasing cybercrime threat; until the next global threat takes place or takes over.

Some maritime software developers have used a physical security method of 'locking out' their systems in order to intercept physical security threats altogether, however, this ironically increases the complication of applying security software updates! This restriction can complicate a shipping company's decision to have an integrated bridge system, due to issues with syncing and communication between different software manufacturers; also meaning only specialised engineers and trained software technicians are allowed to apply updates, causing additional issues. Restrictions like these could mean that your system is 80% more susceptible to cyber threats.

First, the solution is simple; but it will cost you, which no one likes to do unless it's necessary. Only some companies feel that cyber security is important enough to invest into it. Nevertheless, you will watch multiple companies become complacent and unconcerned about the real threat in the water

until it becomes a reality and the organisation comes grinding to a halt. In reality, if you spend as much on coffee as you do on cyber security measures, you will be hacked. It is alleged that almost every company in the World has already been hacked, or if not, will be soon.

The FBI director, James Comey, had the following to say on Chinese hackers: "There are two kinds of big companies in the United States. There are those who've been hacked by the Chinese and those who don't know they've been hacked by the Chinese."

Need for change

This is the world as it is and therefore we need to change with it, not be 10 steps behind. First, we know the industry is struggling from sector to sector, but cyber attacks will only make it worse, so the first move is ensuring everybody is educated in cyber security awareness, preferably starting from the top and working down so the entire seafaring community can spot a cyber attack and know what action to take in response.

Experienced educational companies exist that offer in-depth, classroom based courses on the subject of cyber security. ECDIS Ltd also offers the first maritime based cyber security awareness course with the aim of bringing the industry up to speed. Elements of all the company's BTM, BRM and even ECDIS courses now include cyber prevention and awareness modules.

Countless companies are missing the correct procedures when it comes to security. A robust IT security policy is highly recommended, as this allows employees and users of all IT equipment to be clear as to how company data and information should be used on IT equipment. It's not just small companies either that struggle in this war against cyber activists. Large corporations are also at major exposure risk, primarily due to not having a dedicated IT and security team.

It is recommended that a company appoints a cyber security chief to implement and respond to all cyber security related issues or system flaws that may be found. As a result, one person has ultimate responsibility for implementing and maintaining all cyber security measures within the company thus ensuring consistency of approach.

Cyber security attacks are incorrectly thought of as attacks that occur only over the internet, due to the wrong security measures being taken; however, lack of physical security can also be a major factor in the cause of industry changing attacks. During the 20th century a majority of attacks occur due to people not taking the correct measures to keep our IT equipment safe, another reason why we need everyone to be aware of what's coming. It really is as easy as someone coming into your reception and asking you to 'print off a copy of their CV' from a USB stick, which is actually infected with multiple viruses. This could ultimately allow someone else complete control of your businesses entire network and therefore most likely destroying it.

In summary, Cyber security isn't an issue we can ignore, it may not be heard of yet as giving direct threats towards our vessels but this will come in time when noticed by any cybercrime activists who either want to damage the industry or cause major damage to infrastructure or even human life. It can be averted.

Many, if not all, shipping companies have some form of internal networked server that allows for all of their computers to communicate and send and save files between them and therefore also connect to the internet, so with the improper procedures in place it could be easy for anyone keen to infect an 'auxiliary' piece of equipment that connects to the 'primary'. Think of the random software updates that happen every day, for example to an engine room sensor test, or to the bridge's digital anemometer that may appear non-safety critical, but they are connected to safety critical systems.

We often concentrate and develop robust procedures purely for the few safety critical pieces of equipment, but the attack will take place on a tertiary system that is connected to it.

**This article was written by George Ward, ECDIS Ltd, Project Support.*

Product carrier cargo loss control

Cargo contamination and delivery shortfalls occur far too often. Even more unfortunate is the fact that as soon as a problem is suspected, the blame is immediately put on the ship.*

Having studied hundreds of quality and quantity issues over the years, I would say that the ship is to blame only about 10% of the time. About 80% is caused by suppliers (or 'sellers') at the load port. The remaining 10% can be attributed to receivers (or 'buyers') at the discharge port, if they do indeed ever declare it. When receivers have caused the problem, suppliers and shipowners rarely hear about it, and any issue quickly disappears.

In order to achieve any shipment of oil, there are three basic stages -

1) The load port - cargo is loaded from shore tank(s) to ship's tank(s).
2) The transport or transit - the cargo is transported from port A to port B in ship's tanks.
3) The discharge port or 'disport' - the cargo is discharged from a ship's tank(s) to shore tank(s).

Contamination or loss of the cargo can occur during any of these three stages.

In general terms, suppliers and receivers will jointly appoint at split cost (50/50) an inspection company (which delegates inspectors) to oversee the whole shipment, from shore tank to ship, to shore tank. The primary role of the inspection company is to monitor and record Q+Q (quality and quantity) and eventually produce the 'certificate of quality' and the 'certificate of quantity,' which becomes the 'bill of lading' figure (nobody ever talks about the 'certificate of quantity,' as it is overshadowed by the 'bill of lading'). Inspectors must be present at both load and disport.

A note for the Master: the inspector has absolutely no contractual obligation or allegiance to the ship, which is why, when things turn sour, the inspector usually becomes uncooperative. Inspection companies are normally paid by their principals to supply their own calibrated and certified equipment (there are only two types, MMC or UTI). But inspectors are usually dependent on ships' devices. The next time you get into a dispute with the inspector, issue a 'notice of protest', saying he/she is 'using ship's equipment for the purposes of quantity and sampling'. The inspector will soon go and find his or her own, during which time he/she is causing a delay.

Below are the normal sequence of events:

1) Suppliers sell a cargo to receivers. Q+Q will be agreed. Quantity will simply be a number, for example 100,000 tonnes. Quality will be as per an agreed specification (spec) for that product. Q+Q is written in the contract between them, often referred to as 'deal terms.' One of either the supplier or receiver will usually be the charterer of the ship, depending on the deal terms.
   That's for the lawyers, but if interested look up 'Incoterms' (CIF, CFR and FOB are the most common). These terms define 'risk and title' at each stage, which is important for insurance. The greatest risk is when the ship is in transit or 'afloat' with the cargo, so it is important to know which party is exposed to that risk.
2) The charterer will give voyage orders to the Master defining, among many other things, the name of the cargo and quantity to be loaded ('the nomination'). There may also be some details of the quality spec. In particular, the Master needs to know the density, so he can plan the stowage of the cargo, because for a fixed tonnage, volume varies with density.
3) For example, the Master receives voyage orders to load 20,000 tonnes, +/-5% of diesel (the same diesel you put in a car). The Master will consider how best to stow the cargo (into which tanks to load it). The Master of the ship will consider the compatibility of his last cargo, for example 'motor spirit' (more commonly known as petrol or gasoline), with the next and decide what tank cleaning will be needed, if any. No cleaning, or insufficient cleaning, can cause contamination between cargoes. The general advice for loading diesel after motor spirit is to wash all tanks with water (a salt water wash, then a fresh water rinse), then drain well. The Master will advise the charterer of his intended cleaning plan, and then proceed to clean. Occasionally the charterer may suggest cleaning requirements. Ultimately, it is up to the Master to present his ship 'fit and ready in every respect to load' (this is a standard phrase and includes the cleanliness of tanks for the intended cargo, plus all the other logistical preparations for loading).
4) At some time prior to loading (often before the ship has arrived), the inspector will measure the quantity in the shore tank(s), and also take samples (sample set 1^1). Measurement and sampling should normally be done within 24 hours of the intended load operation. The samples are subjected to key tests in a laboratory, as a last minute check that the product in the shore tank is on spec. As long as the test results meet the minimum quality spec, then the custody transfer (loading) can commence. Shore tank samples (not necessarily those taken within 24 hours) normally form the basis of the certificate of quality.
5) The ship arrives at the load port ready to load the nominated cargo. The inspector will board and will :
   a) Inspect all the ship's tanks to determine their suitability to load the next cargo. Rarely will this entail physically entering the tank. It is normally done from deck level. If the ship's tanks are inerted, then the suitability for loading the next cargo will be based on documents alone.
   b) Dip all tanks to ascertain the amount of liquid remaining in the tanks from the last cargo. This is known as OBQ (on board quantity). On product tankers, OBQ should normally be zero.
6) Once everything is in order, the cargo is transferred from shore tank(s) to the ship's tank(s).
7) After loading is complete, the inspector will :
   a) Survey shore tanks to ascertain the amount that has been transferred from the shore tank. This can simply be the shore tank figure before, minus the shore tank figure after (figure 1^2). This figure may also be a metered figure.
   b) Survey the ship's tanks to see how much has been received on board. This

is known as the 'ship load port figure' (figure 2[3]), and is simply the quantity after loading minus any OBQ. This figure is for reference only, and usually is needed only if a dispute arises.

c) Normally produce a 'certificate of quantity' based on figure 1. This is the preferred figure for official figures, as it is usually very accurate. Occasionally the 'certificate of quantity' is based on figure 2, when shore figures are unreliable, or when loading in ports less technologically advanced. Figures 1 and 2 should theoretically be the same. Any difference is known as the 'load port loss,' and a difference of up to 0.1% is normally acceptable.

d) Take samples from all the ship's tanks (set 2[4]), usually three sets. One is for suppliers (2a), one is for receivers (2b), and one is for the Master (2c). Sets 2a and 2b will normally be transported by the ship and delivered to the inspector at the disport. Set 2c is retained on board indefinitely and is deemed the owner's official set, irrespective of what others the crew may take.

8) As long as there is no issue of Q+Q, the ship sails, and steams to the disport. During transit the cargo must not be tampered with in any way, so the exact same cargo should be found in the exact same tanks on arrival in exactly the same condition, aside from any natural change in temperature that will cause a change in volume. The only exception to this is if the cargo needs to be heated, such as with fuel oils or vegetable oils, which will need the ship to apply heat.

9) J

ust before the ship arrives at the disport, the inspector will measure shore tank quantities and at the same time may take samples.

10) On arrival at the disport the appointed inspector will :

a) Take samples from the ship's tanks (set 3[5]). The inspector will then take receipt of sample sets 2a and 2b from the load port. It is imperative that the Master does not part with his set (2c), as this set will help to protect him in the event of a dispute. The inspector takes the three sets (set 2a, 2b and 3) away to the laboratory. Set 3 will normally be tested prior to the start of discharge to ensure the quality has not changed somehow since loading. As long as the spec is met, they will test no more, and the ship will be ordered to discharge. If set 3 is off spec for whatever reason, then sets 2a and 2b will need to be tested for comparison. If this happens, delays will occur and a dispute will begin. By testing the samples at their various stages, one can usually identify at what stage the cargo became contaminated.

b) Determine the amount of cargo in the ship's tanks, less the OBQ at load. This figure is known as the 'ship's arrival figure' (figure 3[6]), and is compared with the ship's load port figure (figure 2). Any difference is known as the 'in-transit loss.' An in-transit loss of up to 0.1% is acceptable.

11) As long as there are no issues with Q+Q, the discharge begins. Once discharge begins, the Master can be 99% sure that he has loaded and transported the cargo to the disport with no issue of Q+Q, otherwise he would not have been permitted to start.

12) Under the normal course of events, the ship is left unhindered to discharge all

the cargo in one seamless operation. But sometimes cargo is started and stopped at the request of the receiving terminal.

13) At the end of the discharge the inspector will:
   a) Measures shore tank(s) to assess the amount of cargo that has been received ashore (figure 4[7]). This is known as the 'outturn.'
   b) Survey the ship's tanks in order to quantify any cargo 'remaining on board' (ROB), which ideally will be zero. The ROB figure is applied to the ship's arrival figure (figure 3) in order to determine the amount of cargo that has been discharged (figure 5[8]). Figures 4 and 5 should theoretically be the same, although a difference of up to 0.1% is acceptable (this is known as the 'disport loss').
   The overall 'loss' is the difference between the bill of lading (figure 1) and outturn (figure 4). The total acceptable loss is generally three times 0.1% for each of the three stages (load, transit, disport), so a total of 0.3%.
   Note : That does not mean it is acceptable to lose none at load, none in transit, and then the whole 0.3% at the disport ! (although this does cause argument). Also, occasionally, one may experience a 'gain' at any of the three stages.
14) The shipment will have been successful when :
   a) Quality – set 3 samples are within the quality spec. The quality in the receiving shore tank after the discharge is irrelevant to the Master of the ship if set 3 was on spec.
   b) Quantity – bill of lading versus outturn (figure 1 versus 4) is generally within 0.3%.
   When there is no issue of quantity, the ship's figures (figures 2, 3 and 5) are not needed.

