TANKEROperator

JUNE / JULY 2018

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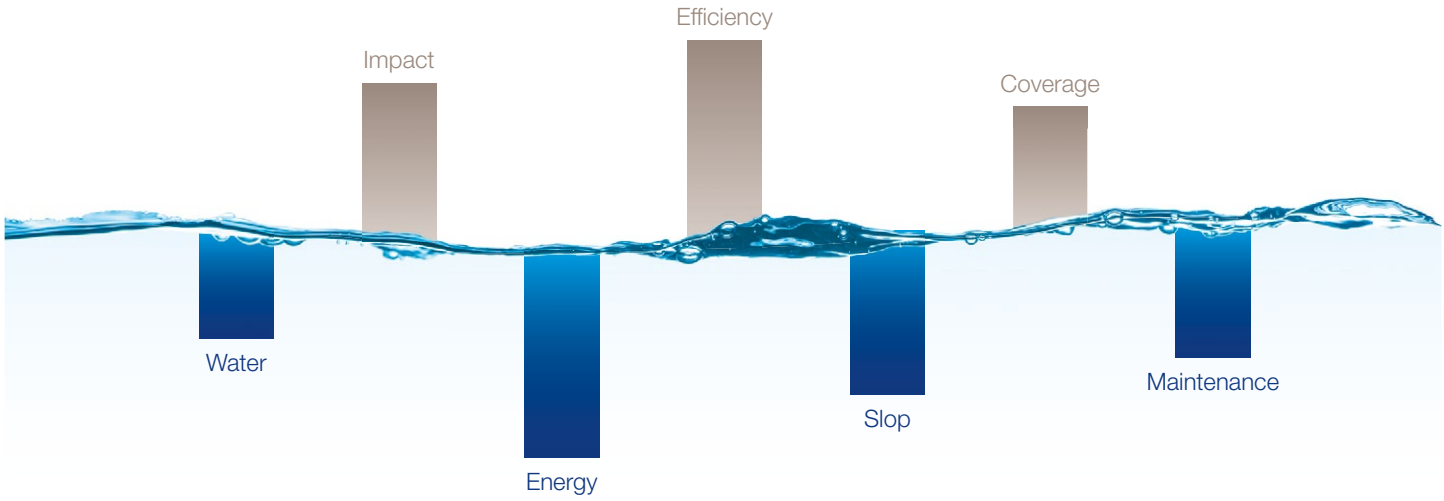


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*Alfa Laval's automated Gunclean Toftejorg tank cleaning solutions represent over 50 years of development.*

*With a helical or criss-cross spray pattern that reaches the whole tank in a fraction of the traditional cleaning time, the cleaning solutions eliminate both hassle and expense.*

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# Keeping the faith

**The tanker market has certainly had enough to contend with in recent weeks on the supply and demand side, including a situation where earnings levels are well below daily running costs in most sectors.**

Problems in Libya, Nigeria, Venezuela and in other exporting countries, have resulted in crude oil importers sourcing their barrels from elsewhere. All was not lost, however, as some have switched to US oil and if China enters the equation, this move considerably increases tonne/miles.

Recently, the number of vessels awaiting cargoes has declined, but by and large, rates have not reflected this by firming, except possibly in the Suezmax sector where cargoes can fluctuate between Aframax and Suezmax in size, especially out of the Black Sea.

However, recent events in Libya where two key loading terminals were closed by fighting will no doubt hit the Suezmax market, as Libya is a great source of crude to the major Mediterranean importing countries, such as Italy.

Of course the US loading ports are severely draught restricted, except for the LOOP offshore terminal, which can now load VLCCs, as well as discharge them.

However, we have recently seen a couple of VLCCs enter two US Gulf ports to load but they will have to be topped up offshore to lift a 2 mill barrel cargo on a 20 m plus draught.

The Venezuelan situation has severely hit the Caribbean crude storage and refining islands, such as Aruba, Curacao and Bonaire, which are able to handle VLCCs. In addition, US-based PDVSA refining subsidiary Citgo has seen its imports cut and therefore product exports curtailed somewhat.

November sees the imposition of US sanctions being re-introduced on Iran, unless there is a 'U' turn by the Trump administration. This will affect brokers, traders, owners, operators and everyone else in the tanker sector, as at some stage, a US concern will be involved in the chain, either directly or indirectly, for example, in finance, re-insurance, etc.

On the demand side, most eyes are on India and China. India imports much of its crude oil from Iran and other Gulf states on short haul voyages. China is a different matter and virtually drives the long haul trades on its own.

## 'Teaport' troubles

A recent report from Gibson Shipbrokers said that the future of the Chinese 'teaport' refineries was up in the air.

This year, as part of its aim to tackle environmental issues, the Chinese Government has announced even tighter regulations and taxation on the independent refiners and blenders ('teaports') in an effort to weed out small operations and deal with tax evading players.

Outright closure of refineries with capacities under 2 mill tonnes per annum would be implemented should the independents fail to meet the new guidelines. In March, it was announced that the 'teapots' were getting ready to start buying ethanol to blend with fuel to meet the government's regulation that by 2020, gasoline must contain 10% ethanol, Gibson said. China's largest independent refiner Dongming Petrochemical has gained permission to start ethanol blending.

However, trouble could be brewing for China's independents from several directions. The Beijing government has introduced new tax rules and shrinking diesel demand coupled with higher crude prices are beginning to threaten the 'teapots' survival and profits are being pressed for the first time since their meteoric rise.

## Trade war

In addition, the independents will also be caught up in the crossfire of the trade tariff war between the US and China. According to Reuters, the 'teapots' are losing money and market share, several have already shut for maintenance to cut exposure to the market, and some may close for good, Gibson concluded.

And then there is OPEC and its allies to contend with. At the 22nd-23rd June meetings, it was agreed to raise production by around 800,000 to 1 mill barrels per day, however you interpret it - about one extra Aframax a day in simplistic terms.

Russia plans to increase its output by 200,000 barrels per day, according to the Russian Oil Minister talking with CNBC. He also revealed that OPEC and non-OPEC countries were already planning an oil production deal for next year.

The US, China and India had urged OPEC to release more supply to prevent an oil deficit that would hurt the global economy. OPEC said in a statement following the meeting that it would go back to 100% compliance with previously agreed output cuts but gave no concrete figures, Reuters said.

Following a review of the deal scheduled for September, the next formal OPEC meeting was set for 3rd December.

I think the message here is - 'keep the faith' at least for this year.

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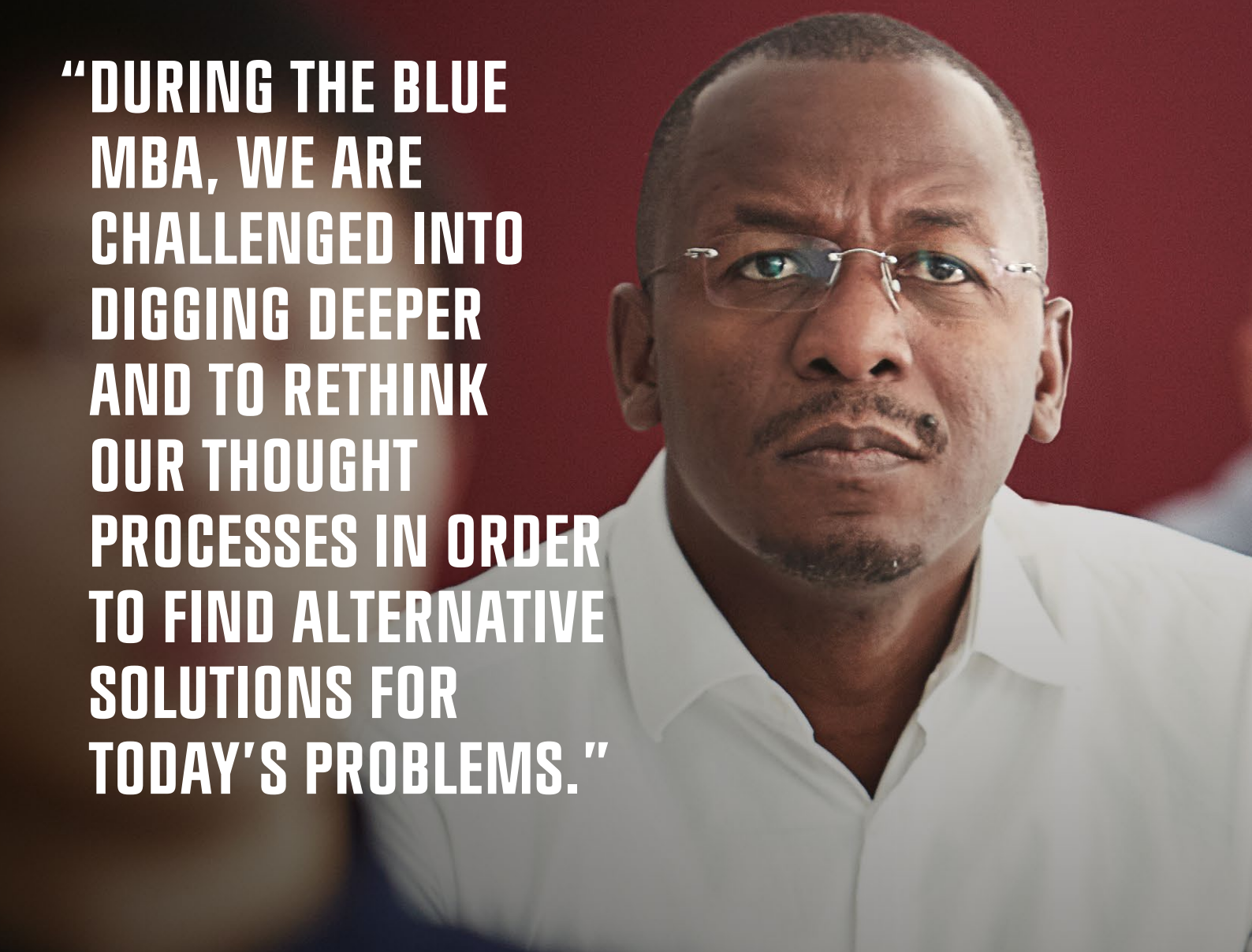

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# Tankers face an uncertain future

**Just when you thought it could not get any worse for the tanker shipping industry, the US is re-imposing sanctions on Iran, which will come into force after the six months wind-down period ends on 4th November, 2018.**

The immediate effects are less tangible but will surely add more uncertainty to the whole shipping industry that has plenty of uncertainty to deal with already, BIMCO's Peter Sand said in his recent markets roundup.

Freight rates for both crude oil tankers and product tankers are mostly in loss making territory. Hardest hit are the larger crude oil tankers. For example, on 25th May, average earnings for VLCCs, Suezmaxes and Aframaxes stood at $4,238; $18,073 and $17,930 per day, respectively.

In the product tanker sector, average earnings were almost as bad, ranging from $10,561 per day for an LR2, $6,500 per day for an LR1 to $9,121 per day for an MR.

In the International Energy Agency (IEA) April Oil Market Report, the agency queried whether OPEC could claim 'mission accomplished' shortly, on rebalancing the global oil market after several years of supply being significantly higher than demand.

BIMCO believed that the oil market still has some way to go before being balanced. Global oil stocks appeared to be significantly above a 'reasonable' target (same stocks/consumption ratio as before the building up of stocks).

The tanker industry will enjoy a noteworthy higher level of demand when global oil stocks are drawn further down, Sand said. Moreover, a better oil market balance may also cause a return to an oil price contango, which is likely to indicate an increased demand for tankers for floating storage.

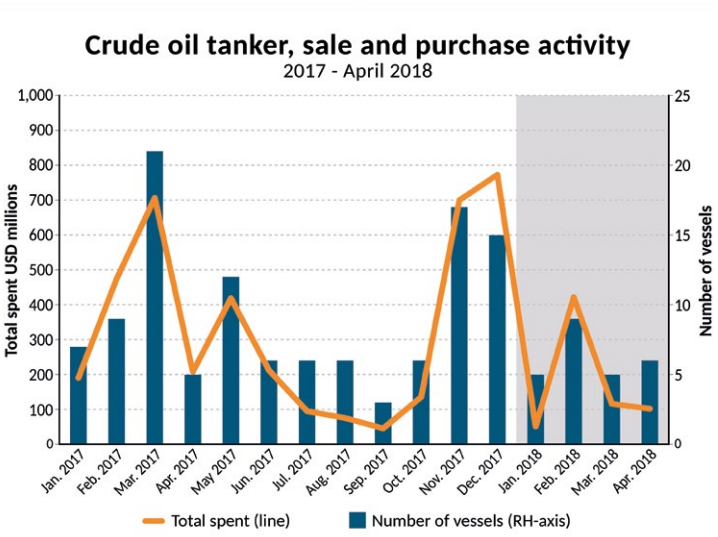
## Supply

March 2018 was the busiest month for crude oil tanker demolition, specifically for VLCCs, since 2003, with 10 units sold for demolition. Such high activity also led to a lack of growth during the first four and a half months of 2018.

Even though demolition of product tankers was high – as 1.1 mill dwt left the fleet - this sector still grew by 0.9% from January through April.

Whereas today demolition is affecting the freight market balance, ordering of new ships represents an omen of what is to come. Currently, it seems that owners and investors who are starving in the freight market have little appetite for ordering new ships for future delivery.

Crude oil tanker ordering is up by just 6% to 6.6 mill dwt (including 20 VLCCs) during the first four months of 2018 from a year ago, whereas product tankers are down by 33% to just 1.4 mill dwt from 2017.

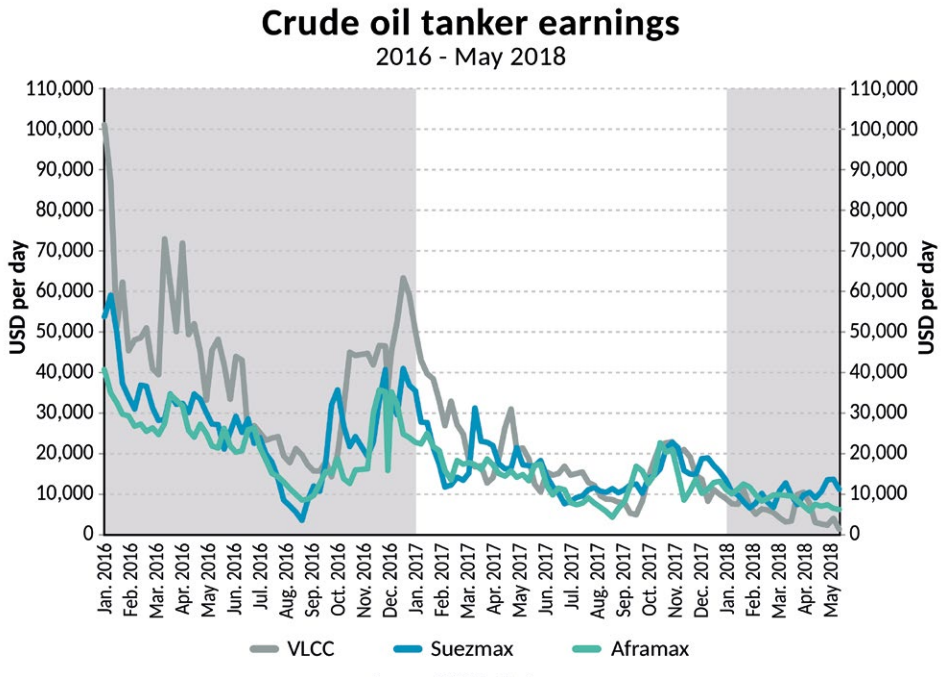



*Source: BIMCO, VesselValue*

Owners and investors have also cooled their interest in secondhand tonnage, with an average of only six ships changing ownership a month this year. This is 50% down on the 2017-average monthly S&P business.