As long as both 14a and 14b are satisfied, there will have been no issue, the ship leaves, and everyone should get paid.

**This article was written by Ian Hodges, Master Mariner, Director, TMC Marine, London. Email : ih@tmcmarine.com*

TMC Marine's Ian Hodges

Footnote

1 Set 1 samples are taken from the shore tank before loading the ship
2 Figure 1 is a number, and is the amount transferred from the shore tank
3 Figure 2 is a number, and is the amount measured in ship's tanks at the load port after loading. Ship's figures are subject to VEF which I will not go into here.
4 Set 2 are samples taken from ship's tanks at the load port after loading
5 Set 3 are samples taken from ship's tanks at the disport before discharge
6 Figure 3 is a number, and is the amount measured in ship's tanks at the disport before discharge
7 Figure 4 is a number, and is the amount received in shore tanks
8 Figure 5 is a number, and is the amount delivered by the ship based on ship's tanks

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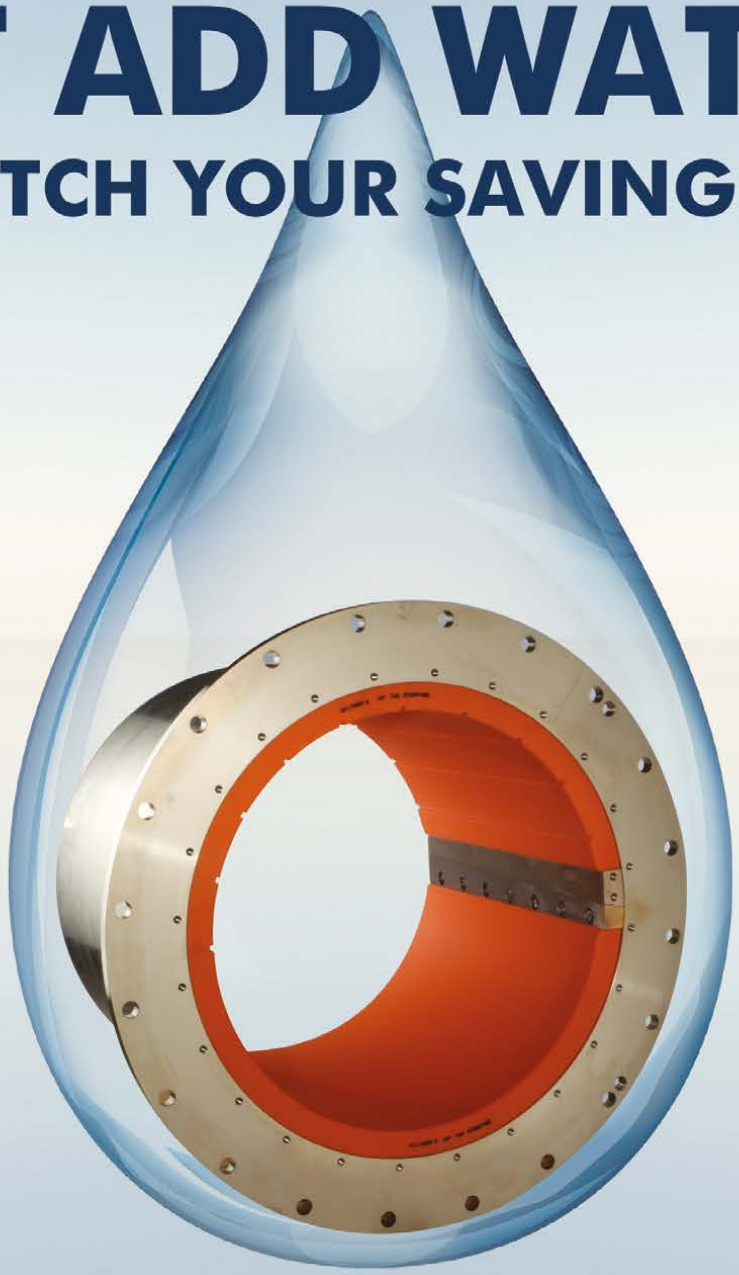

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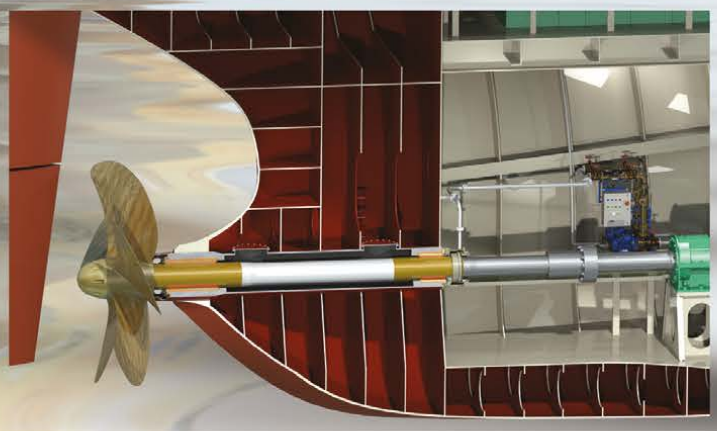

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SABIC chartered eco-friendly LEG delivered

A new liquefied ethylene gas carrier (LEG) was named 'GasChem Beluga' on Teesside at the end of April.

Technically managed by Leer-based shipping company, Hartmann Reederei and commercially operated by GasChem Services, this eco-friendly vessel was built to ship ethane gas from Houston, Texas to feed long term charterer SABIC's cracker at Wilton on Teesside.

SABIC recently converted the Teesside cracker during a major investment programme to enable it to use ethane gas, as well as other feedstocks, thus making it one of the most flexible and competitive crackers in Europe.

Apart from the modification of the cracker itself, the conversion project called for the construction of a new cryogenic ethane tank and the purpose built ships to transfer the ethane from the US Gulf Coast to the UK.

The first of these ships was the 'GasChem Beluga'. She made her maiden voyage from Shanghai to Houston via the Panama Canal last December to mark the official start of the charter period.

Built by Dayang Shipbuilding in China and launched on 8th May, 2016, the vessel was designed and developed specifically for SABIC by Hartmann Reederei, in co-operation with engineering consultants HB Hunte Engineering to take advantage of the emerging global ethane trade.

'GasChem Beluga's' innovative design focused on building the so called Eco Star 36K series of vessels with 'svelte' bow design, which differs fundamentally from conventional gas carriers in that its superstructure is located at the bow.

This results in an optimised distribution of weight and, therefore, a reduced demand for ballast water – which again leads to a reduced fuel consumption and therefore emissions. The new 'svelte' bow design enables the vessel to improve seakeeping at higher transit speeds and improved fuel efficiency, the vessel's designers claimed.

As for the hydrodynamics, the hull was optimised by HB Hunte Engineering in co-operation with Hamburgische Schiffbau-Versuchsanstalt (HSVA).

'GasChem Beluga', pictured on the River Tees for its naming ceremony, is an eco-friendly vessel built to carry ethane gas from Houston to SABIC's Olefins Cracker on Teesside

She is fitted with the latest generation MAN B&W 7G50ME-GIE dual fuel 2-stroke engine, which is claimed to have high reliability and low fuel consumption with low emissions meeting the requirements of IMO Tier II.

The vessel is able to operate on HFO, MDO and gas oil, as well as LNG and is one of the world's first to operate on ethane.

She is fitted with a Kappel propeller and a HB Hunte twist-flow rudder for greater efficiency. The rudder system underwent ship model tests at HSVA, which resulted in reduced energy loss and improved propulsion efficiency for this system.

Cargo tank design

The cargo tanks design is claimed to be a world first. Compared to conventional gas carriers with cylindrical or bilobe tanks, the new LEG-carriers are fitted with a tank design developed by Hartmann Reederei - the 'Star-Trilobe' tank.

This design consists of three cylinders slid into one. Due to better space usage, this results in higher efficiency and allows an increase in capacity of nearly 30% at the same ship length – which again leads to a reduction of fuel consumption and emissions and higher economies of scale.

The 'GasChem Beluga' – which will be joined by a sister vessel - 'GasChem Orca' in July and another 'GasChem Narwhal' - marks a new generation of semi-refrigerated ethylene/ethane carriers, designed for environmentally friendly operations with minimum emissions at a maximum of reliability and sea endurance.

Emissions reduction

The new ships with a cargo capacity of 36,000 cu m each for liquefied gas cargoes up to -104 deg C, will greatly reduce emissions of nitrogen oxides, sulfur oxides and soot particles by running engines on clean gas.

At the naming ceremony, Capt Alfred Hartmann, founder of the Hartmann Group, said: "We are delighted that SABIC has chosen Hartmann Reederei as a partner in the development of this new type of vessel.

"We are proud of the design, which is unique and highly efficient and to testify our commitment to a sustainable LEG-carrier, which is also one of the largest in the world. Whales like Beluga and Orca symbolise a clean environment and therefore the name reflects the 'green' concept and technology of

the vessels," he said.

SABIC's global director supply chain liquids, Frank Claus, added; "As a responsible global company, SABIC is committed to providing high-quality, competitively priced products to its customers whilst doing all it reasonably can in order to reduce the environmental impact of its operations.

"We would like to express our appreciation to all involved, especially the Hartmann and GasChem team for joining SABIC on the journey to deliver on a truly global supply chain. Not only have we managed to lever ethane, as an advantaged cracker feedstock, we are also proud to be one of the first chemical companies in the world to use it as a clean fuel for our highly efficient ships as well.

"Our UK site in Teesside is of strategic importance to SABIC and also from a global supply chain perspective. The flexible cracker project will secure the future of the Teesside site to provide continued employment for the broader community for the next few decades ahead.

"These innovative ships illustrate the sustainable future that SABIC wants to help to create," he concluded.

John Bruijnooge (left), site director of SABIC UK Petrochemicals, with a model of 'GasChem Beluga' and, in the background, the vessel itself

High fuel value

Explaining the design concept, SABIC said that the biggest advantages of the system were that, compared to HFO or gas oil, ethane comes with a higher fuel value. The fuel consumption is lower, making ethane more cost-efficient. Similar to LNG, ethane causes fewer emissions than HFO and therefore rates amongst the 'green technologies'. The vessels can carry their fuel as cargo, which also results

in less bunkering.

Ethane could be used as a fuel to a greater scale for vessels as with a boiling point of -88 deg C, it is easier to transport than LNG. But, for the time being, it will remain a more isolated application, as the global LNG network is well advanced, SABIC said..

This is why the company opted not to commit to one type of fuel. At relatively short notice it is possible to switch to LNG, as the fuel tanks were adapted to the low temperatures required for natural gas and the global LNG bunkering network can easily be used.

The safety requirements concerning the vessels are laid down in the International Code of Safety for Gas-fuelled ships (IGF Code) and several safety systems were fitted on board. For example, when operating in heavy fuel mode, all systems have been installed with redundancy capabilities, meaning that in the event of an error, the system will automatically switch to another fuel system.

When operating on gas, the slightest error will lead to hermetical sealing of the system and an automatic switch to heavy fuel operation without delay or loss. If one type of fuel is not available, it is possible to use different fuels in various ratios, for example 40% heavy fuel and 60% gas, up to 90% heavy fuel and 10% gas, switching over without delay.

Charterer Saudi Basic Industries Corp (SABIC) is one of the world's top petrochemical companies and is among the world's market leaders in the production of polyethylene, polypropylene and other advanced thermoplastics, glycols, methanol and fertilisers.

SABIC's businesses are grouped into chemicals, polymers, performance chemicals, fertilisers, metals and innovative plastics. The company claims significant research resources with 17 dedicated technology & innovation facilities in Saudi Arabia, the US, the Netherlands, Spain, Japan, India and South Korea and operates in more than 40 countries worldwide with around 40,000 employees.

Headquartered in Riyadh, SABIC was founded in 1976 when the Saudi Arabian Government decided to use the hydrocarbon gases associated with its oil production as the principal feedstock for the production of chemicals, polymers and fertilisers.

The Saudi Government owns 70% of SABIC shares with the remaining 30% held by private investors in Saudi Arabia and other Gulf Cooperation Council (GCC) countries.

The company also operates a fleet of chemical tankers under the Bahri Chemicals banner managed by Mideast Shipmanagement, part of the Bahri Group. Bahri Chemicals is 20% owned by SABIC.

Principal Particulars - ECO Star 36K

Class	DNV GL
GT	28,580
DWT	25,287 t
Length, oa	188.30 m
Length, bp	178.82 m
Breadth, moulded	29 m
Depth, main deck moulded	17.50 m
Depth, trunk deck	23.46 m
Design Draught (ethane	9.50 m
Cargo capacity	36,000 cu m
Main engine	MAN B&W 7G50ME-GIE
Output	12,040 kW
Speed	abt 16.5 kn
Flag	Liberia
P&I Club	Skuld

TO

Technology - frozen in time

ECDIS was ahead of its time until the regulators got involved. Now it's at risk of becoming a dinosaur, argues Transas CEO Frank Coles.

The electronic navigation systems used on cargo ships are obsolete and there is little hope of ever bringing them up to date unless there is a radical rethink on the way industry regulates technology.

Incredible as it may seem, the roots of ECDIS hardware that is now mandatory on merchant tonnage can be traced back to the Reagan era. It was born from early chart display systems, which like the microfiche machines of the time, presented digital reprints - known as raster scans - of paper charts on a VDU.

ECDIS was different because it stored, manipulated and displayed each item on a chart in a mathematical representation known as a vector. This laid the foundation for much richer charts and greater flexibility in presentation.

Through the 1980s and 1990s, ECDIS evolved at an accelerating pace. Computers grew in power, shrank in size and in price, eventually becoming affordable enough to install on ships. At the same time, innovators got to grips with and began to fully unlock the potential of the vector format. They were exciting times. In fact, while only a small number of ships availed themselves of the systems, it's probably fair to say that by the early 2000s, ECDIS was ahead of the curve. It was Google Maps for ships before Google Maps.

On numerous occasions, shipowners have approached Transas requesting an iPad app that mirrors the ECDIS display. Actually, from an engineering perspective, this isn't so difficult to implement. In fact, we would love to produce such a system as it would improve usability no end and, simply because more officers would be keeping an eye on a passage, boosting situational awareness and navigational safety. But our hands are tied, because whatever we build, has to be compliant with regulators. And, sadly, that specification was set down before the first iPhone was launched and the iPad was still little more than a glimmer in the mind of Steve Jobs.

It's not only ECDIS. The same disconnect between technology and regulation can be seen with radar. The systems offered to leisure and other non-SOLAS markets sport substantially more flexible and sophisticated display options and functionalities than those destined for commercial tonnage.

Regulatory driven

Mandation creates another problem. Shipowners now fit ECDIS on board because they have to. For any number of reasons, they might have been happier and possibly safer too sailing with paper charts or raster-based chart displays. Before ECDIS became compulsory, an owner would upgrade when they recognised the inherent benefits of doing so (whether safety or commercial or both) and when they had laid the considerable groundwork for training their officers. Essentially, everyone was on board. This typically led to a positive outcome.

If they weren't happy with what was available on the market, they would wait for the next iteration to come out, perhaps - for example - an ECDIS that also worked on an iPad that they knew their crew would be comfortable with and adept at using. A side-effect of this was that less successful innovations would be weeded out. The continuous changing of display, buttons, specifications make it almost unsafe, certainly impossible to consider someone properly trained.

Moreover, it forces shipowners to spend more time and money on training crew how to overcome unnecessary complexity. The end result is that complying with regulation is hampering the practice of good navigation and the job of moving ships from A to B.

While the consensus-based approach to regulation is effective for ensuring that vessels are structurally and mechanically sound, I believe it is woefully inadequate for coping with the rate of change seen in technology and software. The question is how we escape this impasse.

Transas CEO Frank Coles

In recent months, I've read numerous blogs and editorials telling the maritime industry to brace itself for 'disruption'. These warnings are invariably aimed at manufacturers or shipping companies themselves.

I wonder if they have the wrong target: to my mind, it is the regulatory landscape that is most in need of being disrupted. The Apple iPhone was a success because Steve Jobs was not beholden to rules. He rewrote the rules. If mobile phones were regulated in the same way as ships, we would still be making calls from a Nokia 3310 and playing snake.

We all know the definition of a camel- a racehorse designed by a committee. Technology is moving at a rate that the committee or regulators simply cannot keep up with.

Handling ENCs efficiently

NAVTOR was established in 2011, launching its ENC service the following year.

Since then, the turnover had increased tenfold between 2013 and 2016, rising from NOK9 mill to NOK93 mill.

The company has secured both a global customer base and footprint starting from its Egersund headquarters, Norway. NAVTOR also opened dedicated bases in St Petersburg, Singapore, Japan and Sweden and recently - the UK.

The opening of a London office is, according to NAVTOR CEO, Tor Svanes, a natural step forward."We already have a strong position in Europe, but see huge potential in the UK. This is, and has been for centuries, one of the world's leading maritime nations, and we believe the demand for our unique technology and services is clear, strong and broad-based. The UK has always been on the chart for NAVTOR's growth plans, and Richard (Northover) is the right man to help us realise that business potential."

Navtor's Tor Svanes

During his career, London boss Northover has developed an understanding of delivering technical products and services tailored to individual customer needs. His most recent role was at the International Centre for ENCs (IC-ENC) as commercial manager, where he helped grow market share, develop market-wide ENC licensing specifications and cemented the strength of the brand within key industry segments.

NAVTOR's ENC-based portfolio enables access to, and updates of, the latest digital charts, saving man-hours while slashing administration duties, the company claimed.

Chart management is simplified by the use of land-based teams, as well as at sea and receiving an overview of all chart usage, while weather and route optimisation options can help enhance safety and fuel efficiency. With typical optimisation, fuel savings of around 4% can be achieved, the company claimed.

Key NAVTOR products include the NENC service, compatible with all types of ECDIS and available on a subscription or PAYS basis,

NavStation, NavTracker fleet management software, and NavBox – a new system that automatically downloads the latest navigational data without navigators having to check for updates.

At a recent presentation in Oslo at the end of March, Svanes said that the use of digital charts as against paper charts was about 60:40 in favour of digitalisation and that this ratio was expanding.

Nor-Shipping highlight

He said that the latest innovation - NavBox - would be highlighted at Nor-Shipping and is based on Microsoft Azure technology. The software can be accessed on an ipad.

Another solution for passage planning is NAVTOR Kernel, which is aimed at ECDIS OEMS who have to be prepared for the new standard, due to come into play at the end of August this year. He said the software had taken three years to develop.

"There is a lot of development work going on due to an EU project, which started last year," he explained.

This is ENABLE, an EU-funded project that aims to prove, verify and validate the safety of autonomous vehicles of every type. NAVTOR has been chosen to represent the maritime industry. During the project, the company will investigate the concept of 'shore-based bridges' and test the validity of the software element of a remote bridge concept.

Built on continuous data sharing between vessels and land, the project aims to transfer key navigation functions from the crew on board to office-based teams, enabling those on land to navigate vessels at sea.

e-Navigation

Whether vessels switch to full autonomy or not, e-Navigation will soon become central to the voyages of all seagoing vessels, the company stressed.

The company also offers anti-piracy software through a tie-up with Bergen Risk and weather routeing services, but Svanes stressed that NAVTOR would not become an ECDIS supplier or manufacturer.

PAYS is a dynamic licensing tool using vessel tracking data to determine when vessels sails through an area. All ENCs are available for viewing and planning purposes, but the vessel only pays for the chart actually used.

A position fix can be obtained every 90 min using Inmarsat, Satelite-AIS and AIS network. It gives a very accurate track, Svanes said.

When signing up for the service, new users will be sent a NavStick, which is a pre-loaded USB, enabling the transfer of the latest ENC to an ECDIS, as well as accessing global charts and licences.

Another system - NavSync - is an online synchronisation tool, which checks for updates and also generates e-mail reminders.

NavTracker tracks, report and manages vessel and fleet movements, plus chart usage and the chart update history.

Finally, NavStation is claimed to be the world's first digital chart table. It integrates all the navigational data for intuitive and user-friendly presentation. Svanes described it as the full potential of e-Navigation at your fingertips. It is also available as software for a PC.

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Simrad launches subscription service

Navico company Simrad has launched the new ECDIS ONE subscription service to help ship and fleet owners meet updated ECDIS carriage mandates with a flexible, cost-controlled solution, the company claimed.

The new one-stop-shop solution includes requirements scoping, planning consultancy, ECDIS hardware, system commissioning, a full digital services package, access to Navico's global support and service network and type-specific ECDIS training, all based on a single monthly fee over a chosen time period with the flexibility to stop the service before the term ends.

This subscription model simplifies financial planning by offering companies regular and predictable costs throughout a customisable contract, Simrad said.

"We are providing a simple economic solution to help ship and fleet owners achieve full SOLAS compliance using our ECDIS solutions and also giving them access to a wide range of electronic charts and support services we have within the company," said Nicolas Queru, Navico's commercial division managing director. "The new ECDIS 'ONE' subscription-based service will help owners control operational costs and meet the compliance requirements for ECDIS mandated ships, including implementation deadlines fast approaching for those who need retrofit by July 2017, 2018 or 2019."

The new subscription service is made up of six core components:

1) **ECDIS** - Simrad ECDIS solutions have been installed on board more than 4,000 vessels to date, and tried and tested in some of the world's toughest maritime conditions. The subscription package is based on the MARIS ECDIS900 platform, which offers a comprehensive, extensible feature set and support for electronic navigational charts from most leading hydrographic chart providers. ECDIS 'ONE' subscription packages can be deployed in a wide variety of custom configurations to suit the specific needs of the customer.
2) **Digital Charts** - Navico is an authorised distributor of official ENCs from Primar, IC-ENC, UKHO (AVCS), NAVTOR and MPA and also supplies UKHO Admiralty Raster Charts (ARCS). This allows the company to offer both ECDIS hardware and a wide variety of compatible electronic charts under one subscription model.
3) **Digital Publications** - Navico is an authorised distributor of UKHO and Witherby Publishing Group and offers a range of digital publications, such as Admiralty Digital Publications (ADP) and e-NP (e-books) from the UKHO plus e-books from Witherby Publishing Group, ranging from IMO publications to Shipping Guides.
4) **On-Board Chart Management Software** - Simrad MARIS Bridge Assistant (MBA) enables navigators to easily manage electronic charts, paper chart portfolios and digital publications. MBA is optimised for fast and efficient chart updates over shipboard internet connections and integrates seamlessly with the Simrad MARIS customer portal (MCP) fleet management interface.
5) **Fleet Management** - Simrad's MCP is a web-based tool that keeps track of everything from chart management to LogLite reporting. It also provides a full graphical vessel tracking view, accessible from anywhere and at any time via connected PCs and mobile devices. This online tool simplifies fleet management and cost control by combining reports and chart orders into one user-friendly portal.
6) **Global Service** - The 24/7 global support team ensures there is always someone available to assist customers should the need arise, while global service is available with dedicated support engineers located in key ports worldwide.

Subscription costs start from $25 per day for a dual ECDIS system, 10 online computer-based training (CBT) courses with Navico's ECDIS training partner - Safebridge, AVCS regional coverage, regional ADPs and annual on board ECDIS health check.

Under the IMO's SOLAS, regulation V/19-2.1.4, as amended, ECDIS with suitable back-up systems are required on all vessels of a certain minimum gross tonnage and above.

For tankers, from 2012, new tankers of 3,000 gt and above must have met the new regulation and, since mid-2014 and mid-2015 respectively, existing tankers must have had approved systems installed on board.

Raytheon Anschütz announces first user-defined ECDIS

Raytheon Anschütz has introduced what it claims is the world's first user-defined ECDIS.

The software features an intuitive user interface, a clearly structured display, consistent operational concepts and modern interaction patterns, such as touch operation, 'drag and drop,' pins and handles and context-sensitive help dialogue.