The current freight market conditions has also meant that less money was spent, even though asset prices have moved up since the low levels of 2017.

Sand said that BIMCO had revised its previous estimate for crude oil tanker demolition upwards, from 9 mill dwt to 13 mill dwt for this




*Source: BIMCO, Clarksons*

year. The immediate effect is that the estimated fleet growth for 2018 comes down to 2% from 2.7%. During the first four months of 2018, 8.5 mill dwt of crude oil tanker capacity was demolished.

This year is one of prime focus for the crude oil tanker sector with fleet growth below 2% particularly, if 2019 turns out as forecast with fleet growth above 3%, due to a lower demolition figure than seen this year. In an average crude oil tanker market, the fundamental conditions only improve if fleet growth is less than 2%, Sand warned.

Amongst product tanker companies, patience is paramount. The fleet is growing slowly but earnings aren't improving. Quite a few new orders surfaced in November and December, 2017, but interest has cooled somewhat since then.

Staying away from the shipyards is essential for reaping the benefit that two years of tepid fleet growth (2018/2019 at 2.8% and 2.6%, respectively) could bring in the form of higher freight rates.

### Outlook

Global oil stocks level, not only OECD oil stocks, remains the only factor to watch out for. It is also the one factor where hard data is available. Nevertheless, indirect measures point to stockpiles still being too high for normal tanker demand to resume.

This year thus far has seen such a narrow focus on VLCC ordering that the obvious question is - how much is too much? The developments in shipping in general and within the oil tanker sector in particular are focused on the larger ship sizes, but it remains important not to prepare too far in advance for what is forecast to come.

The better earnings that should come out of a stronger demand scenario, may end up disappointing, if there is large overcapacity, Sand said

Another problem - the sanctions against Iran have already had an impact on trade. But will we be able to single out the effect of US sanctions against Iran, when they kick in? The answer is - probably not to their full extent - as tankers are impacted by so many other factors – some more problematic.

For example, the ongoing crisis in Venezuela and Libya has limited oil production in those countries. Imagine if that situation was reversed? The world would then be awash with oil, something which is likely to keep the oil price in backwardation - a situation where the spot price of oil is higher than the expected future price of oil.

In addition, more pipelines are being built worldwide, and they are all equally critical to tankers – as they take seaborne demand away. Amongst the newer pipelines are the Sino-Myanmar pipeline to Kunming, the second Sino-Russian pipeline to Daqing and the East-West Petroline from Arabian Gulf to Yanbu in the Red Sea.

Another trend to keep an eye out for is to what extent will Europe keep its high products imports. In recent years, in particular we have seen Middle East refineries built for exports, with more to come online in the next couple of years.

But will those refineries end up producing for domestic purposes? Sand asked in conclusion.

### Newbuildings

Remaining on much the same theme, Gibson Shipbrokers said that much attention had been given in recent months to continued activity in VLCC newbuildings.

However, what has gone largely unreported is the fact that ordering activity has been completely different in the other tanker segments, starting from Suezmaxes down to MRs.

Most notably, investment in new tonnage has been minimal in the LR1/Panamax size group. Just four tankers have been ordered thus far in 2018 (to the end of May), while ordering was also very limited over the previous two years. Without doubt, the lack of investment interest was driven by poor performance in this segment.

In recent years, LR1s have also faced an additional challenge in terms of the increased competition from both smaller and larger product carriers, frequently reporting lower earnings compared to other sizes.

Not surprisingly, owners have showed preference for smaller MRs or bigger LR2s when ordering a new tanker. With the exception of Handysize tankers, as at the end of May, LR1/Panamaxes have the smallest orderbook, at 7% relative to the existing fleet.

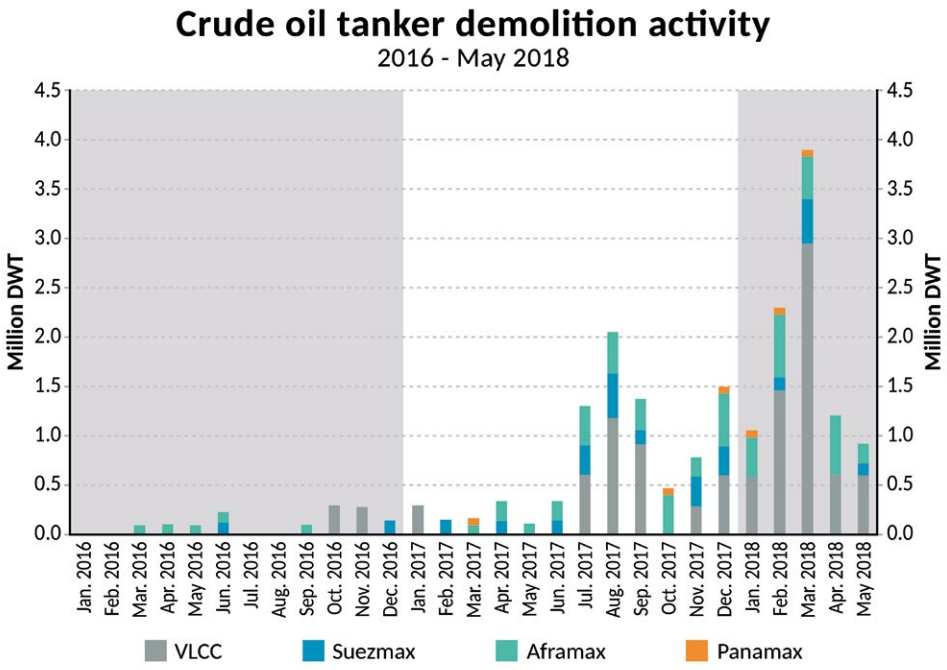
The Suezmax orderbook has also become notably smaller. Only two firm tanker orders, plus four shuttle tankers, have been placed thus far this year, while investment in this sector was also sparse in 2016 and 2017.

As a result, the Suezmax orderbook has now fallen below 9%, relative to the existing size of the fleet, nearly three time smaller than than the position two years ago.

The MR orderbook stands close to 10% thus far this year with just 26 confirmed orders, compared to over 70 last year. It is also worth pointing out that the Handysize orderbook is almost non-existent, numbering just three tankers yet to be delivered.

However, this is largely a reflection of owners' preference for the larger MR size range when ordering new tonnage.

Finally, LR2/Aframaxes have the second largest orderbook of all size groups, largely as a result of robust investment in 2017. Yet, this has also slowed this year, with 12 confirmed orders year-to-date.




*Source: BIMCO, VesselValue*

As such, the orderbook remains notably below that of VLCCs, as just under 12% of the LR2/Aframax fleet is on order versus 16% in the VLCC segment.

The above developments indicate that the growth in fleet size for most size categories could slow down notably next year, particularly if the demolition market remains active.

Scheduled deliveries for Suezmaxes, LR2/Aframaxes and LR1/Panamaxes are expected to fall in 2019 to their lowest level since 2015. The number of scheduled deliveries in the MR segment in 2019 is on par with this year's level, yet still notably below the number of new deliveries seen between 2014 and 2016.

This paints a much healthier picture in terms of fleet growth going forward.

However, in order to see a much-needed rebound in tanker earnings, the current trend of robust ordering in the VLCC segment should not be repeated in other tanker classes, Gibson warned.

In another move, in order to tackle environmental issues, the Chinese government announced even tighter regulations and taxation on the independent refiners and blenders (teapots) in an effort to weed out small operators and deal with tax evading players.

Outright closure of refineries with capacities under 2 mill tonnes per annum would be implemented should the independents fail to meet the new guidelines. In March, it was announced that the teapots were to start buying ethanol to blend with fuel to meet the government's regulation that by 2020, gasoline must contain 10% ethanol.

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However, trouble could be brewing for China's independents from several directions. The Beijing government has introduced new tax rules and shrinking diesel demand coupled with higher crude prices are beginning to threaten their survival and profits are being pressed for the first time since their meteoric rise.

(see page 2).

# Cautious optimism is the message coming out of Norway

**Norway, who for the last couple of years has ranked in sixth place among the world's shipowning nations, has recently moved up to number five behind Japan, Greece, China and the US.**

The offshore segment has the highest value in the Norwegian fleet. Only the US has a larger offshore fleet in terms of value than Norway. Estimates for 2018 show a slight increase in the value of the world fleet in total, which also applies to the Norwegian fleet.

Norwegian-controlled foreign-going fleet has seen a steady growth both in number of ships and by tonnage for the last couple of years, and now stands at 1,771 ships. This represented a growth of 3% in number of ships, and as much as 6% in deadweight tonnage.

The Norwegian International Ship Register (NIS) has also seen a growth in recent years and by March 2018 numbered over 610 ships.

The Norwegian-controlled foreign-going fleet's composition showed that offshore service ships make up the largest segment, measured by the number of ships.

At the end of January, 600 ships were registered in NIS, the highest number since 2008.

Up until 2015, the ship register had been declining in numbers. For example, in 2014, there were 522 ships in the NIS.

In the maritime strategy programme, the Norwegian Government presented several measures to try to reverse the negative trend. Among these, the trade area restrictions for NIS-registered ships was relaxed and the grant scheme for the employment of Norwegian seafarers was strengthened.

Some 54 of the ships, which have been transferred to NIS since 1st January, 2016 can be directly linked to the trade area changes, the authority said.

"This is good news for the entire maritime industry in Norway, and with increased tonnage we also have more influence in international maritime forums. A growing fleet may also provide opportunities for Norwegian seafarers," said Director General of Shipping and Navigation, Olav Akselsen earlier this year.

The gross tonnage of the NIS-registered fleet is now over 15 mill, which is an increase of 14.3% since 2014.

Norway has two ship registers: the Norwegian Ordinary Ship Register (NOR) and the Norwegian International Ship Register (NIS).

- The NIS was established in 1987 in order to ensure a competitive alternative for Norwegian companies in worldwide trade.
- Based on most of the Trade Limitation Committee's recommendations and as a follow-up of the Government's maritime strategy, the trade area provisions for ships in the NIS were amended in 2016. NIS-registered ships may now carry cargo between Norwegian ports, as part of a European route, and NIS-registered construction vessels may operate on the Norwegian continental shelf.
- The amendments to the trade area provisions for NIS-registered ferries engaged on foreign voyages were temporarily postponed awaiting a case decision from the EFTA Surveillance Authority (ESA). In November, 2017, ESA concluded that the trade area restrictions in the NIS are not in contravention of the EEA Agreement.
- The number of ships in the NOR is around the same as 10 years ago.

Meanwhile, the Norwegian Shipowners' Association (NSA) annual outlook survey indicated guarded optimism with regard to revenue and profitability in 2018.

Half of the NSA's members anticipated increased turnover in 2018. For the offshore segments, survey results showed that peak layup had likely been reached.

"We see positive trends in the market going forward. At the same time we expect that 2018 will be a demanding year for our members with offshore oil and gas activities. Higher rates and increased activity are needed to ensure sustainable profitability in this value chain," said Norwegian Shipowners' Association (NSA) CEO, Harald Solberg.

**Tankers registered in Norway as at 8th February 2018**

| NOR | No | GT |
|---|---|---|
| Oil | 15 | 160,000 |
| Chemical | 2 | 2,100 |
| **NIS (Norwegian owned)** | | |
| OIl | 47 | 2,87 mill |
| Chemical | 57 | 1,1 mill |
| **NIS (Foreign owned)** | | |
| Oil | 17 | 600,000 |
| Chemical | 27 | 530,000 |

*Source: NIS/NOR*

The transport segments have gradually increased their turnover since the financial crisis struck the industry in 2008, and have now returned to levels seen prior to the financial crisis.

However, the offshore segments have faced extremely demanding times since the price of oil dropped in 2014, and saw their turnover cut by half over the last three years. Some improvement was expected in rig markets, but offshore service companies anticipated that turnover will decline further in 2018.

In general, all segments forecast somewhat higher activity levels and improved profitability. More than half the companies surveyed by the NSA expected better operating results in 2018 compared with 2017, twice as many as in last year's survey. Only 23% expected results to be weaker this year than last, down by half from one year ago.

All four member segments expressed increased optimism for improved profitability.

**NSA CEO Harald Solberg**

Deepsea shipowners were the most optimistic NSA members. Nearly eight out of 10 deepsea shipping companies expected improved operating results.

At the same time, it was noted that the offshore segments were still facing extremely demanding conditions, with low asset utilisation, high lay up levels, low rates and short time horizons on contracts.

"It is important to remember that a large percentage of those shipowners now anticipating improved operating results in 2018 are coming off very low levels in 2017, and this does not necessarily mean that a company is turning a profit," Solberg pointed out.

## Peak layup reached

The survey showed that peak layup was reached in 2017, when 183 ships and rigs were laid up. The corresponding figure for February 2018 was 162, a decrease of nearly 12%. However, it is worth noting that the number of rigs in layup was stable at 25 during the same period.

The number of ships and rigs in layup is expected to fall to 110 in 2018, a reduction of 44 ships and eight rigs.

"The change in layup figures is due to a combination of increased activity on the Norwegian Continental Shelf, increased ship recycling, and ship sales. If the forecast proves accurate, we will see a layup situation at the end of 2018 similar to that of autumn 2016 – two years after the price of oil dropped in 2014," Solberg said.

Last year proved to be yet another where shipowners were forced to reduce their number of employees. During the past year, companies had to place on leave or terminate 3,100 employees. At the same time, 2,800 people were hired by shipowners in 2017, half of those by rig companies. This meant that shipowners reduced staff by a total of 300 people in 2017.

Staff cuts were fairly evenly distributed between seafarers, rig workers and onshore employees. Almost all cuts took place in offshore service and rig companies.

All segments expected increased employment this year. Collectively, shipowners expected growth in employment of around 1,700 staff. The deepsea segment had the highest expectation for employment growth.

"Shipping and the maritime industries are in transition, and we need new competencies and bright minds from a broad range of professions that can contribute to development and restructuring," Solberg said.

Only 22% regarded access to capital as good, but the number considering the capital market as tight is down from 60% to 39%.

"Overall, we have to go back to 2015 to find a more positive assessment of the capital market. However, this varies considerably between segments. While the transport segments are more likely to experience capital access as good, offshore segments still perceive access to capital as tight," Solberg explained.

Stability and competitive framework terms and conditions were highlighted as the most important when shipping companies were asked to name factors critical to owning and operating in and from Norway.

The wealth tax, tonnage tax and tax refund schemes for seafarers were deemed the most important prerequisites for shipping companies to conduct business from Norway.

## New CEO

Solberg was appointed the new NSA CEO on 1st January, 2018.

"It is important for me to work with our members and all other actors in the maritime cluster to ensure that the maritime industry in Norway is overcoming difficult times.

"Norwegian shipping companies and the maritime industry are a key part of the solution to the opportunities and challenges ahead. Shipping represents a very important part of Norwegian business life that creates jobs and great values throughout the coast, while operating in tough global competition.

"The shipping companies make up a strong driving force in this cluster. In the years to come, the resources in the ocean will be a key contribution to addressing some of the major challenges in the world related to energy, food production and transportation of goods in an environmentally friendly way.

"The framework conditions for the industry will be crucial to ensure good and healthy competitive power," he said at the time of taking office.

From 2014 to 2016, Solberg was director of national and international politics and deputy CEO at the NSA, and last year he was employed at the Royal Secretariat at the Royal House of Norway.

His predecessor, Sturla Henriksen was appointed Special Advisor to the United Nations Global Compact. In this role, Henriksen will support the efforts of the UN to strengthen international co-operation between business and governments, and promote sustainable development of the world's oceans.

"The oceans are our greatest and most important common resource, and they are of critical importance in reaching the UN's declared goals of global sustainable growth and increased prosperity. The future of the oceans is a shared global responsibility, and businesses must be actively and accountably involved in these processes. I am very pleased to have been asked to contribute to this effort,

**Sturla Henriksen has moved to the UN**

"I also believe that Norway can make a significant contribution to this effort. We are one of the world's leading maritime nations, with extensive competence in shipping, offshore energy, fisheries, bio-prospecting, Arctic operations, and resource management. This knowledge and experience is highly valuable for international cooperation," he said.

The United Nations Global Compact, is the world's largest corporate sustainability initiative with more than 13,500 signatories from 170 countries that have committed to aligning strategies and operations with universal principles on human rights, labour, environment and anti-corruption, and taking actions that advance societal goals.

# Odfjell talks a good game

**In a wide ranging presentation at the beginning of this month, covering the markets, financials and vessel operations, Odfjell painted a positive long term picture for the chemical tanker industry sector.**

The chemical tanker and terminal operator aims to increase its fleet to 102 vessels by 2020 on the completion of the company's expansion and fleet renewal programme from the 84 operated at the end of the first quarter of this year.

Odfjell head Kristian Morch said that the company intends to achieve 10% growth per annum over time. He said that the tanker division will benefit from scale advantages and that customers will receive a better service in terms of cost efficiency and predictability by making efficiency gains internally and with unit costs.

One example given was of daily vessel operating costs, which have come down from an average of $9,841 per day in 2014 to $7,600 per day in the first quarter of this year.

All of the vessels are either owned, timechartered-in or commercially managed. As of 1Q18, 18 vessels were timechartered in. Four have been redelivered to their owners to be replaced by two newbuildings and three were under commercial management from Sinochem before they start a bareboat charter with Odfjell.

Going forward, the company will be in a position to replace part of the timechartered fleet with efficient newbuildings or be able to renew the chartered vessels at attractive rates, if the market fails to recover. Morch explained that the timechartered fleet gave the company important flexibility to reduce its exposure if a loss making stainless steel market continues.

Odfjell's policy for its terminal division, is to operate the terminals in an ideal location, preferably where synergies with the tanker fleet are possible.

To develop a world class organisation, Odfjell is undertaken internal leadership development, training, and is encouraging a KPI driven performance culture.

Digitalisation is at the core of vessel operations with real-time connected vessels, advanced analytics resulting in data driven decision making tools.

The company is managing to obtain a 32% unit cost improvement with its new so called 'super-segregators' . For example, bunker consumption has dropped to 24 tonnes per day, compared to 28 tonnes per day for the older 'super-segregators' and the cargo space has risen to 54,600 cu m, compared to 40,000 cu m per ship.

## Technology trials

New technology is to be trialled on board two vessels to gain experience and to prove the benefits before the technology is rolled out across the fleet. This includes installing 4G communications, a Master's dashboard, the advanced use of sensor technology, drones and new communications services.

Real-time access to cargo, fuel, engine and navigational data will also be possible during the trials to provide the foundation for 'big data' analytics and onshore analyses. This could lead to the elimination of reports The analyses can take in 4,000 data points in 15 seconds, Odfjell claimed.

As for the markets and their future, Odfjell said that here has been large investment undertaken in the Middle East petrochemical industry. However, China will still be the largest driver of liquid chemical shipments, due to huge demand growth, despite continuing to move closer to self-sufficiency in 2020-2021.

Chemicals currently account for around 8% of the total products tanker trade. Organic chemicals make up the largest share and has grown at around 4% per year since 2000. China and the US are the biggest producers with 45% of the volume produced. New capacity coming on stream in the US and Middle East will significantly impact on tonne/miles.

Inorganic chemicals account for 13% and are typically shipped in stainless steel tonnage. This category has grown at about 2% per anuum since 2007.

**Odfjell's Kristian Morch**

Vegoils account for 30% and production is growing at about 2% per year. Five countries - Indonesia, China, Malaysia, US and Argentina - account for more than 50% of production. Around 54% of the total vegoil exports come from Southeast Asia, while intra-regional imbalances are driving the short sea trades. Increased long term growth is forecast on the back of a wealthier population.

Other chemicals account for around 7%, which has grown by 3% per annum since 2007. Increased ethanol consumption is being seen in China.

As for the overall chemical carrier fleet, expected growth is around 1.9% per annum towards 2020. The largest growth pattern will be seen in the core fleet at about 3.6% per year. Limited fleet growth will be seen between 2018 and 2020 resulting in fundamental demand outpacing growth towards 2020. An increase in tonne/miles could also fuel further upside.

# Embracing digitalisation for maritime security

**At Singapore Maritime Week at which a seminar audience was asked to vote on the question 'Is digitalisation for real or just hype?' - 81.4% agreed that it is a very real and prevalent part of the world today.***

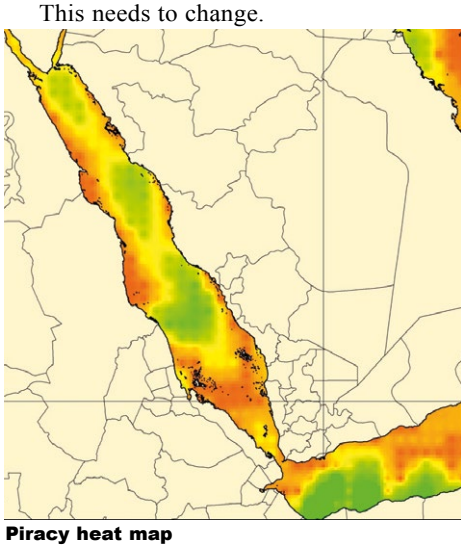
Shipowners and operators recognise the crucial need to embrace new technologies in order to drive operational efficiencies and thrive in the current competitive landscape - failure to do so may put them at an "existential" risk, according to Columbia Marlow's Mark O'Neil. However, at the same time, there is scepticism.

This may go some way to explaining why, despite the growing awareness of the potential value of digitalisation, shipping has been widely seen as slow to the adoption of new technologies as compared to other industries.

A recent smart shipping survey found that, while most maritime industry executives see digitalisation and 'big data' as a transformative force, only 8.7% currently see it as a major part of their operations.

Several potential factors, such as the lack of in-house resources or budget, could play a part. More often than not, shipowners and operators find 'big data' and digitalisation to be vague and have no tangible examples to see how this can impact their day-to-day operations in shipping, and tackle real issues with clear results.

This needs to change.



**Piracy heat map**

At StratumFive, we combine software, innovative technology and knowledge with the experience that comes from decades of seamanship to enable 'big data' and predictive analysis to be optimised for any company of any size.

Our seafaring heritage coupled with our in-depth insight into the mindset of mariners provides us with an unrivalled understanding of the day-to-day challenges that the industry faces. Building on this foundation, we equip owners and operators with the confidence to make better and informed decisions through predictive analysis and machine learning to ensure an efficient and safe voyage, while minimising the risk to ships and crew from adverse situations, such as weather or piracy.

## Heatmap

One such example is an interactive heatmap, which highlights the relative risks of piracy in different areas. This map is based on machine learning; a process that examines the relationships between factors, and works out which are the most important. After determining which cause and effect relationships are the strongest, we can then build an accurate predictive model. Aside from taking into account key factors, such as wind speed, direction, wave height, and swell direction, the day of the week also plays a vital part.

As illogical as it sounds, the piracy risk level can differ on a given day of the week. Maritime piracy has a profound impact on global trade and security. In Somalia, for example, Fridays are days of prayer.

Pirates can be generally categorised into two groups - the less experienced, 'part time' pirates and hardened 'professional' pirates. While the former group will tend to observe their holy day of prayer, the latter will venture out to sea regardless. Hence, should a pirate attack occur on a Friday, it is more likely to result in a hijacking. With this information in hand, a Master can decide when or where to accelerate through potentially risky areas, or change routes – stopping attacks before they happen.

## Voyage monitoring

This example shows how data-driven statistics, powered by machine learning, allow owners and operators to uncover trends that are not immediately obvious. This analysis and research will be further incorporated within OTIS (Online Tracking and Information System), our current voyage monitoring offering to the market, which provides key navigational intelligence. Currently servicing over 11,000 vessels, we provide highly accurate location data, with up to thousands of locations transmitted every day per vessel, achieved by combining multiple data sources.

The true potential of 'big data' and machine learning lies in predictive models, such as the example above. As the next phase in our development journey, we are leveraging the use of data we already have (and new datasets as they become available) to use machine learning techniques to build predictive models based on analytics and data from past voyages. The more datasets that are added, the more detailed and accurate its predictions will become. All this while ensuring that the platform is easy to use and access, flexible and searchable.

'Big data' is not the panacea to all of shipping's ills. However, as more examples such as this are brought into the market, the industry will realise where its true value comes through – in augmenting good seamanship and the wealth of expertise within the industry with the ability to challenge conventional wisdom and make connections between seemingly unrelated factors.

**This article was written by Ross Martin, COO, StratumFive.*

TO

# BEMA to be the voice of the BWTS sector

**Major ballast water treatment systems (BWTS) suppliers have formed an association in order to give them a greater say with regulators and other stakeholders.**

The Ballastwater Equipment Manufacturers' Association (BEMA) met in April of this year for their inaugural annual meeting and elected a board of directors to run the organisation.

The need for BEMA arose from the growing demand for well-founded information on the practicability of BWTS technologies, as well as on the technical and environmental aspects of implementing ballast water management regulations worldwide, the board said.

In the beginning, following the announcement of a further delay of the 2004 IMO Ballast Water Convention (BWMC) implementation dates, which occurred at MEPC 71, a small group of industry insiders gathered in New York City to draw up the framework of what was to become BEMA.

The association moved from concept to reality with their first official meeting on 9th March, 2018. The attendees, made up of representatives of equipment manufacturers, industry stakeholders, and component suppliers from all technologies and areas of the world, voted on and adopted a set of draft bylaws, as well as other formation documents, setting the stage for selecting a board and electing the first association officers.

This idea dates back many years. "What makes this time different," said Mark Riggio of Hyde Marine who was elected BEMA president and was a member of the initial formation committee, "is the realisation that we needed to have a unified voice in the conversation."

BEMA is now a registered trade association based in the US. Its purpose is to seek to provide co-ordinated, technical, non-commercial guidance to both the maritime industry and the regulatory agencies that are trying to understand BWTS intricacies.

Its intention is to serve as a key resource for shipowners, designers, testing equipment suppliers, and regulators to discuss openly how BWTS work and what should be the expectations of each technology operating across a world fleet.

"It has been encouraging to see how enthusiastically the equipment manufacturers have embraced the organisation," said Marcie Merksamer, BEMA secretary general. "We have had a quick and energetic response from suppliers representing all of the major technology types in the industry and from every region of the world. BEMA is truly a global enterprise."

During the initial formation meeting in London, held during the IMO's PPR5, the organisers discussed applying for non-governmental organisation (NGO) observer status at the IMO this year.

After consulting with the shipping industry and prospective members, the focus quickly turned to ensuring that the association first provides value to the industry and then revisits the effort of obtaining IMO acceptance as an NGO.

"There is a lot of value that [BEMA] can provide even before we achieve NGO status at the IMO," said Steve Candito, Ecochlor CEO, newly elected member of BEMA's board. "We have already been approached by ICS, BIMCO, and other shipowner associations to discuss the important implementation challenges. The industry wants to discuss solutions and we are ready to talk."

Representatives from Cathelco, Coldharbour, DESMI Ocean Guard, ERMA FIRST, Evoqua, Optimarin, Panasia, and Wärtsilä were also elected to the board. This ensures that the organisation has balance with regard to the technologies that are being used in the market, the different regions of the world in which the suppliers are domiciled, and the different sizes and scope.

Riggio reinforced the need for this balance, "Representing the entire market is critical if we want to be a truly impartial, technical resource for the shipping and regulatory community," he explained.

Other elected officers of the association included - Vice President ERMA FIRST'S Efi Tsolaki; Treasurer Birgir Nilsen of Optimarin; and Secretary Coldharbour's Andrew Marshall.

BEMA is scheduling meetings with numerous shipowner associations and industry trade groups to provide unbiased direction and advice to their membership about the impending retrofit period, currently scheduled to begin in September, 2019.

An Evoqua spokesperson told Tanker Operator; "We want BEMA to be an organisation providing non-commercial, technical information to the different stakeholders around the ballast water topic. We aspire BEMA to get an NGO status at IMO and help legislators better understand the technical solutions offered by the industry to overcome the problem of non-indigenous invasive species." TO

## BEMA - Key Objectives*

1) Represent and serve as a central, common voice for ballast water equipment manufacturers.

2) Provide the shipping industry with design and operational expertise to balance the directives and opinions of regulators, shipowner organisations, scientific testing networks, and environmental organisations that influence the requirements that directly impact the manufacturers as stakeholders in the ballast water treatment community.

3) Participate at the IMO level and give technical support to all stakeholders as outlined in Article 13 of the BWMC by and providing knowledge about the design, manufacture, installation, maintenance, and long-term functionality of BWTS.

4) Provide and stimulate authoritative organised research, education and information exchange within the industry and with other industries, government bodies, and interested organisations.

5) Mobilise and finance volunteer, internal staff, and external professional expertise to provide the required range of service to members.

6) To maintain a liaison to and co-operate with the governmental agencies and allied trade and professional associations throughout the world.

**BEMA has equal representation geographically and major technology types.*

# Putting a value on ballast water management

**One of the most important environmental developments in the marine sector in recent years, the Ballast Water Management Convention (BWMC) introduces new challenges for vessel owners and operators.**

The challenges are not just the cost of upgrading their systems but also in managing the overheads incurred in the water treatment process. PSM's Mark Jones looks at how digital tank gauging systems can help.