It is claimed to be flexible and can adapt to new use cases or integrate new functions, without overloading the display or overwhelming the user, the company said.

Björn Schröder, ECDIS project manager, said: "The new ECDIS demonstrates the effectiveness of our agile software development and active user participation. Raytheon Anschutz's engineering team provided the technical base, but the support and feedback from our customers and professional seafarers made our ECDIS NX an ECDIS a uniquely powerful tool."

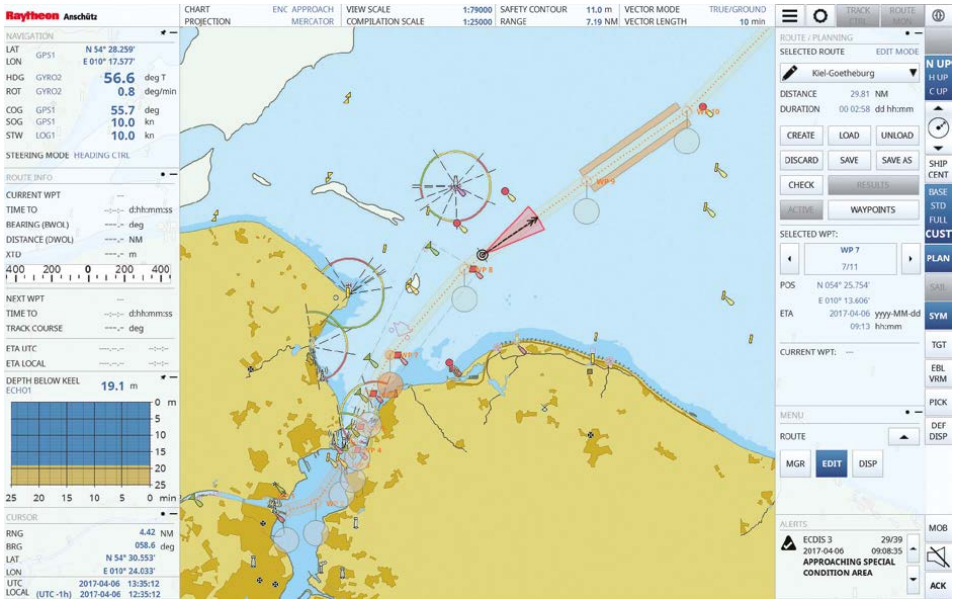
Synapsis ECDIS NX also includes multi-user setting options, as well as smart functions, such as guided route planning with a self-explaining route manager, ETA assistant, curved heading line, or look-ahead zones with graphical danger indicators.

Raytheon Anschütz built the new ECDIS NX application on the technical foundation provided by Synapsis integrated navigation system (INS). This means the highly integrated INS functions, such as alert management or sensor integrity monitoring, are also available for this stand-alone ECDIS.

It complies with all current standards, including the new IEC 61174 Ed. 4.0 and IHO ECDIS S-52 Presentation Library.

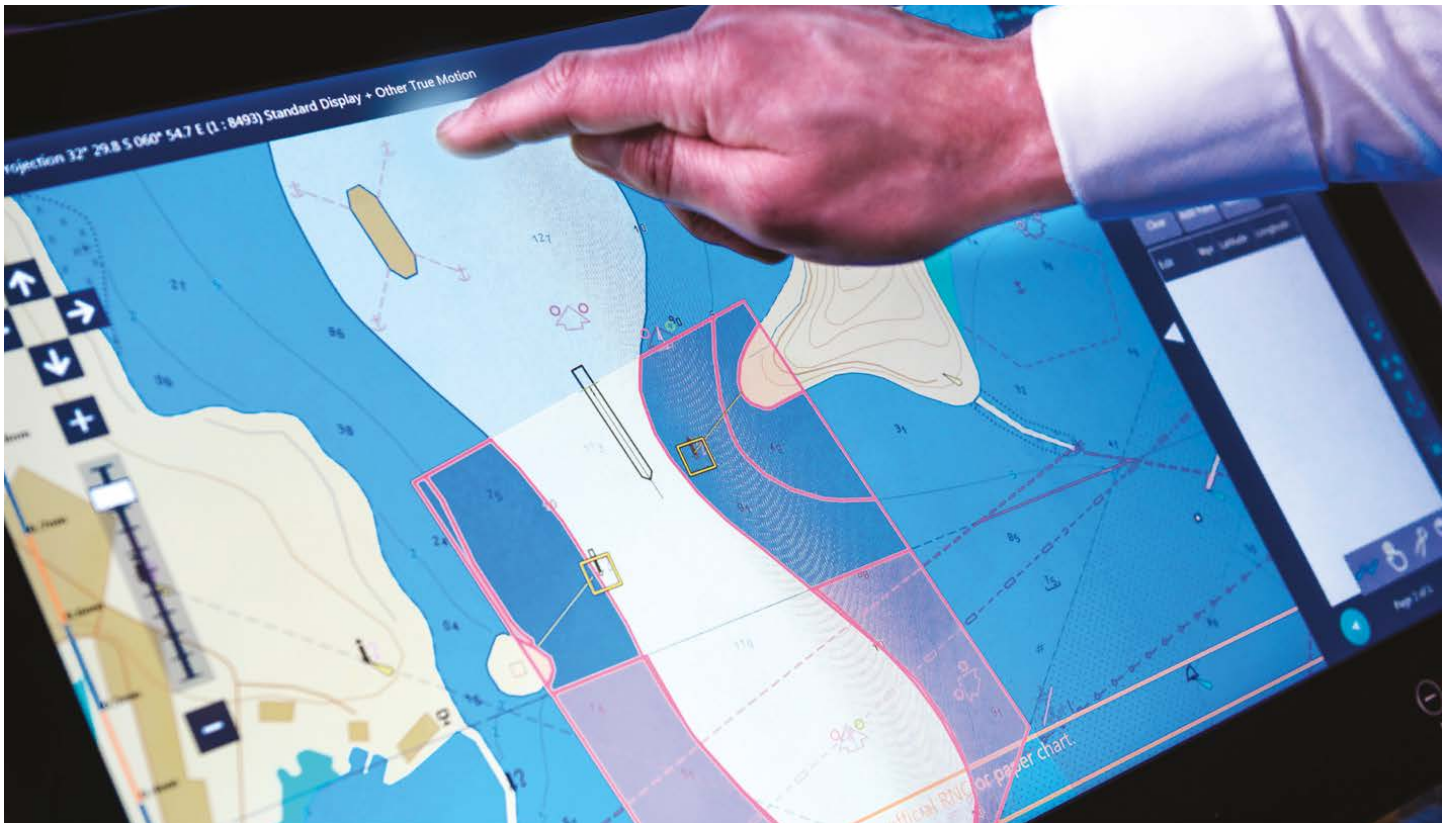
Raytheon Anschütz will officially launch ECDIS NX at Nor-Shipping 2017 in Oslo.

Raytheon Anschütz is a subsidiary of the Raytheon Company and is an integrator of bridge and navigation systems for all kinds of commercial vessels. More than 35,000 vessels worldwide are equipped with Raytheon Anschütz navigation systems, backed by a global network of owned subsidiaries and regional offices, eg in Shanghai, Singapore, Rio de Janeiro, Panama, San Diego, and Portsmouth (UK), as well as a network of specialised service stations around the world.



GNS ties up with SEALL

Global Navigation Solutions (GNS) has announced a couple of initiatives recently.



For example, GNS and SEALL ECDIS have announced a new strategic partnership to combine GNS's expertise in back of bridge navigation software and navigational data provision with SEALL's ECDIS and software development capability.

The first focus area of the new partnership is the touch technology SEALL ECDIS. This new ECDIS introduces an entirely new user interface for ECDIS using multi-touch technology display and new software.

Navigators are able to control an ECDIS by using their fingers to make it faster and easier to access, view and interrogate navigation critical information and action front of bridge tasks.

SEALL ECDIS and GNS's Voyager back of bridge data management and route planning software have been developed using the same technology to display, manage and use digital charts. This enables an easy flow of data from the back to the front of bridge, reduces duplication and re-keying, makes planning and voyage execution simpler and delivers a better all round user experience on board, the companies claimed.

SEALL features a 24-inch full colour display and full QWERTY soft keyboard, which makes it easier to add notes and annotate a passage plan on ECDIS. When users need to type, SEALL presents them with a smartphone-like touch keyboard, which is more efficient to use than a trackerball. In addition, a simple and modern tablet style menu enables users to move easily around the features.

The SEALL ECDIS is driven by the 7th Generation patented Intel Core i7 processor, thought to be the most powerful processor available today, to ensure the best possible performance.

Easy installation

It has also been designed with easy installation and set up in mind. It automatically detects any sensors that it is connected to, including motion, positioning and heading devices and automatically sets up monitoring functions such as cross track.

Des Neill, CEO, SEALL ECDIS, commented "We are now in a new era of navigation. Companies must co-innovate to solve tough user experience challenges for their customers. This is why we are working with GNS, a market leader in the provision of maritime solutions. This new offer represents our belief that the future of navigation requires new ideas – as companies become more dependent on technology to navigate safely, as data volumes increase and real-time intelligent-response becomes a necessity of doing business."

"We are very pleased to form a strategic partnership with SEALL. By combining GNS's expertise in maritime solutions, with SEALL's vision for next generation ECDIS, we can achieve exciting new digitally-led efficiencies and safety improvements on board." said Paul Stanley, GNS Group CEO. "Together GNS and SEALL are working together to innovate around user interface design and front and back of bridge integration and are addressing the user experience challenges that are preventing shipping companies from achieving many of the efficiencies and improvements promised by digital navigation."

The SEALL ECDIS has been type approved by DNV GL, is fully compatible with all commercial ENC services, including AVCS and Primar products and is claimed to be competitively priced to make it affordable to all shipping companies worldwide, in particular companies looking for retrofits to comply with IMO ECDIS carriage requirements.

SEALL ECDIS was launched in 2013 by

Jargoon, specialists in maritime software development, with the motto of 'See all there is to Sea'.

In another move, GNS has introduced a 'pay as you sail' (PAYS) service. PAYS offers flexibility and convenience, combined with accurate fixed pricing, the company said.

GNS PAYS offers access to AVCS and can provide a flexible PAYS service with the benefits of fixed price bundles.

The patented Voyager Open Permit delivers unrestricted access to AVCS coupled with Voyager software for route planning and navigation management. GNS' data analytics provides cost-certainty of a fixed annual price to make navigating with ENCs simpler and easier to manage than before, the company said.

Users get unrestricted access to the entire AVCS portfolio and can choose to pay one fixed annual fee regardless of how many ENCs they open, view or sail through. Annual fees are calculated using GNS's pricing algorithms that use vessel tracking data and other factors to generate accurate prices tailored to each vessel in a fleet.

"We are excited to deliver another industry first by making the buying and management of ENCs even simpler and more cost effective," said Stanley. "Voyager Open Permit puts open access to global ENCs within reach of all mariners worldwide and at the same time, provides shipmanagers with the ENC cost certainty and visibility of vessel movements they need to confidently manage vessel operations. All of this is possible without any hardware installation requirements or set-up costs."

Key features of Voyager Open Permit include:

Cost certainty: GNS uses its unique tracking-based algorithms to give shipping companies accurate fixed annual prices. Vessels have 'always-on' access to global ENCs and shipmanagers are 100% certain of how much they are spending on a daily, monthly and annual basis.

No risk of over ordering: With Voyager Open Permit, vessels can open, view and plan routes using as many ENCs as they like without incurring additional charges.

Global coverage: Users get access to PAYS coverage, as well ENCs, which are not currently included within PAYS – all at one fixed annual price.

Vessel tracking: A free online tracking service allows shipmanagers to monitor vessels progress and view ENC usage in real time from anywhere in the world via PC, laptop, tablet or smartphone.

No installation costs: Unlike many other PAYS services, there are no extra hardware requirements or set-up costs. All you need to get started are Sat C details and an ECDIS. GNS activates the service in as little as 24 hrs completely remotely from the vessel.

Voyager Open Permit includes free access to GNS' route planning and navigation management Voyager software. With the software, users are guided through route planning, ENC management and updating. When updates relevant to the vessels holdings are available, users are alerted via the home screen, making it easier to keep on top of navigational compliance. It allows users to tailor the updates they receive to specific routes or trading areas to keep download costs to a minimum.