Marine bio-invasion is a growing issue, with shipping identified as a major cause in the transfer and introduction of invasive new species and dangerous pathogens across the world's oceans. With the increase in traffic and use of water as ballast in steel-hulled vessels, the problem has increased exponentially in recent years, and according to the IMO may not yet have reached its peak. *

Ballast water is an essential component of ship operations in steel hulled vessels, with large vessels requiring many thousands of cubic metres of water to maintain stability and manoeuvrability, both at sea and in port.

The load may contain thousands of aquatic or marine microbes, plants and animals, which are then transported and released across the globe, with potentially devastating effects on local marine ecosystems. Threats include for example the European Green Crab which is a carnivore that preys upon clams, mussels, oysters and gastropods, as well as out competing them for food to the spread of bacteria such as cholera and the invasive Asian Kelp.**

## Hidden price tag

The new ballast water standards will be phased in gradually. Over time, all ships in international traffic will be required to fit an approved water treatment system to minimise the uptake of organisms and to remove sediments and unnecessary discharge. In addition, ships will be required to carry a ballast water management plan and to record and report on ballast exchanges. Ships of 400 gt and above will also require appropriate certification.

However, the bill for compliance extends beyond the initial investment in treatment systems to the ongoing costs of processing the vast amounts of water involved. Water treatment systems operate at high voltage: depending on the treatment method, energy consumption can be considerable, to which the cost of additional consumables, such as chemicals, must be added.

The result is that ballast water can no longer effectively be considered as a free commodity but becomes an overhead that needs to be incorporated into already heavy operational costs. Moreover, older vessels may have limited space, restricting the power available to drive these systems, which makes it even more essential to manage their use carefully.

**Tank gauging enables the BWT process to be monitored**

## Controlling consumption

Modern tank level gauging systems can help cut costs by continuous measurement of ballast water levels to ensure that the treatment is run for only as long as required. In addition, they provide accurate data in real time to inform ship systems to comply with new recording and reporting standards, which require vessels to hold data in a ballast water record book.

Failure to product such data could lead to delays in port as well as the infringement of regulations.

The new legislation presents an opportunity to upgrade to the latest digital tank gauging systems. Although BWMS now being fitted to new ships may incorporate tank gauging equipment, where existing ships are being refitted this assumption cannot be made, with potentially up to 40,000 ships affected.

As with all new marine regulations, implicit also in the introduction of new standards is the issue of safety. Maintaining the ship's stability during ballast water exchange is paramount.

Tank level gauging systems enable the process to be monitored and the correct sequencing of tanks to be observed, with automatic start/stop and high/low alarm functions built in to prevent stresses on the hull which might lead to deformation. An equally important factor is the protection of the ship's propellers, with both outcomes having additional repair cost implications.

Ballasting a vessel is also essential during voyages to optimise its manageability and to ensure safe navigation during heavy weather conditions. The latest digital systems incorporate a range of transmitters, gauges and switches to enable balancing of the ship to compensate for weight loss due to consumption of water and fuel and to maximise fuel efficiency through control of the ship's draft and trim.

Where these tank gauging systems are part of a ship-wide system, such as PSM/Scanjet's Intelligent Tank Management System ITAMA, vessels also benefit from additional synergies to assist with satisfying these legal requirements while maximising efficiency and energy consumption. TO

** International Convention for the Control and Management of Ships' Ballast Water and Sediments (http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Control-and-Management-of-Ships'-Ballast-Water-and-Sediments-(BWM).asp)*

*** Ballast water management - the control of harmful invasive species (http://www.imo.org/en/MediaCentre/HotTopics/BWM/Pages/default.aspx)*

# BWTS design/installation methodology

**Although entering into force in September, 2017, the timeline for BWTS installations allows for another two years, a date most likely in the latter half of 2019.**

A large number of retrofits are expected to be carried out from that period onwards. Therefore, an accurate and efficient method of design and installation is crucial in order to clear the regulations in time, ClassNK said.

This is more or less a straightforward decision when it comes to newbuildings, but retrofitting can be a long and expensive process if due care is not taken.

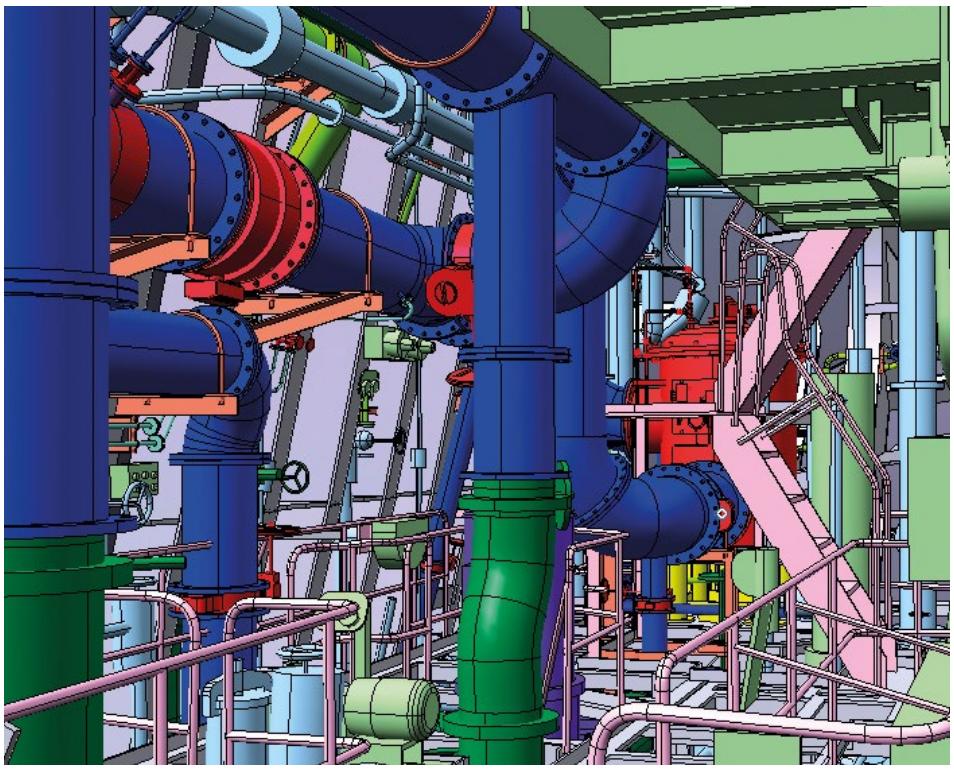
The first step in retrofitting BWTS begins with a preliminary investigation of the different systems available. The choice of BWTS must be a system already approved by the major authorities. It must also suit the vessel's operations, which means that owners will have to look into their current ballasting operations.

Based on this, owners can calculate the associated costs, such as price of equipment, running costs, and after service, once the type of BWTS has been decided upon.

Next is the design outline. Detailed meetings between the owner and designer are essential in order to ensure the design/installation plan is appropriate. After that, a rough equipment layout can be drawn up, together with a piping system plan. The required energy to power the system must also be calculated, before determining the ballast capabilities of the vessel, ClassNK stressed.

After the planning is complete, it is time to carry out an on board visit and undertake 3D scanning in the designated area. A 3D laser scanner takes point data from roughly 50-200 locations of the designated area, taking just two minutes for each scan. At this stage, the BWTS layout and distribution pipe routing are also decided, as well as confirming the electrical routing and plan for retrofitting electrics.

The next phase is creating a 3D model using the 3D CAD data taken from on board the vessel. Most conventional software takes seven to 10 days to create 3D models, however the ClassNK PEERLESS solution can build a model in one to two days. Using this system, the software package converts the information gathered into cloud point data to create highly accurate 3D models.



**3D scanning results in a quicker and more cost effective retrofit - ClassNK**

## Final stage

With the 3D model now ready, the final stage of the detailed design plan can begin. This includes the finalisation of the BWTS layout, system diagram, as well as determining any required ancillary construction, and the order, time, and cost of entire construction process.

After the technical aspects of the BWTS plan have received approval from a classification society, it is on to the manufacturing process.

The piping system must be manufactured before any equipment can be fitted on board. This is a precise process that requires a high degree of accuracy. Pipes must fit perfectly within the plan, which is why it is imperative to create a highly detailed and accurate 3D model.

Installation can only begin once piping and electrics system components have been completed, and an engineer is dispatched to help carry out the conversion of the main electrical panel and valve remote control system.

Sticking strictly to the design plan, the installation can be carried out rapidly and accurately. Failure to do so could result in delays and a longer construction time. The results of the time spent planning the design and installation process are the overall lower costs thanks to the short construction period and minimum downtime of the vessel.

While there are many steps in carrying out a detailed and accurate BWTS design/installation process, the software ultimately results in a quicker and cost effective retrofit of BWTS.

# Hesitation no longer an option

**Closing the loophole on further scheduling interpretation of IMO ballast water management system (BWMS) regulations should alert owners to their risk from a supply and yard capacity crunch, according to naval architecture and engineering consultancy Foreship.**

While the recent IMO Marine Environment Protection Committee (MEPC 72) focused on the agreement to cut greenhouse gas emissions by 50% of their 2008 levels, by 2050, it also rubber stamped the entry into force date for the BWMS code of approval agreed at MEPC 71. All systems installed on or after 28th October 2020 are subject to the new code.

Lack of agreement on the details of BWMS testing and approvals had effectively stalled BWMC's entry into force since its adoption in 2004. The delay has encouraged risk-averse shipowners to wait before making BWMS commitments.

"When agreement was reached last year for the BWMS Convention to apply to new ships from 8th September, 2017, many in the industry saw that as clarity for a regulation that had effectively been on ice for 13 years," said Olli Somerkallio, Foreship head of machinery department. "However, there was still work to be done, as some of the approvals issues that had blocked uniform entry into force were revived."

### Survey date change

For existing ships whose last International Oil Pollution Prevention (IOPP) renewal survey took place between 8th September, 2014 and 7th September, 2017, the Convention now demands treatment system installation at the next renewal survey on or after 8th September, 2017.

"Adopting the Code brings the framework for compliance," said Somerkallio. "Looked at from the budgetary point of view, it means that hesitation is no longer the smart tactic. Yard space is limited and, while the list of BWMS suppliers may be long, the number of sub-suppliers is not. Many brands draw on the same sources, and these are components that are also used for shore-based water treatment technology.

"I would say that this is the very last moment to start building a fleet-wide plan for BWMS installations and start reasonable negotiations and an orderly procurement process with the system suppliers. Hesitancy now may only result in the short supply of components later, including filters, UV systems or the cells for electro-chlorination systems."

**Foreship's Olli Somerkallio**

MEPC 72 also saw amendments to details of the IMO's guidance on scaling of BWMS and approval of Guidance for Administrations on the type approval process for the systems.

TO

# USCG up to nine type approvals

**USCG has issued up to nine full type approvals and has another 15 applications undergoing testing**

The US Coast Guard's Marine Safety Center issued its ninth Ballast Water Management System type approval certificate to BIO-UV Group, after a detailed review of the manufacturer's type approval application determined the system met the requirements of 46 CFR 162.060.

The treatment principle of the BIO-SEA B BWMS consists of filtration with UV treatment at uptake and discharge. This approval covers models with maximum treatment rated capacities between 55 cu m per hour and 1,400 cu m per hour.

Earlier, the eighth USCG BWMS Type Approval Certificate was awarded to Samsung Heavy Industries.

The treatment principle of the Samsung Purimar BWMS consists of filtration with electrolysis during uptake and neutralisation at discharge. This approval covers models with maximum treatment rated capacities between 250 cu m per hour and 10,000 cu m per hour.

Another South Korean system, Techross was the seventh but had the distinction of being the first South Korean manufacturer to receive certification.

Techross' approval covers BWTS from 150 cu m per hour to 12,000 cu m per hour capacity.

Around 15 applications for type approvals have also been received, the latest two being from Hyundai Heavy Industries (HHI) for the HiBallast system and from Headway Technology for the recently taken over OceanGuard BWTS.

TO

# Service resources will be critical

**As the deadlines for choosing a BWTS draw closer, beyond the choice of technology, supplier service capabilities are coming into focus.**

Before ballast water regulations entered into force, the discussion on the market centred largely on the differences between treatment methods. Today, however, a growing share of it focuses on the differences between suppliers.

"Service is at least as important for our choice of ballast water treatment system as the technology itself," said Per Tunell, Wallenius Marine COO. "We need to be certain that the supplier we buy from is going to be able to support us in the future."

Installations performed in the next few years are only a starting point. Given the size of the world's fleet, there will soon be a significant number of BWTS in operation. This places obligations on the system suppliers, who must be prepared for their support.

"Providing the support customers expect and require will take much more than a handful of field service engineers globally," said Carl Kesselmark, Alfa Laval PureBallast service development manager. "That makes it important to look beyond the coming wave of retrofits and consider their service future today. Our customers' reputations and revenue depend on their ability to keep their own promises, so we need to safeguard their compliance in the long term. Fines, delays and related costs are unacceptable outcomes.

**Servicing equipment will be vital**

"In the past year, we've trained even more of our 500 field service engineers to work with PureBallast, and we've added dedicated PureBallast engineers to handle individual regions," he added. "Worldwide, Alfa Laval has around 100 service engineers who can provide service for PureBallast, plus a nearly dozen-strong team in Sweden and China that supports our engineers and customers 24/7. The numbers will continue to grow, along with the already deep knowledge in our 26 sales companies."

Just as important as having service resources is making it easy for customers to take advantage of them, Kesselmark said. As a result, the company has clearly packaged its PureBallast service offering, with the result that many customers choose to sign service agreements at the time of purchase.

"The Alfa Laval 360 deg service portfolio contains a wide range of services that can keep PureBallast systems running at their best," Kesselmark explained. "But it's more convenient and economical for customers when they can choose a package that meets their needs as the basis for a service agreement. Our compliance service package, for example, includes calibration and everything needed to verify that PureBallast is functioning according to its type approval."

## Tanker interest

The number tanker owners who choose UV BWTS over electrochlorination continues to grow. Up to the middle of this year, Alfa Laval had won almost 90 system orders for its PureBallast 3.1 in the range of 1,000 cu m per hour or more.

Today's UV systems compete easily in terms of footprint and energy efficiency, even at flows of 1,000 cu m per hour or above. This adds to their long-standing operational advantages, which include a chemical-free process that poses no corrosion risk, Alfa Laval claimed.

For example, a 2,000 cu m per hour system, configured for Ex demands, will be retrofitted by European tanker management company, DS Tankers.

"PureBallast 3.1 was selected not only for its small footprint and simple installation, but also for its ease of use," said Anders Lindmark, Alfa Laval PureBallast head. "No chemicals are needed to treat the ballast water or to neutralise residuals, which means there will be no chemical handling on the part of the crews. And just as importantly, there will be no risk of corrosion in the system components or ballast water tanks. Those things make a difference for any vessel, large or small."