Vessels that use this service are 44.2% less likely to get navigation-related observations or be detained (based on results from Jan - Dec, 2016). Less manual data entry, less cutting and pasting, and full compatibility with every major ECDIS also means greater productivity – Voyager users spend more than 20 fewer hours per week on navigation tasks, GNS claimed.

The software has been designed to be highly intuitive and easy to use. Crews need much less support from traditional help desk services and most can become self-sufficient very quickly. As with all GNS products and services, Voyager Open Permit comes with 24/7 support from a global service and support team of mariners and navigation experts.

GNS is also offering Voyager Open Permit on a standard PAYS tariff with an annual service fee and retrospective monthly billing based on chart usage.

Fibre optic condition monitoring systems offer better results

Developer of fibre optic condition monitoring systems, Light Structures, has fitted several systems to large tankers, as well as to other vessel types, since its launch in 2001.

The systems are based upon the Fiber Bragg Grating technology (FBG) and the company claimed that fibre optic systems offer excellent reliability and unique data quality, compared to conventional technology.

Its patented SENSFIB product range includes hull stress monitoring (HSM), ice load monitoring (ILM), sloshing monitoring (mainly for gas carriers) and FPSO monitoring with the customised HullInfo software. In addition to operational data, the systems provide data for active fatigue management (AFM) reports.

The core SENSFIB system gives crew and vessels' owners/operators/managers real time information about the hull/containment system/structure.

By monitoring the stress responses in the hull during voyages, HSM helps to prevent design stresses being exceeded. The development of hull fatigue is measured using long-life optic sensors located in various areas in the hull. This is achieved by measuring the hull's relative deformation, strain (stress), due to loading (still water strain) and due to waves (dynamic strain).

The measured stress is analysed in a distributed way inside the sensors. The analysis used identifies the static, dynamic and slow changing temperature components from the signal and calculates different signal characteristics. The results are transmitted to the central unit, normally located on the bridge, to be further analysed, data logged and displayed to the bridge personnel to assist in navigation. The various components of a typical HSM system are strain sensors, accelerometer units, bow pressure transducers, plus the bridge display units.

As mentioned, SENSFIB HSM systems are based on the FBG system, which is an internal stripe pattern in the core of the optical fibre that strongly reflects one wave length (or colour) of light and the user interface can be configured to show current stress, fatigue accumulation, accelerations and slamming trends, as well as sailing conditions, such as sea state, wind, speed and position if the equipment is integrated.

HSM requirements

The sensors were developed specifically for HSM requirements and come in both short and long-base fibre optic strain sensors, fibre optic accelerometers and fibre optic sloshing pressure sensors.

FBG optical sensing technology is claimed to give SENSFIB a competitive advantage, compared to conventional strain gauge based sensors. The key advantages being:

- Sensors are intrinsically safe requiring no ZB and no limitation to their positioning.
- Reliable as they are immune to EMI. The software is based on a Linux OS platform.
- Accurate as the stress measurements are based on measurement of the wavelength of light.
- Reduced ownerships costs (recalibration, maintenance, repairs and service).
- Flexibility due to ease of installation (no hot work required for sensor installation).
- The basic HSM system can be easily expanded to include fatigue monitoring on the water line, bow sensors for ice load monitoring, etc, as required.

SENSFIB HSM helps the navigators to monitor the current hull stress status with online information regarding the load margins and provide assistance in making faster decisions for a safe voyage. The same data can be processed later to give inputs for maintenance planning and fleet utilisation.

A vessel's safe and cost-effective operation requires an exact knowledge of the ship's design and awareness of the operational risks and their consequences. Tankers and other types of vessels are particularly at risk of hull fatigue damage, induced by the stresses that can occur in the hull, as a result of ballast, cargo loading and sea state.

Fatigue build-up in vessels leads to local cracks in the hull, which if left unrepaired, eventually endanger the vessel's structural integrity. Hull stress is one of the major factors, which cause irretraceable damage to vessels. One of the challenges involved in hull fatigue has been the lack of information transmitted the bridge about the actual load on the hull/structure.

To reduce failure incidents, the IMO and leading class societies have recommended the use of HSM systems.

Important system features include -

- Structural integrity vs safety (HSE).
- Fatigue management.
- Preparation ahead of lifetime extension application.
- Preparation and documentation ahead of risk-based inspections.
- Automated monitoring has become a preferred solution compared to traditional visual inspections, due to development of new technology and cost/time saving for owners.

Light Structures offers data management services onshore to help maintenance planners and other onshore personnel manage the assets. Reports, which summarise the hull condition, are available based on data from the HSM system. Data

can be transferred for onshore analysis on backup media. Regular condition reports come as a supplement to inspections and provide hull status documentation that can be used towards maintenance planning, customers, authorities, environmental groups and potential vessel buyers.

The company recommended that for analysis of actual fatigue life in hotspots, a fibre optic strain sensor is placed in a location near the hotspot(s) of interest, where the stress is well defined (no gradients), and calculate the hotspot stress and consequent fatigue damage using stress concentration factors (SCF) found from the design calculations (hotspot locations and SCFs are supplied by the shipyard).

One strain sensor can be used to calculate stress and fatigue in several nearby hotspots, based on individual SCFs for the hotspots. Individual SN-curves may also be defined.

The comparison of actual fatigue life with design fatigue life is a standard function in the SENSFIB system. The result is normally presented based on the latest half hour of data (single point in time) with a bar graph, and the time history of the comparison implemented as an onshore function. An online graphical representation of the timeline can also be shown on board as a custom function in the human/machine interface.

In case there is a significant difference between the actual fatigue life and the design life, the system can provide the user with advice on the cause. The standard function will present the overall fatigue life calculation together with the contribution, due to wave loading (included in design life) and contributions due to vibrations (not included in design life).

Design parameters

With access to a full set of design parameters and environmental data, including wave data, it is possible to extend the advisory function to include a comparison of the actual loading conditions with the loading conditions used for design life calculations, as well as a comparison of the actual wave scatter with the design wave scatter.

In addition, the company markets the patented SENSFIB Integrated Marine Monitoring System (IMMS), which combines a number of different monitoring solutions in a single package:

- SENSFIB Hull for basic data acquisition from fibre optic sensor systems and interfaced systems.
- SENSFIB Fatigue Monitoring based on rain flow counting from actual stress histories. Extensions for low-cycle fatigue are available, as well as a data management and reporting service - SENSFIB Active Fatigue Management (AFM). Motion sensors (6DOF) and radar-based sea state monitoring can also be included in this package. A mooring monitoring front end is available for monitoring offsets and mooring related motions.
- SENSFIB Design Evaluation is an advisory function for tracking the actual fatigue damage accumulation, compared to the fatigue design and hull response model using a spectral fatigue calculation approach.

AFM can improve maintenance planning with both the tool, as the report is accepted by leading class societies. This will lead to an improved lifecycle, reduced survey costs, delivering an attractive return on investment (ROI), Light Structures claimed.

Founded in 2001 by scientists from the Norwegian Defense Research Establishment, the company has now supplied nearly 200 systems to the commercial shipping, naval and offshore sectors.

Headquartered in Oslo, the company has a subsidiary -GME - based in Busan, South Korea and a network of agents in South Korea, China, Japan, India, Canada, Greece, Singapore, Australia and the UAE.

Today, the company offers fibre optic HSM, sloshing monitoring, ILM, while GME offers torque meters, performance monitoring and electrical/mechanical.

Among the leading tanker companies to have invested in a Light Structures systems are Adnatco, Bahri, Frontline, Gener8, Neda Maritime and Teekay, as well as several FPSO and FSO operators.

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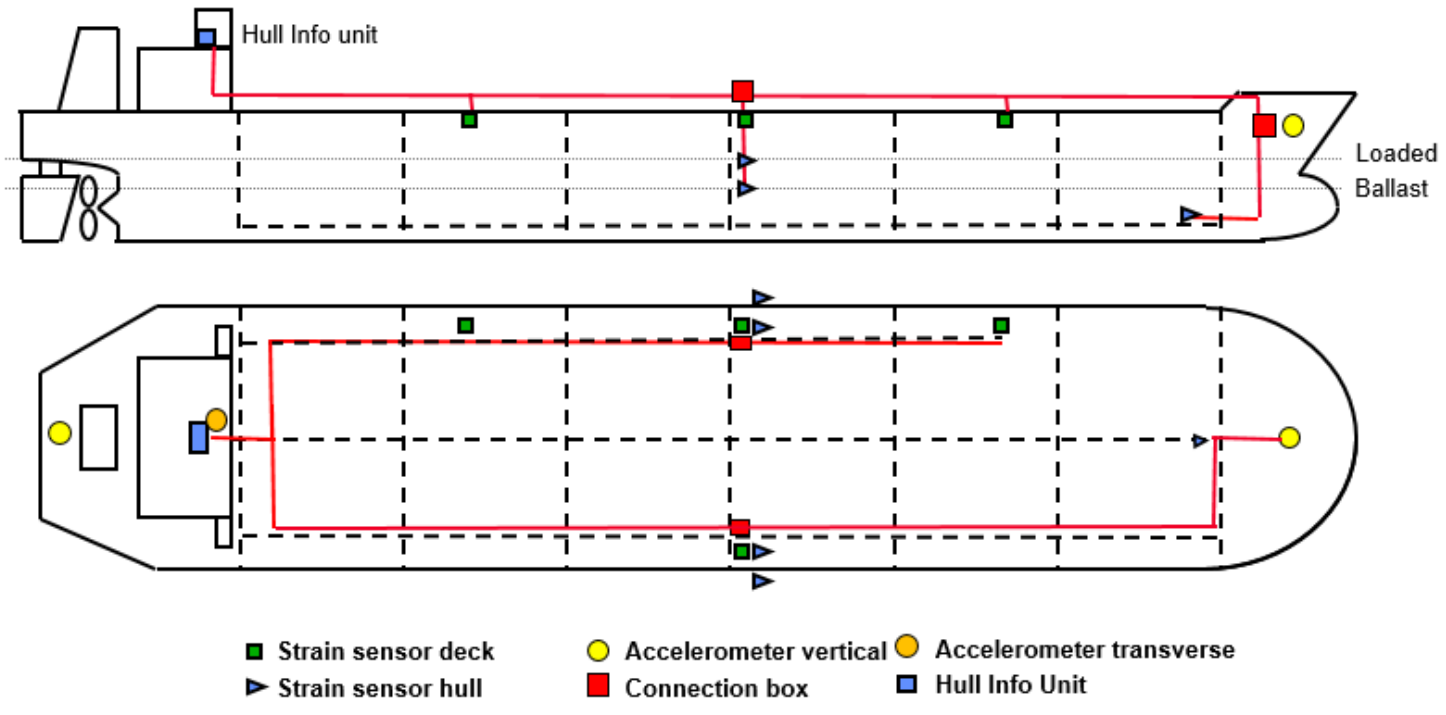


Tankers adopt Clean Marine's exhaust gas cleaning solution

Exhaust gas cleaning systems (EGS) developer and supplier, Clean Marine, has won some significant orders in the tanker and gas carrier segments, since the company was founded in 2006.

For example, systems have been fitted on board two MRs built at Hyundai for long term charter to BP.

These have seven exhaust sources each. In addition, two chemical tankers from Hudong-Zhonghua for Stolt-Nielsen will also be fitted with seven exhaust sources, while two shuttle tankers built at Samsung for AET on the back of 10-year Statoil charters, are fitted with 10 exhaust sources each and one VLGC also built at Hyundai for Dorian has five exhaust sources.

In addition to the tankers, systems have been installed on board a Handysize bulker and two reefers.

Both the MRs and chemical tankers' exhaust sources include one main engine, three auxiliaries, two boilers and one composite boiler, while the larger shuttle tankers sources include two main engines, five auxiliaries, two oil fired boilers and one donkey boiler each.

For the tanker market, Clean Marine's Allstream technology is the recommended system whereby all the exhaust sources are cleaned by one scrubber. At a recent presentation in Oslo, the company's chief sales & marketing officer, Frode Helland-Evebo, explained some of features and benefits of the system.

He said that all the exhaust streams are cleaned with a single scrubber, which he claimed was a cost efficient solution for vessels with many exhaust sources and was easy to install.

Hybrid System

The system is a hybrid, which means it is able to switch between an open and closed loop operation. The closed loop method can be used in areas where discharge at sea is banned. Helland-Evebo said the technology was unique in that the pressure is maintained at the desired level at various exhaust loads and ensures no back pressure to engines and boilers.

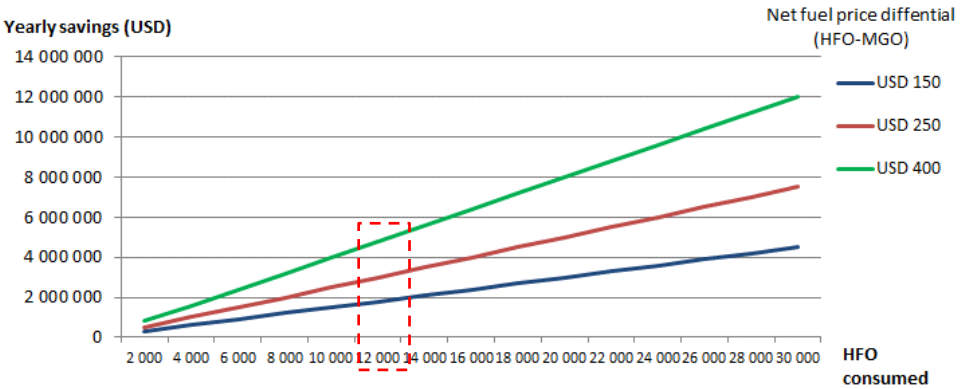
It can operate efficiently in all types of seawater, as an adjustable injection of NaOH can be made according to the alkanility of the seawater in which the vessel is sailing. Finally, he said that it was a scalable and flexible system, which could be developed according to the highest practical ship exhaust load and a system can be installed on a vessel at the newbuilding stage or retrofitted.

He gave an example of a Suezmax on worldwide operation with a $250 per tonne fuel spread, where the cost of MGO, compared to HSFO, gave a fuel cost of $2.5 mill per year. The cost of of an EGCS is around $3 mill, which includes the installation, with a payback time of 1.2 years.

The value of Allstream fitted to a tanker was estimated at between $1.5-$4 mill per year for an operator, while for the boilers the value was estimated at $2 mill to $4.2 mill over five years.

For NOx Tier III applications, in the future it could be possible to fit an EGR/SCR plus an EGCS. The SCRs may be fitted in series with the EGCS (SCR after the auxiliary and the EGCS after the SCR). The only concerns were back pressure issues and ammonia slips.

However, he explained that, Clean Marine's EGCS do not create any back pressure due to the fan's configuration and as for the ammonia slip, this will be taken care of by the scrubber process in general.



The value of Allstream for the tanker ship operator is estimated to 1,500,000 –4.000,000 USD per year

Strategic alliance

Clean Marine has signed a strategic alliance with Hyundai Global Service and has a global agency, on site managers, fabrication and service network. The company will mainly undertake the design in-house, as well as the engineering and sourcing. The fabrication is fully outsourced and the equipment is assembled at the shipyard. The installation and commissioning will be supervised by company personnel on site.

The company's main shareholders include Klaveness Invest (21%), Smedvig Capital (38%) and Bjarne Rieber Group (34%).

Regulations driving MDT and Wärtsilä's technology

The two major engine manufacturers have been constantly upgrading their offerings and introducing new technologies, as emission control regulations start to bite.

For example, at an event in Tamano, Japan on 11th April, MAN Diesel & Turbo (MDT) and its licensee – Mitsui Engineering & Shipbuilding – introduced a new high pressure selective catalytic reduction (SCR) system – MAN SCR-HP.

The MAN SCR-HP is available for 2-stroke engines of all bore sizes and reduces – through internal catalytic reaction – NOx exhaust emissions to IMO Tier III limits.

With specially developed honeycombs and honeycomb materials, as well as an integrated mixing unit, the overall size of the reactor has been radically reduced, compared to typical market designs and its medium-speed counterpart. MDT said that it expected to deliver the first system from the beginning of 2018.

Bjarne Foldager, MDT vice president and head of sales & promotion 2-stroke business, said: "The development of our new SCR is an important step on the path to a more sustainable future of shipping and global trade. At the same time it offers additional choices to shipowners worldwide, who can now choose from all NOx reduction technologies and select the optimal solution for their MAN Diesel & Turbo 2-stroke engines. Furthermore it strengthens our position as the world's leading system provider in the field of marine propulsion."

Dr Gunnar Stiesch, MDT head of engineering engines, said: "The successful technology transfer from medium speed design to 2-stroke is this project's major achievement. The reactor design has been driven by the desire to reduce the SCR system's overall size, while still maintaining the effectiveness of a much larger design.

"Reaching this target was only possible by focussing on key cornerstones of the design – the honeycombs as well as the reactor concept. For both components, we have collaborated with worldwide stakeholders to ensure that we offer the best possible design to the market, something I'm confident we have achieved," he said.

Development

The development of the SCR-HP system was

based on MAN's in-house competence with 4-stroke engines, for which it can already reference more than 650,000 operating hours. The newly-developed system comes in six frame-sizes, covering up to 25 MW per reactor.

A major milestone in the development of the MAN SCR-HP was reached during the approval certification and engine shop test. The test was carried out in close collaboration with MDT licensee and partner, Mitsui Engineering & Shipbuilding, at its engine works in Tamano under ClassNK's observation.

MDT offers two alternative methods to meet IMO Tier III NOx requirements for MAN 2-stroke engines. The first, exhaust gas recirculation (EGR), is an internal engine process that prevents the formation of NOx by controlling the combustion process. The second method, SCR, is an after-treatment method that uses a catalyst and an additive to reduce the NOx generated by the combustion process.

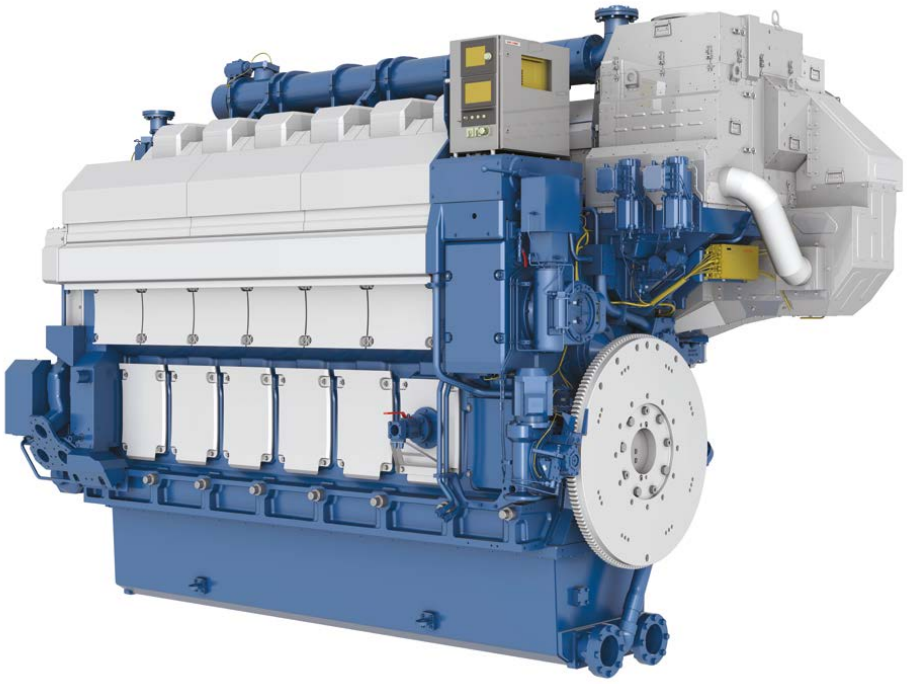
Following the technical presentation and a demonstration of the new SCR system in operation on an engine test-bed, Ralf Klaunig, MDT head of turbocharger sales, spoke to the audience about the product's next steps and its timeframe for market introduction.

"The market has expected MAN to offer its own SCR system for 2-stroke engines for some time now. For us, it was clear from the start that we should focus on a high-pressure solution in order to give more flexibility to shipowners. The improved and compact design, compared to conventional reactors, leads to considerable benefits for engine builders, shipyards and shipowners," Klaunig said: "Being the engine designer, it's clear that we possess the greatest competence to design the best possible concept. Our customers gain a great advantage in relying on MAN as a full solution provider as no other company can align our competences and design an entire engine-room from propeller layout up to the funnel. Especially the Scheme B approval will lead to remarkable cost reductions in the engine-approval procedure."

SCR-HP Series

MAN SCR-HP comes in six frame sizes, covering engines up to 25 MW with one reactor for the entire exhaust stream. Larger engines will require two reactors, which can be arranged in a set up similar to turbochargers.

The system consists of the reactor – including mixing unit, urea injection lance, honeycombs and soot blowers – along with a module-based supply system, as well as the reactor's control unit that communicates with the engine-control system.



A 6-cylinder in-line Wärtsilä 34DF engine. The engine features advanced dual-fuel technology and high efficiency and its success is evidenced with more than 300 engines delivered globally

It is available for Scheme A and Scheme B classification approval. Scheme A approval includes a certification of the complete system on the engine test bed, SCR and original piping. Approval via Scheme B reduces complexity for all involved parties. The engine is tested in IMO Tier II mode on a test bed. MDT then models the SCR system and calculates the Tier III mode. On the parent engine, this mode is certified on board during engine commissioning.

Scheme B approval is confirmed by several classification societies and reduces the test demands required of the engine licensee. The process is well established in MDT's medium-speed sector and over 100 systems are already on order awaiting Scheme B certification.

US EPA compliance

Rival Wärtsilä has been awarded model year 2017 certification of emissions compliance from the US Environmental Protection Agency (EPA) for its 34DF dual-fuel engine family.

The EPA Tier III certification and the corresponding EIAPP certificate were both issued in March, 2017. The Tier III certification of conformity covers the Wärtsilä 34DF engines manufactured from the date of issue until the end of this year.

These are the first Category 3 Tier III certificates issued by the EPA to any manufacturer, Wärtsilä claimed. Category 3 relates to engines with a displacement per cylinder of greater than 30 litres.

This certification verifies that the Wärtsilä 34DF engine is fully compliant with the EPA Tier III emission standards in gas mode operation. As required by the EPA Tier III standard, the engine is equipped with a continuous NOx measuring and monitoring system for verifying emissions compliancy inside NOx Emission Control Areas (NECAs). When sailing outside NECAs, the fuel-flexible 34DF engine can be operated with conventional marine diesel fuels as required.

"Once again Wärtsilä technology is leading the way to greater environmental sustainability and a cleaner shipping industry. It is an honour for the company to be the first to be awarded this important EPA certification," said Patrik Wägar, product director, medium bore engines, Wärtsilä Marine Solutions.

The 34DF engine features advanced dual-fuel technology and high efficiency and more than 300 engines of this type have been delivered globally.

For marine applications, it is manufactured in configurations from six to 16 cylinders covering a power range of 2,880 - 8,000 kW. Based on the proven Wärtsilä 32 diesel engine introduced in the mid-1990s, the 34DF's fuel flexibility means that the engine can be optimised for constant speed generating sets, as well as variable speed mechanical drives for main engine applications, Wärtsilä said. TO

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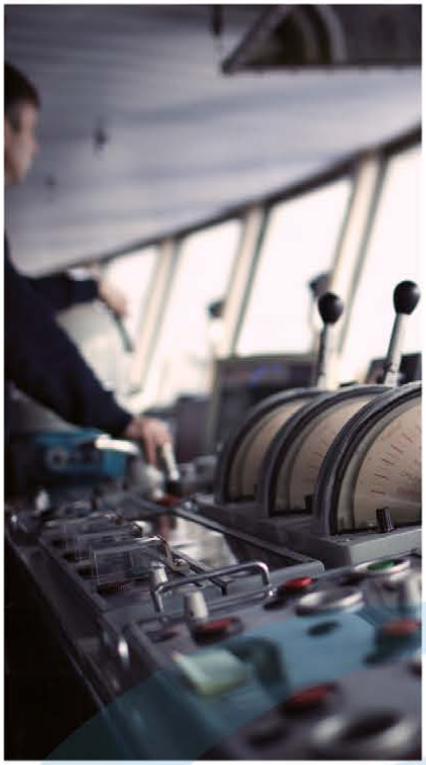

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Changing times for monitoring and measuring

For vessel fleet owners managing changing demand in a volatile market, as well as the cost of upgrades to comply with incoming industry safety regulations, flexibility and cost-effectiveness are paramount when it comes to systems supply and replacement.