## Most tanker types

Talking with *Tanker Operator*, Lindmark said that Alfa Laval had sold systems for most tanker types, ranging from small chemical tankers to Suezmaxes and VLCCs.

"We see an increased interest from tanker operators in the PureBallast UV technology. Ease of installation and no need for neutralising chemicals are two main reasons for this interest together with the broad service network of Alfa Laval.

"We have also developed a standard deckhouse solution for vessels without pump rooms or with pump rooms too small to fit BWTS, which has gained a lot of interest from the tanker sector," he claimed.

He also confirmed that ever since the IMO convention was ratified in September, 2016 market activity has increased. With the clarification of the installation schedule at MEPC 71 in July, 2017, the market has clarity of the installation dates and interactions with shipowners has continued to increase based on that, including quote activity and design discussions.

Lindmark also confirmed that he had joined BEMA as a charter member when the association was formed earlier this year. TO

# Angelicoussis chooses Ecochlor BWTS for 36 vessel retrofits

## Large tankers among the vessels to be retrofitted through 2020

US-based ballast water treatment system (BWTS) manufacturer, Ecochlor has finalised a contract to retrofit 36 vessels, including Suezmaxes, Aframaxes, VLCCs, Minicapes and Capes for the Angelicoussis Shipping Group (ASGL).

Installations are expected to be undertaken between 2018 – 2020 in Singapore, Dubai, Qatar and China.

ASGL's fleet is comprised of bulk carriers, tankers and LNGCs. Maran Tankers Management (MTM) manages the tanker shipping unit and in 2001 Anangel Maritime Services (AMSI) was set up to manage the drybulk carrier fleet.

Maran Tankers Management said that choosing a BWTS with low power consumption and a minimal environmental footprint, along with providing a safe, easy-to-operate option for the crew, were critical factors in reaching this decision.

There were many things Anangel took into consideration when selecting the BWTS for the fleet. After a thorough review, the features and benefits of the Ecochlor BWTS, along with a commitment to customer service and ensuring the compliance of Anangel vessels, were important factors in the choice.

"We look forward to working with both Maran and Angangel to retrofit their fleet of vessels and continuing to support their efforts in satisfying regulatory compliance. Our BWTS are setting the standard in the ballast water treatment industry for operational performance and reliability," said Tom Perlich, Ecochlor President.

Ecochlor CEO, Steve Candito, added, "Having both IMO and USCG Type Approval were very important factors in the selection process by ASGL. Our expertise as well as the system's ease of use and reliability are critical issues to shipowners as they look for manufacturers that are absolutely committed to making sure their vessels are in compliance with BWT regulations now, and for the life of the vessel."

Over the past two years, the Ecochlor BWTS has been installed on dozens of tankers with ballast water flow rates ranging from 750 to 6,000 cu m per hour.

These installations were undertaken on product tankers, Aframaxes and Suezmaxes at shipyards in China, Croatia, Romania, Portugal and Turkey. Currently, there are two drybulk carrier newbuilding installations underway in China and four tanker retrofits scheduled over the next few months.

### Non-Ex-proof

The Maran Tankers installations will not be Ex-proof, the company explained. For Ecochlor BWTS tanker installations in a hazardous zone, the interior of the treatment deckhouse is structured to be rated as a non-hazardous space.

This is accomplished by elevating and positioning the deckhouse, among other conditions, according to regulatory requirements, the company told *Tanker Operator*.

The company explained that installations were expected between 2018 – 2020 with integration engineering supplied by Argo Navis Marine Consulting & Engineering. Engineering drawings may have been completed on the few vessels with retrofits scheduled in this year, but most of the vessel's engineering drawings will be scheduled throughout this timeframe.

Based on past retrofits of the Ecochlor system, "detail engineering, ie piping routing, orientation of filters, size and shape of the new deckhouse, are almost always unique, since no project is the same with any other unless the ships are identical," explained Andreas Zontanos, co-founder of Argo Navis Marine Consulting & Engineering.

"To minimise time before and during installation, particularly when in drydock, I will never stop saying that planning pays off. The more the owner's representatives (and project managers by default) are involved and prepare the project, in co-operation with the engineering company, the maker, the shipyard, the ship's affected systems (AMC, VRC, MSB) makers… the better prepared when the ship arrives in the shipyard," he explained.

Ecochlor has manufacturing facilities in the US and China. The generator, control panels, chemical tanks and some piping are all shipped to the shipyard. Components that are not supplied by the manufacturer are prefabricated at the shipyard, for example, a deckhouse (if required); piping; foundations for the filters and system to name a few.

As for BEMA, CEO Steve Candito was one of the founding members. Ecochlor hopes to see BEMA become a resource of information for shipowners, maritime associations and anyone in the industry seeking qualified, unbiased information concerning ballast water management systems and the regulatory requirements involved to be compliant.

Eventually BEMA would like to have a discussion platform at the IMO to represent the view of manufacturers for important decisions affecting the BWMS industry, the company explained.

### Ecochlor's current orders

| Vessel type | No | Series | Model |
|---|---|---|---|
| Capesize bulker | 3 | 200 | ES-5000-5 |
| Capesize bulker | 12 | 200 | ES-6000-5 |
| Minicapes | 5 | 200 | ES-4400-5 |
| Aframax | 2 | 200 | ET-3600-6 |
| Suezmax | 4 | 200 | ET-5000-5 |
| VLCC | 10 | 200 | ET-6000-5 |

*Source: Ecochlor*

# Why not use waste heat?

**At a meeting of IMarEST's UAE branch held towards the end of last year, Copenhagen-based Bawat introduced a patented system that represents arguably the simplest technology to treat ballast water.**

This is claimed to be a unique system that does not interrupt revenue earning cargo operations, does not need UV, filters or chemicals and optimises energy efficiency by exploiting the engine's waste heat. It also complies with the IMO D2 performance standard.

At the meeting, Klaus Andreasen, Bawat senior sales manager, claimed that this BWMS represents a breakthrough technological advance in ballast water treatment. This in-voyage system ensures zero impact on ship performance and zero disruption to cargo and ballast operations while the vessel is in port.

Bawat's BWMS is based on pasteurisation with no use of chemical compounds, UV-radiation or filters. Pasteurisation is a combination of heat and time and is a widely used process in the food industry, he explained.

Ballast water is pumped through a pasteurising unit, consisting of plate heat exchangers and a retention tank. When passing through the pasteurisation unit, the ballast water is heated and kept, while still in flow, within a retention section for up to about 75 seconds, depending of the pasteurising temperature.

The heating takes place in one or two plate heat exchangers and the heat is provided by on board surplus heat sources – eg, main engine jacket cooling water or exhaust heat economisers.

Following pasteurisation, the ballast water passes through the regeneration section, acting as a pre-heater of the incoming ballast water, and cooler for the outgoing ballast water, taking the temperature down to four to seven degrees higher than the inlet temperature.

When the ballast water has been treated in the pasteurising unit it fulfils the Ballast Water Conventions outlet criteria to both USCG and IMO's way of testing methods. No holding time or retreatment is necessary. There are no filters used in the process, neither is chemical use required.

Since the water fulfils the Ballast Water Convention's outlet criteria when treatment in the pasteurising unit is completed, it gives the opportunity to treat the water in four separate ways. Using pasteurisation for water treatment avoids the risk of toxicity to both the environment and humans.

Andreasen emphasised the economic advantages for shipowners, for example, flexibility in offering four different treatment options in the same system, and adaptable to any ship size.

## Containerised system

As an alternative quick response to fixed on board systems, Bawat has developed a containerised BWTS. This offers an onshore mobile treatment service to shipowners for water treatment at ports and terminals.

In addition, this mobile solution could be used as a backup service for ports aimed at ship's which are unable to discharge treated water. Shipyards could also see a mobile solution as an opportunity to treat ballast water from docked ships.

The mobile solution includes heat recovery, no use of consumables and with no end residue for treatment.

Andreasen explained that for tankers, X-proof was not an issue as equipment can be fitted in any location on board. The question is - how to get the heat up on deck from the engine room jacket water for example. However, as most vessels use steam, getting it on deck is not a problem if taken from the economiser.

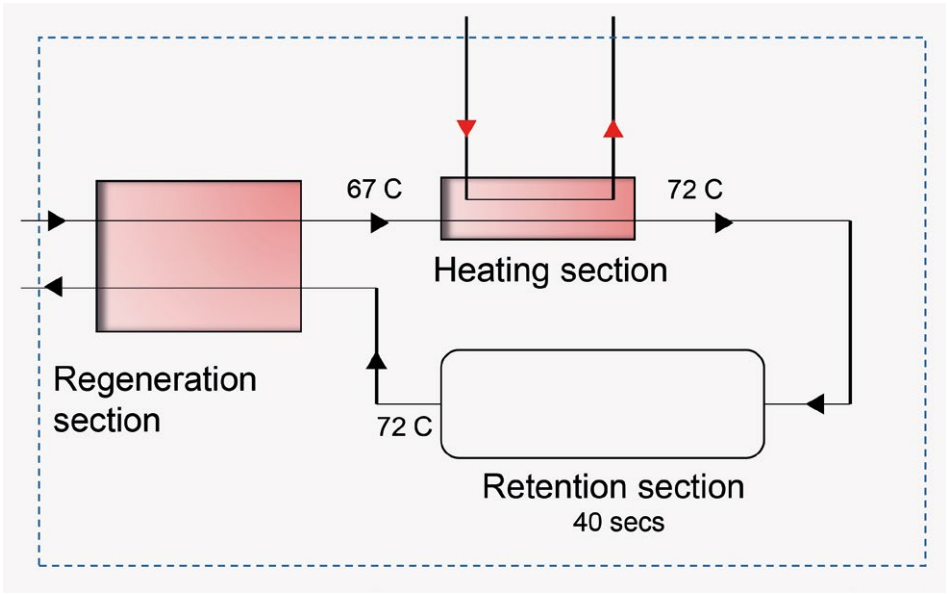
Bawat uses standard components, which can be sourced from different suppliers as necessary making Bawat independent, he claimed. The company only designs the system and only the retention tank needs manufacturing. He also explained that Bawat can supply the equipment or get sub-contractors to do the entire manufacturing process and fitting.

Although having a relatively low capacity of between 30 - 700 cu m per hour, this doesn't matter over a long tanker voyage, as the ballast water in a tank can be treated during the voyage.

He said that Bawat is going for USCG approval in the first quarter of next year and has already completed the land-based tests and is now embarking on shipboard testing using Lloyd's Register.

The company was established in 2011 and received IMO DNV GL type approval in October 2014 and from BV in May 2015. In June 2015, Bawat received an ABS certificate of design assessment was awarded USCG AMS status in February, 2015.

As at the beginning of June, Bawat had received the same amount of inquiries when compared with the whole of last year. However, Andreasen warned that in general there could be delivery bottlenecks ahead caused by other parties, such as class societies.




**Bawat's Pasteurisation technology**

# Fuel consumption and emissions abatement system launched

**FUELSAVE, a German energy efficiency start up for fuel and emissions reduction, has launched a system claimed to optimise the fuel consumption efficiency of all marine diesel engines.**

The technology, said to be proven in both in-the-field and laboratory tests, is offered with a contractually guaranteed 10% saving on overall fuel costs. The technology also significantly reduces CO2, NOx, and particulate matter (PM) emissions, through a cleaner and cooler combustion process.

Patented engine efficiency enhancement system, FS MARINE+, uses an on board hydrogen synthgas generator to inject a gas and liquid water/methanol solution into an engine's combustion chamber to significantly improve efficiency.

According to Marc Sima, the company's co-founder and President, FS MARINE+ can be applied to almost all types of 2- and 4-stroke engines. Those running on HFO, MGO or MDO benefit from the greatest efficiency gains and, consequently, the highest savings and best return on investment (RoI).

Efficiency gains were confirmed during land-based tests carried out by FTVR, the same independent test laboratory at the University of Rostock, Germany used by engine builders to assess their engines' emissions behaviour.

Even though the test engine operated only one cylinder, FS MARINE+ was shown to reduce fuel consumption by up to 11.8%, NOx by up to 36% and Filter Smoke Number (FSN) by 40%. It also reduced the engine's air intake manifold temperature by 50 deg C, without detriment to the engine's operation and performance.

DNV GL surveyor examines the system

## Pilot trials

Similar efficiency gains were achieved during pilot trials on the 4-stroke engine on board a 160 m long vessel. During the 30-month trials, overseen and verified by the shipowner, independent third parties, authorities and engine service companies, the introduction of FUELSAVE's enhancement resulted in significant reductions in fuel consumption and emissions.

Engine wear and tear was also found to have been greatly reduced, compared to other engines operating without FS MARINE+. This was due to a cleaner combustion, cleaner cylinder heads, greater cylinder lubrication efficiency and substantially fewer carbon deposits, all of which had a beneficial impact on engine maintenance.

## Smoother operation

The vessel's Chief Engineer and the engine service company also noted that FUELSAVE system led to smoother engine operation with reduced levels of engine vibration.

"Results from these trials have verified the performance of FS MARINE+," said Sima. "Through independent analysis and reports from engine service and maintenance companies, as well as from a university testing institute, we are confident in introducing the product to the maritime market.

"FS MARINE+ has the potential to reduce fuel costs and emissions considerably. This is why we offer a contractual guarantee of a 10% reduction in fuel consumption. Our pricing model provides a return on investment of just three years within a five-year standard warranty period, extendable for 15 years to further maximise the RoI," he said.

## Class approved

The technology, approved by DNV GL, can be retrofitted to any vessel, runs completely autonomously and without the need for any special training. It allows operators of older tonnage to achieve IMO Tier I and Tier II compliance and can be used on IMO Tier III engines for even greater fuel efficiencies. This is because the emissions are controlled through the exhaust after-treatment system of a Tier III compliant vessel.

The company said that it plans to roll out further systems over the next two years, by which time the company hopes FS MARINE+ will be approved by all the main marine engine builders.

"We aim to establish FS MARINE+ as the industry standard for fuel efficiency across the maritime industry, not only capable of protecting the environment but increasing the profitability of ship operators," said Sima.

FUELSAVE has already been contacted by shipyards and engine manufacturers interested in validating the technology and incorporating the FS MARINE+ solution in their engine products so that their customers can gain a competitive advantage, he claimed. TO

# Accurate portable sulfur testing is key

**The 2020 sulfur cap will be a significant issue, not just in terms of the uncertainties surrounding fuel availability and compliance, but also in terms of a positive knock-on-effect on shipping demand and the negative and inevitable higher cost of bunkers.**

With less than 18 months to go to implementation, significant questions remain around key issues, such as fuel availability, compliance options, the impact it will have on budgets and costs, among other topics. But there is one aspect of the regulation that arguably underpins all of this debate and discussion, and that is how the regulation will be enforced, as without it, the global sulfur cap could be rendered meaningless.