PSM's Mark Jones explains how component manufacturers are working with shipyards and integrators to provide new options for monitoring and measurement.

Modern tank gauging systems are designed to be flexible, with a plethora of solutions available from single transmitters to more complex systems combining radar transmitters, temperature profiling probes and advanced calculation software.

While digital tank gauging systems are gaining traction in the marine market as a fast, cost-effective monitoring and measurement solution, especially where extensive data capture is involved, analogue systems still have much to offer for simpler requirements.

With a significant proportion of vessels in service still using analogue systems, demand for analogue replacement parts also remains high for upgrades and in expanding existing systems.

Working with parent company Scanjet, PSM has developed a new range of Analogue Programmable Transmitters (APT's) to service the component supply needs of systems integrators and shipyards looking either to upgrade vessels or expand existing systems.

Customisable solutions

Meeting the needs of newbuilding and repair requirements for a large and diverse range of vessels means that flexibility and availability is vital to achieve a fast turnaround at competitive prices.

The in-built scaling features of these latest analogue transmitters enable engineers to configure the transmitters at point of installation for a range of different shipboard applications. Connection is by industry-standard DIN plug, while the programmable calibration capability, a new development in the market, allows a 3:1 turndown.

Available with a choice of materials and mounting adaptors, the APT500 series is designed to provide maximum flexibility in integrating transmitters with other system

The APT500 series is IECEx and ATEX certificated

elements, a key consideration for systems integrators and in facilitating replacement and expansion works.

The new programmable transmitters, which generate an industry standard signal output of 4-20mA, are suitable for all tank duties from measuring levels for ballast and draught to general shipboard pressures.

Nominal measurement ranges from 0.2 to 10 bar for level transmitters and -1.0 to 60 bar for pressure transmitters.

All-weather operation

Dependability is a key factor when it comes to the supply of components for marine systems subject to extreme conditions in daily use at sea. Certified to IECEx and ATEX standards for use in hazardous areas with a robust all-weather design, the APT500 series has been designed with a high overload tolerance.

Options for the body in Hastelloy and a choice of materials and protection for the sensing diaphragm ensure pressure transmitters are compatible with all fluid types. Temperature-compensated output over a wide range from 0 to 70 deg C ensures accuracy is maintained to +/- 0.2% of full range, with a state of the art measurement element that provides long-term stability.

With speed and breadth of choice an essential prerequisite, a key objective for the new range of transmitters has been to ensure the availability of components from stock in a range of sizes and materials to avoid any delays in installation.

For fast-track projects and where customisation is required to meet specific application needs, the APT transmitters can be pre-calibrated during production to agreed specifications. The standard data connection and supplied PC-based software allows further calibration changes to be made at any time to accommodate changing requirements.

Future proof

In a tough commercial environment, adaptability is important both in terms of meeting often rapidly changing needs and in maximising the original system investment. A key objective in the launch of the latest APT transmitters is to provide an economical, scalable solution that ensures longevity.

Analogue systems continue to provide excellent value

Analogue systems continue to provide excellent value for simple applications and where volume of output is a consideration. Where more complex needs require a more advanced solution and/or where extensive data capture is required, digital systems, such as those available from PSM and parent company Scanjet incorporating PSM's advanced ICT transmitters provide an intelligent system, which utilises all the latest technology to provide comprehensive control.

Water absorption in tank coatings

by Reian, G,[1] Jotun Performance Coatings R&D Jotun AS, Sandefjord, Norway.

The absorption-desorption of fresh water and seawater was investigated for four commercially available epoxy tank coatings, each based on a slightly different binder technology.

It was shown that there are considerable differences between the various coatings when it came to water absorption and subsequent desorption. The pure epoxy and novolac epoxy coating absorbed less water overall and desorbed faster and more completely than the coatings based on novolac-RDGE or epoxy-silicon.

The latter two coatings retained a lot of water, even after as much as 10 days of perfect ventilation. As to the difference between fresh water and seawater, the coatings generally absorbed a higher amount of the fresh water than they did seawater. Based on this, it can be argued that fresh water is the better choice for cleaning purposes.

A cargo tank coating is generally exposed to water more frequently than to any single cargo, as water is used to clean the tank between different cargoes. Water retained in the coating after cleaning could potentially cause several problems; one being failure of the coating by reaction of water with subsequent cargoes, causing acidic or other harmful species to form within the coating; another problem could be water contamination of the cargo itself.

To shed more light on this, a test was initiated to study the amount and rate of, water absorption of four commercially available epoxy tank coatings and, more importantly, how long ventilation time the absorbed water needs to fully leave the coating.

Coating	Technology	Curing regime
A	Pure (bisphenol A) epoxy	7 days 23 °C + 16 hours 60 °C
B	Novolac epoxy + resorcinol diglycidyl ether (RDGE)	7 days 23 °C + 16 hours 60 °C
C	Novolac epoxy	7 days 23 °C + 16 hours 60 °C
D	Epoxy-silicone hybrid	7 days 23 °C + 2 hours 105 °C

An overview of the commercial tank coatings tested

Experimental procedures

Four different epoxy tank coatings were tested. The coatings are listed in Table 1 with technology base and curing regime. The coatings were applied onto patented Mylar polyester films for easy removal of free films. The coatings were applied using a fixed frame applicator, aiming to get a dry film thickness per the respective product's technical data sheet (TDS).

After application, the coatings were cured per their respective TDS and/or application guidelines. The free coating films were then cut using a scalpel in squares of approximately

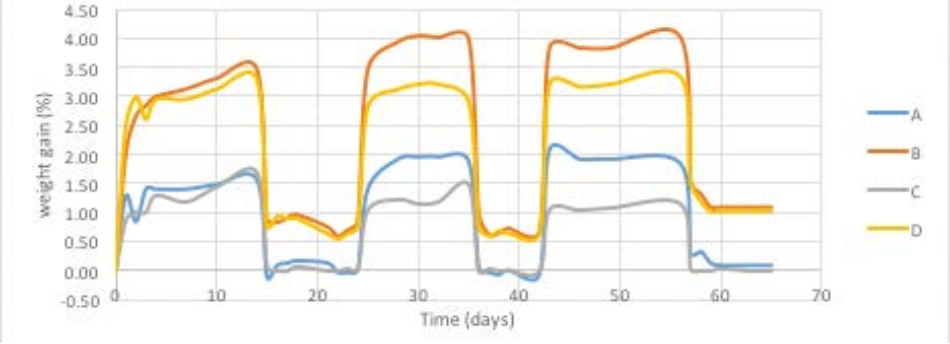

Figure 1: The three cycles of absorption-desorption of fresh water is shown for the four different tank coating products

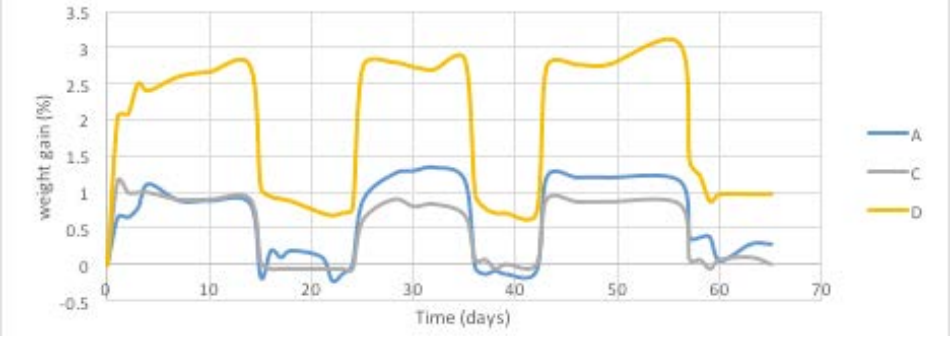

Figure 2: The three cycles of absorption-desorption of sea water is shown for coating A, coating C and coating D. Testing of coating B had to be terminated shortly after start due to film breaking

2 x 2 in and each square was weighed before immersion. During the absorption period the coating squares were immersed in fresh (tap) water or seawater[2], in closed containers. The samples were removed at intervals for weighing.

All excess surface liquid was removed with a dry paper towel before each weighing. Weighing was performed using an analytical balance to ~0.1 mg. During the desorption period the coating was left to ventilate on the bench under ambient conditions (21 deg C - 23 deg C, 20 - 40% relative humidity) and weighed periodically. The absorption-desorption experiment was run over three cycles to study the accumulated effects of water uptake.

Definitions

Sorption describes the combined processes of adsorption and absorption (1). Adsorption is the physical adherence or bonding of ions and molecules onto the surface of another phase. Absorption is the incorporation of a substance in one state into another of a different state. For the sake of this article, we will assume that the migratory process is purely absorptional and all the molecules contributing to weight gain are incorporated in the free volume of the coating film.

Desorption is a phenomenon whereby a substance is released from or through a volume. The process is the opposite of sorption (ie, either adsorption and absorption). This occurs in a system being in the state of sorption equilibrium between the bulk phase and an absorbing volume (coating film). When the concentration (or pressure) of substance in the bulk phase is lowered, some or all of the sorbed substance returns to the bulk state.

The absorption and diffusion of water in polymeric materials such as epoxy systems is related to the free volume (2,3) and the polymer-water affinity (3,4) The amount of free volume depends on the molecular packing and is affected by both the crosslink density (and therefore the extent of curing) and physical ageing (5).

The polymer-water affinity is significantly influenced by the presence of hydrogen-bonding sites within the polymer (6). Water can sometimes be absorbed without causing swelling; when this happens, it is suggested that it remains unbound to the polymer and is effectively accommodated within the free volume (4).

Results

The test results for water absorption-desorption of the four tested tank coatings are summarised in Figure 1 for fresh water and in Figure 2 for seawater. Each absorption phase lasted for 12-14 days and each desorption phase for eight to 10 days (varying to fit in with weekends).

The results were plotted as percent weight gain as a function of time. It should be noted that there are no results presented for coating B with seawater, as the free film broke into several small pieces shortly after starting the test. It was considerably more brittle and therefore more difficult to handle than the other samples.

It can be seen from both Figure 1 and Figure 2 that for all coatings, and for all cycles, absorption stabilizes quite fast (reaches equilibrium) within a few days. The absorbed amount of water is considerably higher for coating B and D. This indicates that these coatings have a higher molecular affinity for water and/or a higher free volume. Previous absorption testing (not published) indicates a predominance of the first effect (higher affinity towards water) for these two products.

From both figures, it can also be seen that for all coatings, the desorption rate is fast and an equilibrium is reached within 24 hours of perfect ventilation[3]. For coating A and C all the absorbed water has left the coating within 24 hrs of ventilation, as can be seen by the graphs coming to equilibrium around the horizontal axis. For coating B and D, there seems to be a considerable retention of water. Even after 10 days of perfect ventilation there is still water left in the paint film and it even seems to accumulate from the second to the third test cycle.

It is difficult to predict the exact effect of water retention in a tank coating, but one has to wonder if it will affect coating lifetime and performance, especially if the coating is exposed to a water sensitive or an easily hydrolysable cargo.

Looking at the difference between fresh water (Figure 1) and seawater (Figure 2), all coatings absorb a higher amount of fresh water. In other words, fresh water penetrates more easily into the coatings film than does seawater. This could be a good reason to choose fresh water over seawater when cleaning coated cargo tanks.

Literature:

(1) Sax, N. I.; Lewis, R. J. L. *Sr. Hawley's Condensed Chemical Dictionary, Eleventh edition*; Van Nostrand Reinhold: New York, **1987**.

(2) Duda, J. L.; Zielinski, J. M. *In Diffusion in Polymers*; Neogi, P., Ed.; Marcel Dekker: New York, **1968**.

(3) Van der Wel, G. K.; Adan, O. C. G. *Prog. Org. Coat.*, **1999**, 37, 1.

(4) Van Landingham, M. R.; Eduljee, R. F.; Gillespie, J. W. J. *Appl.Polym. Sci.*, **1999**, 71, 787.

(5) Struik, L. C. E. *Physical Aging in Amorphous Polymers and Other Materials*; Elsevier: Amsterdam, **1978**.

(6) Adamson, M. J. J. *Mater. Sci.*, **1980**, 15, 1736.

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Footnote

[1]Author can be contacted at gard.reian@jotun.no

[2]Artificial seawater was made per recipe given in ASTM D 1141.

[3]The free films of coating in this experiment were left to ventilate in a, relative to area, infinite volume of air. The desorption rate will depend on the access to 'fresh' air and so the results might be different for a more poorly ventilated storage tank.

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Monitoring and reporting

A new vessel performance monitoring and reporting software company - COACH Solutions - was formed in June of last year.

In the second part of the roundup of *Tanker Operator*'s recent Copenhagen Tanker Conference, **Mathias Nyman Rasmussen**, COACH senior performance manager outlined the software's potential to save shipowners and managers money.

He explained that the company was born out of major Danish shipowner, operator and manager, Clipper Group's fleet performance department, which started to develop vessel specific performance data software in March, 2011, culminating in the first vessel using the reporting system in November of that year.

In November, 2013, the software was marketed to external clients other than the members of the Clipper Group and by June 2016, the software was connected to 350 vessels of which around 70% were third party interests.

A month later, the company was established as a separate entity in its own right in co-operation with group of naval architects, software developers and shipowners.

The company now employs 12 people in Copenhagen and Mumbai.

Rasmussen said that many companies had developed or were developing their owns systems, which resulted in less time being spent on monitoring and analysing information at the expense of actually developing the systems.

In short, he said that the software enables vessel owners, managers, operators and other stakeholders to monitor and track the technical performance of their fleet in a uniform way by using the most efficient resources to improve fuel consumption.

COACH is a software package for both crew and shore-based staff for a vessel's voyage performance monitoring, for example as per the charterparty and an analysis of its hull, propeller and engine efficiency.

COACH's Mathias Nyman Rasmussen

Two packages

The software comes in two packages - COACH Onboard and COACH Online.

COACH Onboard is a reporting system from ship-to-shore on board, including customised vessel specific validations. It is a small application installed on board a vessel and

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collects data, which is manually entered by the crew.

The system can dynamically validate engine, speed and consumption data for each vessel and it can be customised to fit a client's needs.

The unification of noon reporting in COACH Onboard therefore decreases the work load for the vessels, which leads to higher data quality.

COACH Online is an intuitive online service for shore-based staff. This online system includes:

- Hull Performance: a systematic assessment of performance and improved process as to when hull cleaning and drydocking should take place. A 15% fuel saving will typically have a payback time of a few weeks, Rasmussen claimed.
- Speed and Consumption Tables: Updated continuously to reflect current performance and speed percentage trend.
- Auxiliary machinery: Regular statistics leads to reduced fuel consumption for electricity and heating. For example, 10% saving on a Handysize vessel more than $15.000 per year at $275 per tonne.
- Main Engine: Regular and systematic assessment can lead to fuel savings in the order of 0-2%, primarily by adjusting maximum pressure and ensure clean coolers. Annual savings for a Handysize bulker is up to $15.000 per year.

COACH Online is also a browser-based portal for all reports and analysis, including -

- Position overview and voyage summaries.
- Updated performance data available continuously.
- All reports and analysis available for all vessel groups.
- User rights controlled by COACH.

Noon reporting voyage monitoring is available in a customisable format and is available online or as a subscription. Rasmussen said that the challenge with noon reporting was the physical input needed, but COACH is able to integrate the data in a unified format into other systems.

All the data outside the validation ranges can be reported directly to operators or to technical superintendents, while the charterparty performance can be monitored daily. COACH uses two weather routeing companies, one based in Europe and the other in the US. The entire data stream can also be forwarded to other systems, for example, Veslink, SMHI, Sertica – in any format.

AIS tracked

Vessel tracking is accomplished through AIS via terrestrial and satellite systems, which is included in the packages. AIS positions are used for performance calculations for higher resolution and all the positions can be viewed on a map, together with reports and notifications. Vessel comments and notifications are also shown.

COACH offers a daily voyage monitoring service and users are notified if any values are out of its range. A summary is delivered to clients at the end of each voyage, which again is available online and as subscriptions.

As for performance monitoring, the speed percentage is expressed as a function of speed drop. The current performance is equal to the achievable speed, compared to the speed at newbuilding condition.

The software will automatically calculate a performance baseline and monthly evaluations can then be compared. The evaluations will include weather, currents, conditions and speeds.

This gives owners and operators the ability to make correct decisions regarding hull and propeller cleaning.

Rasmussen gave an example of a vessel which was due to drydock in six months and as a result, the owner had decided not to undertake a hull clean before the scheduled docking. Had the owner opted for an in-water clean, a saving of around $100,000 would have been accrued, which included the cost of the hull clean, he claimed.

He also said that a 1% speed loss roughly adds up to 3% additional fuel consumption.

Auxiliary machinery and boilers are also monitored. Each vessel's boilers and auxiliaries can be compared to identify the lowest performers and this includes all the large power consumers on board. The breakdown of the auxiliary performance for each vessel group is included on the monthly report available on COACH Online.

Also available in COACH Online is an eco speed calculator, which instantly returns the most economical speed for a voyage, and shows the relative cost for all speeds. This uses the operators' inputs for voyage distance, fuel prices, TCE, etc.

The calculator can take both newbuilding and current performance into account and is used by operators to optimise voyage instructions and thereby results.

COACH also has a supporting services function built in, such as a diesel engine service, which calculates performance for both main engines and auxiliary engines. This module uses shop trials data as a reference and also uses load dependent algorithms.

Abnormalities will be easily identified allowing the necessary steps to be taken before a potential breakdown. The module is specific for each engine on board a vessel and the reports are sent to the vessels for evaluation.

Rasmussen said that COACH gives transparent fleet performance data enabling owners, operators and managers to use best practice for improving their vessels' performance. The results can be shared within the fleet or vessel types/ classes and the low/high performers identified.

A monthly follow-up can be arranged to discuss any actions needed to improve a vessel's performance. Vessel groups can be separated into - vessel classes, operations/technical teams and technical managers, each of which can be benchmarked against one another. Each vessel is manually assessed every month.

It is often found that owners/operators do not have the required data to build ship specific models, while incorrect shop tests and sea trials are part of the game. Some vessels will also change ownership several times To combat this, a comprehensive catalogue of different ship and equipment designs are used to fine-tune the software models. The method is validated by more than 325.000 data sets and after two or three months, models are calibrated using reported data.

In summary, Rasmussen said that COACH's benefits included noon reporting where standardised and improved data quality leads to better decision making. With hull performance, systematic performance assessment and improved processes as to when hull cleaning and drydocking should take place. The speed and consumption tables are updated at all times to reflect current performance.

Eniram's viewpoint

Jan Wilhelmsson, Eniram's vice president commercial shipping, explained how proper data validation and filtering saves costs and time.

He thought that digitalisation had gone in two directions- knowing what has happened (noon report) and why did it happen. The latter starts to add value, he said.

The company had sat down with some 46 vessel operators most of which still used the noon reporting system, which has been in existence since the 1940s without much change.

The shoreside management has embraced software systems for tasks such as crew payments, etc, but he thought that on board ship, the operations were almost as they were some 100 years ago.

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Eniram's Jan Wilhelmsson

Software companies were now moving into the timeline scenario and reporting vessel operations in real time. "It is pointless reporting that the vessel was operating at the wrong speed last week," he said. "We need visibility in real time."

Not only should an operator see what's wrong but he or she should also be given advice about what could happen in the next five to six hours or six days, which will give an impact on vessel operations from a risk perspective.

Eniram has invested in a €20 mill data centre in order to deliver cryptic analytics to not only the shipowner but also to the other stakeholders, including the charterer who could be the vessel operator and paying the fuel bill.

Around 80% of bulk shipping is not controlled by the shipowner by way of investments, operations and undertaking the work involved. He thought that this was one of the reasons why digitalisation has not been taken up to any great extent.

One of the plus points of the data analysed by Eniram is that it is virtually error free as the errors are automatically identified, validated and thus 'repaired'. The software can also be connected up to any system providing third party data.

He said that the speed log was the most relevant sensor for commercial shipping but many contain errors, which need fixing by an engineer or technician.

Eniram has worked on data analytics for about 75% of the world's cruise vessels and Wilhelmsson explained that this sector was five to six years ahead of the bulk markets, although admitting that the stakes were higher, if an incident occurred.

Avatar produced

In 2013-2014, Eniram created a predictive software analysis system routeing information from the ECDIS to the company's data centre at which an avatar of the vessel was produced.

In September, 2016, Eniram, now owned by Wärtsilä, unveiled Skylight, which is a commercially driven tool operated with the help of a transponder fitted to the ship's rail. This transmits vessel data back to the data centre every five minutes.

At the centre, the analysts have access to several weather data providers, as the forecasts given can vary between suppliers.

He claimed that Skylight was cost effective to normal commercial shipping companies at around $460 per month all up. Other systems are due to be launched this year, he advised.

When asked about the expertise available to undertake the analysis, Wilhelmsson said that Eniram was constantly hiring technicians and does not wait until a position appears. The company has doubled its staff to around 140 employees in a year and recently opened an office in London.

For the cruise shipping sector, the company was constantly in discussions with vessel operators asking questions and, as a result, could start seeing patterns emerging.

He explained that Eniram's predictive services took around 12 years to evolve and now there is a hard core of customers paying the monthly fee.

Data logging

Henrik Marloth, Team Tanker International's project manager gave a glimpse of how the company was trying to monitor performance of its fleet, which he admitted was not easy given the 32 vessels were managed by four third party shipmanagers.

As project manager, Marloth is responsible for setting up technical projects, an energy performance system and conducting performance awareness training for crew within Team's fleet.

He explained that the above was undertaken in close co-operation with the three fleet managers and the small technical department within the Team's organisation in Copenhagen, plus the third party shipmanagers, which technically operate the vessels.

Team found that the noon reports were prone to errors and so the company set out to improve data quality and with it, vessel performance. Projects need to be evaluated from a solid base with which to work, Marloth explained.

Automated data logging systems were installed which had to be cross-functional, ie cater for the company's chartering, finance and operations sectors.

Three items were identified as crucial to optimising performance- hull, propeller and main engine. The hull and propeller were counted as one item and the engine performance and evaluation the second area to be looked at.

The engine performance data and logging systems (diagnostics) software was purchased from Tekomar and a new trim tool based on CFD was introduced for logging the hull systems.

With the navigational systems also connected up, trend lines could be seen taken from the logged data which was being input from the various sensors on board about every minute, which Marloth admitted was a lot of data running into the cloud-based database. However, he said; "If you cannot measure, you cannot improve."

Being employed by third party managers, the crew sometimes did not follow the monitoring and data logging as "…it might not have been as simple as it sounds on board," he said. Last year, the company introduced a one day session on board dedicated to crew awareness to try to overcome this problem.

He stressed that he didn't want the seafarers to become slaves to time as to when data logging takes place, as the database could be changed to reflect this in the company's operations department.

Simple things, such as inputting the incorrect draft when laden or in ballast will affect the operator's view of the vessel's performance, he said, notably the fuel consumption. The operator also needs to know whether the vessel is alongside loading/discharging cargo or tank cleaning and also fuel changes as a result of sailing in an ECA. The three most important components for optimising vessel operations were - draft, speed through the water and power, he said.

"If I don't get the crew on board to take the initiative, I don't get the savings," he said, adding that they can be an operator's right arm.

For power, the base line reference model is taken from the testbed trials and one vessel can be compared with another of the same class. As for the generators, the time of two or more running in parallel can be reduced, as running extra auxiliaries adds to the fuel consumption and maintenance. When loading or discharging, the use of two generators is normal but while a vessel is at sea, only one operating is necessary.

The data input and the automated data logging process is being aligned with ISO 19030, which outlines general principles for the measurement of changes in hull and propeller performance and defines a set of performance indicators for hull and propeller maintenance, repair and retrofit activities.


Henrik Marloth

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