The lack of clarity around compliance testing and enforcement of the regulation ahead of the 1st January, 2020 deadline has raised significant questions, and many believe that the post-2020 landscape will be a picture of confusion and even commercial advantage for those who choose to ignore the rules. Indeed a recent report from consultancy Wood Mackenzie stated that one reason shipowners may not comply with the global sulfur cap is the lack of a robust enforcement mechanism from the IMO.

Some steps are being taken to address in-consistences in enforcement. The IMO's Pollution Prevention and Response (PPR) committee is working to develop guidelines that will cover shipowners' plans for implementation, verification and control issues, as well as fuel non-availability reporting. The PPR has also agreed to the proposed draft amendments to MARPOL Annex VI that will prohibit the carriage of non-compliant fuel oil.

Furthermore, China had recently submitted its proposal to IMO's MEPC 72, suggesting that the analysis of sulfur content in fuel oil should be made mandatory to avoid disputes, and that testing methods should be measured against ISO 8754 or ISO 14596 standards. More recently, the Paris MoU has agreed to issue a 'Letter of Warning' from PSC inspectors, beginning 1st January, 2019, to encourage timely compliance.

In addition, there is currently significant variance in the fines handed to shipowners. For example, in the current European ECA, some authorities have issued fines equivalent to tens of thousands of dollars, whereas the fine for violating the directive in Swedish waters can be upwards of $115,000, and a recently reported breach by a cruise vessel in France could potentially result in a $200,000 fine and a prison sentence for the Master. One thing that is clear, however is that port authorities are taking compliance seriously, as highlighted by the detention of five vessels in the European ECA in April alone.

## Accurate information

Several recent reports have stated that more than half of the shipping industry is not ready to comply. With little time remaining until the regulation enters into force, shipowners and PSC need a clear pathway to enforcement and compliance that is based on robust and accurate information. It is essential to equip both PSC and shipowners with easy access to the data they need to accurately check and prove compliance.

Traditional methods for confirming compliance have relied on paperwork, such as the Bunker Delivery Note (BDN), which significantly increases the risk of non-compliance and subsequent penalties for shipowners. Furthermore, the delay incurred by laboratory testing creates the risk that the vessel may have left port with non-compliant fuel on board.

Accurate portable sulfur testing allows PSC to ascertain compliance almost instantly, and allows shipowners the opportunity to avoid fines, plus the time, expense and operational impact of having to de-bunker non-compliant fuel in order to take on compliant fuel again.

For example, Parker Kittiwake has recently launched its portable XRF analyser, which provides an accurate indication of sulfur content through the analysis of a small fuel sample in less than three minutes, in accordance with lab standard ISO 8754.

XRF provides both shipowners and PSC with easy access to the data they need to accurately check and prove compliance on board, making the process of compliance testing efficient and cost effective for all parties. Furthermore, the portable device can also be used to measure a range of wear metals in lubricating oil, allowing operators to quickly identify potential damage in cylinder liners, bearings, piston rings, gears, stern lubes and hydraulic systems.

Robust implementation of the global sulfur cap is key to the success of the regulation, but this must be done in conjunction with supporting shipowners with compliance whilst ensuring a level playing field for the industry that will incentivise co-operation rather than deliberate non-compliance.

On board testing is the most efficient means of achieving this, both for the regulators and for shipowners, and it is ready and available today. TO

ParkerKittiwake's Larry Rumbol

**This article was written by Larry Rumbol, marine condition monitoring manager, Parker Kittiwake.*

# Tankers beginning to adopt scrubbers

**As the shipping industry continues its push to reduce emissions to air, DNV GL has announced a new class notation for exhaust gas cleaning systems (EGCS). The new notation will be published in July, 2018.**

This new notation, Emission Reduction (ER), will cover not only scrubbers for removing SOx, but also selective catalytic reduction (SCR) and exhaust gas recirculation (EGR) systems for removing NOx.

"As the 2020 IMO sulfur cap on fuel draws closer, we have been hearing more and more from shipowners and operators who are looking for guidance on the installation and approval of systems which reduce emissions to air," said Knut Ørbeck-Nilssen, DNV GL – Maritime CEO. "Therefore, we are very pleased to be able to offer the emissions reduction notation to our customers. This notation will enhance the transparency of the installation and approval process for owners, the yards, and class, and give owners the confidence to invest in these systems."

The interest in installing emission reductions systems, especially scrubbers, has risen dramatically in recent months. In May, 2018, the total number of vessels either ordered or installed with scrubbers stood at 817, a jump of nearly 300 vessels in a space of only a few months.

The class notation sets out requirements for the design and arrangement of EGCS, SCR and EGR systems, including the piping systems conveying wash water and/or treatment fluids, the exhaust arrangements and components, control, monitoring and safety systems, as well as manufacture, workmanship and testing.

The ER class notation is claimed to be a natural complement to DNV GL's Scrubber ready notation, released in 2016, which enabled shipowners to prepare newbuildings for the installation of a scrubber.

As for Wärtsilä, Jan Othman, director, exhaust treatment, Wärtsilä Marine Solutions and Aslak Suopanki, manager, environmental, Wärtsilä Services told *Tanker Operator* that the company had won many orders for the tanker segment in various size ranges.

A typical tanker setup is a single scrubber, which handles exhaust gases from all the sources to be scrubbed. Open loop systems normally fits the bill for the majority of tankers, they said.

For tankers, the main challenges are related to EX zones during installation and finding space for seawater pumps in the engine room. Other issues include managing pipe routing between the seawater pumps and engine casing, as well as installing structural reinforcements in the funnel area.

Scrubbers, like any piece of main equipment on a vessel, need regular service and Wärtsilä offers any type of service required to maintain the scrubbers during its life-time and can also offer extensive service agreements.

Wärtsilä told *Tanker Operator* that it was aiming at both the newbuilding and the retrofit markets and a strong interest had been seen in both markets thus far this year.

"In our view, the market seem to expect a rather substantial fuel spread between HFO and MGO and hence, a strong business case across vessel segments for fitting scrubbers. We have experienced that this has lead into a rush for fitting scrubbers and we expect the market to remain active within the coming years," they said.

Wärtsilä has thus far not gone down the road of manufacturing scrubbers under a license agreement or in partnership with shipyards. The company explained that it is continuously investing in developing its scrubber portfolio and has been investing extensively the last 10 years.

## Lifecycle costs

Meanwhile, LAB, part of the CNIM Group, has challenged the shipping industry to consider lifecycle costs, including the cost of repairs, maintenance, and shipyard time, as part of the analysis when selecting exhaust gas cleaning, or scrubber, technology.

While the majority of scrubbers in use today are constructed from high-end alloys there have been reports in the market of corrosion on some marine scrubber units. LAB has developed a composite scrubber - available in open, closed or hybrid format - as an alternative to its range of alloy units.

As well as removing the risk of corrosion, LAB's patented DeepBlueLAB SOx composite units can be located on deck or around the funnel area, making it easier to install and maintain. Moreover, all engines and the vessel's boiler can be linked to one scrubber unit, meaning there is less complex piping for installation.

The company told *Tanker Operator* it had not won any orders for tankers but has proposals out with tanker operators for consideration.

What's important for any ship type, including tankers, is that the scrubber manufacturer works closely with the shipowner/operator to determine the right solution for each individual vessel. A consultative, partnership-led approach is essential in ensuring that shipowners have a thorough understanding of the available choices, both in terms of material and configuration, and that this partnership continues through both design and installation but also across the lifetime of the vessel.

LAB's DeepBlueLAB solutions operate in open loop, hybrid, or closed loop mode – with open loop installations able to be adapted to closed loop, providing the opportunity to future proof vessels should regulations change. In addition, LAB supports shipowners and managers in selecting the optimum configuration of the DeepBlueLAB system by offering a comprehensive, no obligation, fit-for-purpose assessment for each vessel.

Scrubbers do not represent a single solution for the whole of the merchant fleet. However, for many shipowners, including in the tanker sector, composite scrubbers are a viable and commercially compelling option.

Factors for consideration include: the

age and type/configuration of the ship, the capacity of the fuel tanks, its trading route/patterns, what types of fuels will likely be available at the different ports and a cost-benefit analysis; and the company's access to finance.

In terms of the composite scrubber and its application to the tanker market, the key is its flexibility; there is a choice in terms of where to fit it and LAB works with the class society from the outset to identify the most suitable location. On a tanker, the scrubber is usually located around the funnel above the engine room, towards the back of the vessel, which means it's out of the way of the cargo area.

The pipework is significantly reduced and carefully channelled and the sea chest is secure and corrosion resistant.

Importantly, although LAB's technology offers customised solutions for both offline and inline configurations, the offline multi-streaming unit is far easier to install. While inline systems can only be fitted to one engine, offline multi-streaming solutions offer greater flexibility as they ensure that the scrubber can treat multiple engines, including auxiliary engines and boilers.

With one scrubber fitted on one main engine, the funnel may have to be altered to accommodate it, which greatly increases costs.

As for maintenance, there aren't any major moving parts with scrubbers, so it's mostly pumps and pipework maintenance, which ships' engineers are certainly accustomed to, LAB said. Maintenance is required every three to five years, in line with drydocking, and LAB offers an after sales service to ensure that customers are continuously supported throughout the lifecycle of the scrubber.

## Retrofit focus

LAB is aiming at the newbuilding and retrofit market, but the latter is the company's main focus, as there are so many vessels that stand to benefit from scrubber technology in line with meeting 2020 requirements.

LAB has invested in design resources and has a robust supply chain for the manufacture of the scrubbers. Time is already tight, as shipyard capacity is finite and shipowners considering scrubbers will need to make a decision soon if their vessels are to be equipped before the 2020 deadline.

Aside from the economics of the price differentiation between MGO and HSFO, vessels using scrubbers to continue to burn high sulfur fuel have a number of advantages. Industry analyst Rudy Kassinger believes that scrubbers represent a sound investment of at least five years, and allow vessels to continue with the same lube oil, as well as avoiding the potential complications with the multiple distillate blends. Long term confidence in the technology is epitomised by investment banker Goldman Sachs, which is offering to assist with financing scrubber installations.

Some of the scrubbers are manufactured by LAB and others by an approved and accredited specialist manufacturer.

For those considering scrubbers, it is important to understand the available options in terms of design and materials, and LAB is the only company that offers customers genuine choice between the traditional high-end alloy and composite material. TO

# Communication bridge - harsh realities turned towards greater safety

**On 3rd June, 1993, nine seafarers on a tanker died. A quarter of a century later a wreath was laid under the ship's bell in a London church. However, 25 years on, how far has the industry gone to prevent another 'British Trent' disaster?**

Tankers are the most volatile of vessels. Their cargo is a varied collection of fuels and gases, which share a common factor, danger. With due care they are kept under control, without it they are lethal.

But it was not the cargo that caused the BP tanker to hit international headlines; ignited, the 3,600 tonnes of unleaded petrol were the killer, but the root cause was human error. The resulting inquiry was a bit one-sided – the lawyers for the vessel which struck the 'Trent', the bulk carrier 'Western Winner', blocked all communication with the officers and crew.

The inquiry drew heavily on the eye-witness reports of pilots and circumstantial evidence to show a catalogue of mistakes, most of them down to not following procedures, with the implication that there was a lack of training.

The maritime industry is almost as old as the sea, but it lags behind 'newcomers' like the oil & gas, aerospace and the aviation industries in targeting the most common source of an incident, the human factor.

At much the same time as the 'British Trent' disaster off the coast of Belgium, Maersk Training was developing maritime skills with its first full-bridge simulator. Compared to today's sophisticated computer technology, it was a Mark I Nintendo. However, it showed the way and it lead to the most advanced block of simulators being built and commissioned at Maersk's Svendborg headquarters in Denmark.

The training centre was originally set up because of an accident on a drilling rig, then it developed maritime courses, and ever since the two industries have been leap-frogging over each other. What the drillers did, after a couple of industry shaking disasters was to realise that the key to any scenario was the human interaction.

**Maersk's Svendborg training academy**

## Interaction

The emphasis swung from generating situations on screens to watching the person pushing the buttons, seeing how they interact with colleagues and how, under pressure, they communicate in a manner free from mis-interpretation.

I too have gone through this evolution, starting life as a seafarer and now observing and coaching as a psychologist on the new Bridge Team Enhancement courses that Maersk Line intends to put 2,200 officers through. It will take up to six years to complete the programme, since the process is very instructor intensive, and the teams small.

A maritime and a human factors instructor (a psychologist) work closely together to assess each individual on maritime theoretical knowledge and applied navigation alongside human factors, such as personality and cognitive skills. Eight bridge officers are assessed in the five day programme and each leave with personal development plans. The combined focus on assessing technical and non-technical competencies is unique in the maritime domain.

On oil platforms where they have gone through a similar process, they have seen, according to one medium sized operator, a 62% reduction in incidents. Is it not time that the guys who move the oil around the globe were granted the same level of professional attainment to lessen any lurking dangers?

**This article was written by Frank Lamberg Nielsen, Senior Consultant, People Skills, Safety & Security, Maersk Training.*

# No drydocking needed thanks to afloat seal repairs

**Recently a Hydrex diver/technician teams carried out an underwater stern tube seal repair on a tanker berthed in Antwerp.**

Once the operation was approved, all the preparations were handled quickly and the lightweight equipment was mobilised almost immediately. The team was on-site and ready to start the seal replacement when the vessel arrived in Antwerp.

The operation started with a thorough underwater inspection of the stern tube seal assembly. It was revealed that a rope and a fishing net were entangled around it. Both were removed by the divers and the flexible mobdock was installed to allow for work in dry conditions. The team then removed the three damaged seals and replaced them with new ones.

Despite the vessel's location close to the Hydrex headquarters in Antwerp the company's well-stocked fast response centre nevertheless saved the owner a costly and unwelcome trip to drydock.

In another case, a Hydrex diver/technician team carried out underwater stern tube seal repairs on a 138 m LNGC during the vessel's stop in Singapore. The ship's stern tube was suffering an oil leak, making a quick on-site repair necessary.

As a result of Hydrex' many years of experience, the technical department was able to offer a repair plan to the customer very quickly.

Again, once the operation was approved, all preparations were handled swiftly and the lightweight equipment was mobilised from the fast response centre almost immediately. Within a matter of days the diver/technicians were on-site and ready to start the seal replacement.

During the operation the team removed the three damaged seals and replaced them with new ones. A technician from the seal manufacturer was present during the operation to give his approval of the repair.

Responding to another incident to a 180 m oil tanker, which had a leaking stern tube assembly, Hydrex was asked for the best possible afloat repair solution.

As the vessel could be trimmed, the company suggested replacing the damaged seals above water during the ship's stop in Flushing, instead of using one of the flexible mobdocks.

**No docking required**

Hydrex team first built a scaffolding around the stern tube seal assembly. Next they removed the rope guard, which allowed the entire area to be cleaned and an inspection to be performed. The assembly was then opened to give the OEM service engineer access to the seals.

After the seals had been replaced the assembly was closed again. Leakage tests were then successfully carried out. The Hydrex technicians repositioned and secured the rope guard. They removed the scaffolding thus concluding the operation.

This operation is a perfect example of how Hydrex uses its experience and knowhow to offer the best solution for a specific situation. Often an underwater seal replacement using the flexible mobdock technique is the only option, but in this case, trimming the vessel was more efficient, the company said.

Hydrex has developed a flexible mobdock repair method that enables the underwater replacement of all types and sizes of shaft seals. This technology has been successfully used by the company's diver/technicians for over a decade.

Damaged stern tube seals will cause an increasing amount of oil leaks or water ingress as the damage worsens. By replacing the seals when the damage is first discovered, the down time can be kept low. The ship can keep its schedule as seal repairs can be performed during cargo operations. This is done by creating a dry underwater working environment around the shaft.

Replacing seals is not always straightforward, because there can be variations in the configurations of the stern tube itself. There can also be complications with the liners, which can be worn down and show ruts.

Like all shaft seal repairs offered, these were performed in co-operation with OEMs. This allows Hydrex to provide customers with original spare parts, which guarantees the best quality material.

Hydrex usually supplies the equipment but the owner is free to supply its own OEM seals. The company claimed that it can handle all type of seals from all manufacturers. TO

# Oman sets its stall out

**Oman Drydock Company's (ODC) recently appointed CEO, Said bin Homoud Al Mawali, used this year's Posidonia, as a platform to reveal his plans for the giant shiprepair yard.**

"We are already delivering top class services to our customers, utilising our existing first-class facilities, which are now complimented by the recent investment in a new floating dock. We are always striving for the best service offering and options to our customers, and continual investment is key to delivering this." he commented.

ODC's Duqm facility has two ULCC size graving docks, five quays, with a total of 2,800 m of alongside berthage with water depths of between 9 and 10 m, and 14 jib cranes with lifting capacities of between 40 and 100 tonnes. It also has five separate workshops.

Since ODC began operations in 2011 the yard has carried out around 570 repair/conversion projects, and in response to recent market demands, the yard has managed to build up experience in carrying out both ballast water management system (BWMS) installations and scrubber retrofits.

"Our aim is to be the first choice for shipowners for shiprepair and conversion operations of commercial tonnage and naval vessels, as well as the offshore industry, not only in Oman, but the entire Middle East, and with a strong orderbook and promising year ahead, we are in an advantageous position.

But our plans do not stop there. In a strategic move to continue the evolution of our operations and given our location, facilities, skill-set and the continuous commitment to deliver excellence, we are now looking at entering the world of shipbuilding," Said said. TO

# ASRY installing BWTS on VLCCs

**Bahrain-based ASRY has signed an agreement with Arab Maritime Petroleum Transport Company (AMPTC) to install ballast water treatment systems (BWTS) on part of its fleet.**

The agreement has already seen one system installed on a VLCC, with another two to be fitted in the coming months. Negotiations are continuing to extend the agreement to include further installations throughout 2018 and 2019.

ASRY Ship Repair General Manager, Magdy Sharkawy, commented; "Like many of our customers, we have a long and trusting partnership with AMPTC, and we're happy to be chosen as their partner to optimise their fleet for the new BWTS regulations. More of our regular customers are now moving forward with their BWTS plans and we have been working closely with them from both an engineering and installation perspective to make these decisions as efficient as possible."

**A Hyundai BWTS installed by ASRY on a VLCC**

Ahmed Demerdash, AMPTC's Technical Manager, added; "ASRY was our first choice for these installations, as they have good experience with the engineering requirements, and a good network of partnerships that we can rely on. They have taken good care of our fleet for many years, and this is a continuation of that collaboration."

The AMPTC vessels will receive Hyundai BWTS, with which ASRY has a Memorandum of Understanding to be a 'preferred yard' for both BWTS and scrubber installations.

This agreement sets out a framework for preferential co-operation that includes the retrofit of BWTS and scrubbers, takes Hyundai Global Service as one of the preferred suppliers to ASRY for HHI equipment, including 2-stroke and 4-stroke engine main equipment parts and spare parts, and also all commits to joint undertaking of the required training to optimise the installation process.

At Posidonia, ASRY's New Construction and Engineering Senior Manager, Sauvir Sarkar, said; "We have installed several BWTS systems for our long-term clients already and see more negotiations taking place for the rest of the year. Our Greek clients are proving to be the most interested in moving forward in both the BWTS and scrubber retrofits."

ASRY provides a turnkey BWTS and scrubber service that includes everything from surveying, to 3D scanning, to engineering, to fabrication, to installation and can install any system from any maker, and has already installed systems from Alfa Laval and Hyundai. TO

# BASS enhances fleet management software

**BASS has launched the patented BASSnet Fleet Management Systems version 2.10.**

BASSnet 2.10 has been optimised for integrated, powerful performance on a fleetwide basis. Significant enhancements have been made to key modules. In addition, customer insight has been prioritised at every stage of the development process, the company said.

"Since BASS' inception in 1997, customers' needs and feedback have always been at the core of the development of our solutions. This latest release is another fine example of BASS' customer-centric approach in offering problem-solving solutions, with highlights being the new data privacy features and enhanced fleet management," said Per Steinar Upsaker, BASS CEO and managing director.

Highlights include new and comprehensive fleet management features that allow for fleet-wide central management of equipment data. A new 'Equipment Setup' feature allows customers to create and manage a library of machinery equipment by manufacturer and model. The function also contains standard instructions, materials and documents that can be shared across a fleet. In addition, office users can easily get an overview of how a particular equipment is used fleet-wide.

BASSnet's fleet management features are closely integrated with the maintenance & materials module, which allows for high-level planning, scheduling and execution of a chosen maintenance regime against individual vessels or the entire fleet.

This module is also fully integrated with BASSnet risk management, ensuring quality and safety while supporting the need for work permits, safe job analyses, risk assessment, and event reporting.

In addition, the BASSnet's document management module provides a powerful document management system to facilitate the 'paperless office' concept. Using this feature, customers can efficiently manage and distribute statutory and company documents across a fleet and offices, with the ability to implement a quality management system by accessing and attaching documents at each transaction level.

Seamless integration with other modules, such as projects (drydocking) and maintenance, HR manager system, procurement and financials, allows customers to monitor fleetwide projects with efficiency and transparency, BASS claimed. Also, enhancements in procurement's contract management and e-Invoice management features, in concert with the integrated projects software, provides customers with tighter control in managing budgets.

For customers looking to master vessel operations, an operations module allows comprehensive management of vessel particulars, with electronic log entry, and features the work management, rest hours and certificates. In addition, this module provides user-friendly environment management features with in-built logic to ensure vessel compliance with the EU MRV (Monitoring, Reporting, Verification) regulations for monitoring carbon emissions.

## New interface

Many parts of the BASSnet 2.10 system have also adopted the new user interface technology, Windows Presentation

Foundation. "In BASSnet 2.10, adoption of Microsoft's Windows Presentation Foundation (WPF) as a UI technology is becoming more prevalent to allow for a more modern and user-friendly experience," added Martin Bjoernebye, BASS's vice president of R&D.

BASSnet 2.10 boasts a number of other useful features to ensure fleet productivity, safety and risk management, including:

- SAFIR (safety & information reporting) ensures that quality management principles are implemented in all business processes performed in the system, with methodology based on the main principals within the revised ISO 9001 standards and ISM Code. This module includes features for event handling (accidents/incidents, etc), audits & inspections, vettings, lessons learnt, and training and drills. A powerful statistics feature additionally allows customers to enjoy in-depth analysis related to safe operations across the fleet.
- Risk Management is integrated with a number of modules (eg, BASSnet Maintenance). Various approval work flows under this module (including for work permits, risk assessment and safe job analysis) allow the customer to manage fleet-wide risk free operations.
- The third edition of the Tanker Management and Self-Assessment: A Best Practice Guide (TMSA) is available on the TMSA overview screen under reviews & improvements, with updates to reflect current legislation and emerging issues, while incorporating feedback from companies and users of previous editions of TMSA, as well as providing guidance on OCIMF's view of industry best practices. The module includes a powerful feature to review company-wide processes as part of the management cycle.
- Ports management provides all port forms required by ports worldwide to comply with port state authorities and the IMO, with auto-population of data into related forms from other BASSnet modules. This module provides port information of all worldwide ports through a Port Guide feature, while new updates are immediately available to vessels by replication.

Integration is a hallmark of the BASSnet suite of products, the company claimed, as customers can also choose to install comprehensive financial and human resource systems for their fleets:

- Financials covers all aspects of the accounting cycle (such as the general ledger, accounts payable and receivable, fixed assets and budgets), which provides value in fleet management operations, seamlessly integrating data from other modules while delivering operational efficiency.
- The HR manager system ensures efficient crew management, comprising entire processes from recruitment, planning, compliance with the STCW Code and crew matrixes, management of crew travel, training, crew budgets, as well as comprehensive payroll work flow, crew nationalities and statutory requirements. This module provides integration to external systems, such as training providers, travel agents, as well as banks for crew payments.

Significant enhancements were also made to ensure personal data protection and privacy in the 2.10, HR manager 2.10 and financials 2.10 systems. TO

# Alfa Laval addresses 2020 fuel challenges

**Alfa Laval has a unique depth of expertise in marine fuel treatment, encompassing not just fuel separators but the whole chain from bunker tank to engine.**

As on board operations change in response to fuel sulfur regulations, the company is optimising and updating its technologies to meet the new challenges.

The result will be improved engine protection and increased energy efficiency, despite more varied and less predictable fuels, the company claimed at a recent presentation.

With the global sulfur cap taking in effect in 2020, on board fuel handling will become more complicated than ever before. "There will be many options for compliance and every vessel will have to choose the route that makes most sense for their operation," explained Serdar Sengun, Global Sales Manager Marine Separation, Alfa Laval. "No matter what customers choose, it will have dramatic implications for the fuel line. But Alfa Laval is taking a complete and forward-thinking approach to fuel line optimisation."

A number of new fuels and fuel blends have already entered the market, and more are likely to appear once the global sulfur cap is in place. For many fleets, 2020 will also mean going from existing single-fuel systems to multi-fuel operations. If not managed properly, using multiple fuel oils can result in a variety of issues – especially when the fuels are unfamiliar. The problems can range from clogged fuel systems to, in the worst case, engine stoppage.

"As refineries recalibrate for lower sulfur content, we also anticipate a continued increase in the proportion of cat fines in marine fuel oils," Sengun warned. "Already, we have seen a huge rise in cat fines, which cause major problems if not separated from the fuel before it reaches the engine."

## Meeting challenges

Meeting the challenges of more varied fuels will affect the fuel line as a whole. Centrifugal separators, which are the primary defence against cat fines, will need to perform at different capacities and with new levels of efficiency. Fuel conditioning systems will need to handle fuels with more widely differing properties, using embedded automation to avoid handling mistakes and perform safe changeover within the required engine parameters. Overall, the existing synergies between fuel line equipment and the engine itself will need to be strengthened.

"Matching the separator feed to engine load is critical to achieving the highest efficiency and engine protection, as field tests have clearly shown," Sengun said. "After separation, matching the fuel to the maker's specifications is critical for the engine, its injection systems and the safety of the vessel. All of these processes have to occur smoothly and safely, no matter what fuel is used."

## Technology ready

Alfa Laval said that it was focused on ensuring technology that will reliably support customers in 2020 and beyond. As well as introducing improved touch screen control for the Alfa Laval fuel line, the company will optimise and update key equipment within it prior to the global sulfur cap. This includes Alfa Laval FlowSync, the company's solution for automatically adjusting the separator feed, as well as the Alfa Laval FCM One Oil. Launched in 2014 and already capable of advanced fuel changeover and managing up four different fuels, a new version will be released by the end of this year.

"As the market's only supplier offering solutions and expertise for the entire fuel line, we are helping customers adapt today to the changes that are coming tomorrow," Sengun claimed. "No matter how vessels decide to meet the global cap, Alfa Laval technology will bring them the protection, efficiency and performance they need." TO

# White paper addresses boilers and burners

**Alfa Laval has published a white paper that explores the impact of fuel choices for complying with MARPOL Annex VI on boiler and burner operation.**

'MARPOL Annex VI fuel strategies and their influence on combustion in boilers' sheds light on a frequently overlooked aspect of meeting today's SOx emission regulations.

To comply with MARPOL Annex VI, shipowners and operators can install a scrubber and continue using HFO, or they can work with one or more compliant fuels: LNG, MGO or low-sulfur/ultra-low-sulfur HFO.

While the boiler is generally not a part of this decision, its operation will ultimately be affected.

"Depending on the choice made, there can be many different factors to consider when it comes to boilers and burners," explained Jeroen Van Riel, Alfa Laval's Global Service Manager, Boiler Service. "There may be boiler modifications needed to perform optimally with a scrubber, or there may be issues with fuel line safety and the properties of alternative fuels. New flame characteristics, for example, may produce different results with an existing boiler configuration," he added.

The white paper examines each MARPOL Annex VI fuel strategy individually, together with its potential effects on boilers and their combustion. The paper does not argue for or against any of the strategies, but rather provides a clear and neutral overview from the perspective of steam production.

# Clarity and simplicity - concentrating on the human element

**Kicking off *Tanker Operator's* recent Athens Conference and also chairing the event, Marine Operations and Assurance Management Solutions' (MOAMS) Martin Shaw said that good businesses need good people.**

He urged the industry to focus to what people are doing right and better business will be the result, rather than spend time looking for human errors.

"Why do we create so much processes and documentation to avoid and record human error?" he asked.

Shaw then showed how the shipping industry had arrived at today's complex systems by charting the industry back to the 1960s.

He said that today, it was difficult to work out what was important on board a ship. "It is a little bit complex to say the least," he said.

ECDIS he said was the prime example of complexity leading to a spate of ECDIS driven collisions. He also sited the cases of the two US destroyers who were in a war situation lockdown at sea but managed to collide with merchant vessels, despite relying on very complex equipment to navigate by.

Complex technology is often being controlled by untrained people, he claimed.

He also said that automation may mask the development of a serious system failure, resulting in limited time for the operator to gain 'situational awareness' and react. There is also the question of a lack of practice on running systems on manual.

Other considerations are system design, control system reliability, poor integration, a lack of standardisation, limited information and training.

He explained that the IMO was still investigating human error and said it had been recognised that the human element is a complex multi-dimensional issue that affects maritime safety and marine environmental protection.

This involves the entire spectrum of human activities performed by ships' crews, shore-based management, regulatory bodies, recognised organisations, shipyards, legislators, and other relevant parties, all of whom need to co-operate to address human element issues effectively.

This basically is about everything and its all connected, he said. Quoting Scott Sagan in his work - 'The Limits of Safety', he said that things that have never happened before happen every day.

Adapting this to the shipping sector, Shaw said; "In the marine industry, things that have happened before happen every day in different ways."

Throughout his many talks and lectures, Shaw has been a champion of so called 'resilience'. 'To deal with complexity you need resilience,' is one of his major themes, explaining that a resilient shipping company will be able to adapt to changes at a corporate and operating strategy level, at an operating and commercial management level, at a resource and systems level and at the sharp end/front line operating level.

"Can your people contribute?", he asked. "Are people on board only there to make mistakes? Or are they the only thing that makes an imperfect ship and management system work?"

Focus less on the potential for error and more on their actual value. Seafarer's navigate the ship, load and discharge the cargo, operate and maintain its machinery, act as the brain that connects the ships equipment and process with the real day to day world and do so mostly without error. Decisions made at the front line, by informed staff, will have an immediate impact, he stressed.

Today there are multiple paradigms - hardware and competence, process and human error, human element, plus resilience and the human contribution. Each paradigm brings something to the table but eventually succumbs to the the law of diminishing returns or the environment.

"All things that have happened in the past lead to things in the future," he concluded.

## OCIMF workload

OCIMF's director **Capt Andrew Cassels** gave an overview of the forum's work bringing in the human element.

He first explained that after 24 years, SIRE remains a valued and necessary system to support high tanker standards. Submissions and downloads were still rising.

The average inspection frequency worked out at one every four months and 29 days. He said that the number of ship inspectors was 628 and in 2017, the number of tankers inspected had risen by 300 to 8,904, compared to 2016.

**OCIMF's Capt Andrew Cassels**

The number of SIRE reports uploaded had increased to 21,970 last year from 21,155 in 2016, while the number downloaded went up to 158,046 from 158,046 in the same period.

The 10% increase in tanker report downloads was partly explained by a general increase and a member bulk downloading reports.

In addition the number of terminals registered with MTIS rose to 681 last year from 613 signed up in 2016. OCIMF now also covers barges and offshore supply vessels, as well as tankers. Cassels also revealed that the SIRE Composite Guidelines and VIQ 3 are due for publication this year, the latter in the third quarter.

Addressing the human element, Cassels said that the human factors focus group (HFFG) will:

1) Be responsible within OCIMF to develop a strategy on how human factors are incorporated into its work.
2) Co-ordinate across OCIMF to ensure alignment, consistency and clear direction on how improvement can be influenced within the marine industry.
3) Leveraging expertise and knowledge from established human factors programmes and initiatives.
4) Consider how human factors can be brought into OCIMF's technical publications to promote a safer working environment and improved pollution performance.

5) Promoting standardisation where appropriate to reduce the potential for human error.

Turning to TMSA3, he said that it also focuses on the focuses on the human-being in -

A) Leadership: Communication of safety & environmental excellence (Element 1).
B) Competency Assessments: Ship & shore-based personnel assessments (Elements 2, 3). Review & appraisal of crew members performance, eg, leadership and communication styles, training in cross-cultural interpersonal skills.
C) Well-being of Personnel: Align with MLC (Element 3A).
D) skills and competence for tasks: Emphasis on personnel throughout (eg Element 4).
E) Navigational Audit; Competency assessment programmes to ensure that Masters and navigators maintain core skills (Elements 4, 5).
F) Company audits: Cargo, ballast, tank cleaning, bunkering and mooring operations to assess skills & proficiency of personnel, leadership and effectiveness of team and identify additional training needs (Element 6).
G) Company safety culture: Encouraging hazard identification and safety awareness through the use of behaviour based safety systems, eg unsafe act awareness programmes, stop work authority, and near miss reporting and fleet safety trainers (Element 9).
H) Security: ISPS and cyber security awareness (Element 13).

In addition, OCIMF and INTERTANKO have joined forces on two initiatives -an accident database for the centralised reporting of tanker accidents and lessons learned and competency assessment and verification scheme.

The accident database is a confidential and anonymised reporting system giving independent analysis under OCIMF and INTERTANKO governance to provide industry tanker data to allow:

1) Industry reporting.
2) Shipowner can get fleet performance analysed against the whole database.
3) Aid 'good regulation' by focusing attention where it is needed.
4) Help international associations to develop the right guidance, recommendations and best practices.

Suggested accident reporting templates are to be launched this year.

Also to be launched in 2018 is the lessons learned and competency assessment and verification initiative, which is focused on the softer human skills designed to compliment company technical competency assessment.

The sixth edition of ISGOTT is currently under review but is likely to include a 'Human Factors' chapter. "Despite ISM, ISO, PTW, etc, we are still killing people in enclosed spaces," Capt Cassels said.

In conclusion, he said that tanker performance had come a long way in the last four decades since ISGOTT was released but there was more to do. Human factors has to be the next critical aspect of tanker operations to address....but it's a huge subject, he said.

He stressed that OCIMF will look at human factor elements that can be introduced into its library of publications to help the industry take the next step forward to further improve tanker performance.

## Clarity is key

**Theophanis Theophanous**, managing director, Bernard Schulte Shipmanagement (BSM) Greece explained that clarity was key to getting a message across.

Having a large fleet, embracing technology for policies and administrative functions, reduces the daily work load.

**BSM's Theophanis Theophanous**

Procedural manuscripts must be carefully designed by the authors taking great care not to make the text too difficult to understand or unnecessarily complex to be interpreted by the

user.

Text that is written in a complicated manner by the authors will consequently be equally more demanding to comprehend by the end user. To obtain better compliance, the text must therefore be written in a more user-friendly and understandable manner by the manuscript writers and editors.

He gave an example of a message written in 76 words where 11 would easily get the message across.

He explained that manuals presently in use by BSM included a Marine Manual, Technical Operations Manual, Emergency Response Manual, Behaviour Based Safety Manual and a Shore Based Incident Investigation Manual.

Text should be clear and easy to understand, as user-friendly procedures improve compliance.

In each manual, uniformity was key, such as an introduction, warning, procedure and a checklist. He said that BSM follows the aviation model where a checklist is undertaken before an aircraft leaves the standing area.

He said the advantages of these administrative changes were clarity, organisation, environmental, cost savings, integration, plus a streamlined and quicker workflow.

The challenges, he said, were knowledge capture, training, implementation time, expense and expertise development.

In the manuals, 1,000s of words have been reduced to 100s and to achieve clarity, the text had to be precise.

BSM has also introduced Enterprise Resource Planning (ERB).

Using smartphone technology, BSM offers its seafarer support by way of all the information he or she needs for the next assignment as a company policy.

This includes the viewing planned voyages, scheduled training periods, and to provide date of availability. Travel documents, including e-tickets, contract letters, joining letter, etc, plus allotments, detailed pay slips, incidental expenses are all available via a secure personal log in.

Other advantages on the system include chatting with the crewing department, updating local contact details, full documentation download - with those expired highlighted - alerts and notices.

BSM can also send customised alerts, such as IMO rule changes, he explained.

Another initiative is to offer the shore staff the benefit of working from home for three days on a monthly basis. Continuous training is also undertaken both ashore and at sea.

Due to making use of technology, Theophanous explained that certain shoreside functions, previously carried out at each of BSM's many offices worldwide, have now been centralised, resulting in the number of employees being reduced.

## Procedure problems

**Michail Malliaros**, fleet personnel manager, Euronav Ship Management (Hellas) urged the industry to make procedures easier to follow and improve the way that procedures are managed.

For example which equipment could be made easier to operate, to help crew get more comfortable and thus more efficient.

The big human element challenges to be met include navigation equipment, cybersecurity, new emissions requirements, new regulations, etc, he said.

Maintaining motivation and mental focus among ships' crew, ie wellness was also important.

He agreed that making procedures, etc easier to follow would lead to improvement and to the best outcome.

**Euronav Ship Management's Michail Malliaros**

Malliaros advised not to write over something that already exists but rather write a separate procedure then take a look at it.

"Keep it simple. Write it in a way that someone not in the industry can understand it," he said. Keep the results to support procedures you need. Test it but not by yourself as you need feedback, he stressed.

Make use of the various best practices around as the information is largely developed today so ensure the information is available and be aware of what is available in the market, he said.

Technology is moving quite fast so use it wisely to improve systems and procedures. There is also a need to make officers and crew aware of technology through training.

Technology can be provided anywhere in ships specific modules, operational guidelines and procedures and guidelines as to how the equipment is managed.

He gave an example of a car with defects/ problems, which if not fixed will only grow until the car stops running.

Maintaining motivation and mental focus among ship crew, ie wellness was also important. Motivation is a big subject, he thought.

Crew wellness includes physical, emotional, social, intellectual and spiritual concerns - all five should be addressed equally - a new target for the industry, he concluded.

## Discussion period

In the discussion period which followed, interplay between management, technology and risk was debated.

**Dimitris Lyras**, director, Lyras Shipping, chairing the session, said that shipping companies were managed for millennia with what we call 'common sense'. Now shipping companies are looking at bringing common sense back.

But all of the discussion about bringing autonomous ships into operation, or having companies run by artificial intelligence (AI), and other advanced technology, is clouding the issue, because it leads people to believe that the future will not need human management at all, he said.

It is also a major distraction for senior management, who are not usually technology experts themselves, and so not necessarily in a position to make a judgement about what exactly AI is capable of, and whether it can really add value.

**Michalis Pouris**, Intership's head of HSQE, said that his company recognises that the role of technology is to assist people, not to control people.

Among other factors, people do not like to be controlled by technology. "We need to have people on our side," he said. "We consider that people are the great asset for our business, we need to focus on this." The idea that people might one day be phased out "is the wrong approach, now we realise it," he said.

**Intership's Michalis Pouris**

## Innovative designs

All of the 'innovative designs' being promoted for shipping, such as computer autonomy, "cannot survive by themselves without people," he said. "You may have unmanned aeroplanes, but I believe unmanned ships is a dream, with the severity of the sea. Unless we are prepared to lose ships in the middle of the ocean. People mean everything on the ship."

Shaw said there are three things company managers should do – provide direction, give leadership (including developing company culture), and actually manage the company.

Management tools and systems are only part of the third of these, but perhaps take up a much larger amount of managers' time. The other elements, including leadership, creation of culture and focus on people, "have been missing of late," he said.

And some companies are "not totally clear on direction. If you have a company that's got a very strong set of management systems, and has a very unclear direction, it is just going to get to the wrong place very quickly.

"Finding the balance between direction, leadership and management, to me, seems to be the right thing. You can't do without all of them, you've got to have the right tools to deal with the right problems, " he said.

Lyras suggested that the current high levels of interest in the shipping industry in advanced digital technology, such as AI and autonomy, could be providing a dangerous distraction. Senior managers, who have no particular technology expertise, are suddenly getting very involved in discussions about them.

Respected shipping industry leaders are saying in conferences that "AI will replace people," Lyras said. Someone in this frame of mind will struggle to have a clear idea about how to lead a tanker company in today's business environment.

He gave an example of a shipping company he knew, which recently applied for a bank loan, and was forced to reply to questions from the bank about why automated ships weren't going to take over their business.

The bank staff had bought into the idea of autonomous ships, which would be operated by a shipyard that built them. In their view, there would be no need for a shipping company, because they saw the core competence of a shipping company as organising people on ships, who would be no longer required, he explained.

This was perhaps the last thing the shipping company wanted to think about at a time of cash flow struggles. "We have to ask ourselves if the leadership can or should actually cope with this barrage of discussion about technology," he said.

Company CEOs are typically focused on where the company makes its money. Since no shipping companies make their money from technology, CEOs usually don't pay it much attention. Yet CEOs are being asked questions like 'why don't you have unmanned ships,' he said.

Shaw noted that there has been talk about technology replacing people every five to 10 years over the past few decades. One question nobody seems to ask is, whether it would be a good thing for society, considering that there are predictions of another 2 bill people on the planet, and entire country economies (such as the Philippines) have big dependence on revenue from human maritime work.

He said that the talk about autonomy in shipping is largely driven by equipment suppliers, not the needs of shipping companies. "Technology has its place but it should be technology in service of the organisation, the leadership of the organisation," Shaw said.

Shaw noted that Maersk Line is fitting technology on some of its containerships, which it calls 'autonomous', but it is designed to help navigators with a range of sensors, not remove people. Maersk has been clear that they are not planning to reduce the number of people on board ships, but will try to provide better inputs to the human navigator, he said. "Similar periods in the past left so many unanswered questions about why technology failed in its barrage of promises."

### Technology and efficiency

Malliaros said he is a fan of technology, and it has enabled companies to achieve big reductions in manpower from 100+ people in the past on each vessel to around 24 now.

Technology has enabled shipping companies to work more efficiently, but it has not managed to eliminate people, he said. And overall, the shipping industry "occupies more human resources than ever before."

BSM's Theophanous agreed, saying that technology "is an extra tool to do our job more efficiently." However, he is open to the idea of shipping companies having tools like Apple's Siri available to them, giving immediate answers to questions, including questions from company staff and customers.

Capt Cassels noted that while people are blamed for about 80% of accidents, nobody counts the number of times that a person does something almost intuitively, which prevents an accident from happening.

Often, people "can feel something wrong. They change the process, potentially outside the procedures, and it stops an incident happening. That's never recorded," he said.

On the issue of unmanned ships, Capt Cassels



said that ships engine rooms are often unmanned for eight or nine hours overnight, but they are long way away from being totally unmanned. When the crew start their day shift in the engine room, they find that there has been things going wrong overnight, which need fixing.

For navigation, one issue will be the dangers of having both autonomous and non-autonomous vessels sharing the same waters. Perhaps richer companies will go for autonomous navigation, with their vessels sharing waters with poorer companies who can't afford it, he suggested.

Today's seafarers are continually reminded, as Capt Cassels was, when at sea himself, that at sea there's no fire brigade or rescue services, "you're out there on your own. We've got a little bit more help with internet connectivity. [But] I feel we'll always need the human being on the ship to get us out of trouble," he said.

And also bear in mind that "if we have an incident [with an autonomous ship] where oil is released in massive quantities, we will not be forgiven."

"So I think there's a lot of progress, a lot of efficiency, but there's that point I don't think we can get beyond, which is, 'take everybody off the ship,'" he said. "It might be OK for a small ferry on a predefined route where you can manage all the ships around it. Anything longer trading than that, I don't think it's going to happen in my lifetime."

## Nautical advisors

**Jennefer Tobin**, general manager at marine technology company id2 and a former seafarer, said that in the past, shipping companies had someone in the role of 'nautical advisor.' This person was usually a former seafarer, who represented the interests and perspectives of seafarers to company senior management. This person also acted as a leader to the seafarers.

"That role has long since gone away," she said. "I often look and think, who is actually directing the quality of, and giving leadership and management to, seafarers? A person who they will follow because they hold him in high regard for his achievements at sea and in the company? It isn't the financial, technical, operational director, all of them are dealing with a very specific aspect of the technical delivery.

"The idea of having a leadership role, which includes mentoring, understanding the wider responsibilities on board, has become obsolete, dissipated, or gone away," she said.

It means that officers and crew in the fleet do not have a clear way to understand the responsibilities they have accountability for, and how they should demonstrate that they have done the job.

MOAMS' Shaw noted that the "Designated Person Ashore" (DPA) in theory is someone whose role is to represent seafarers, who they can take their concerns to. But this person's role is not necessarily to take care of crew.

## Training leaders

Theophanous said that one of the main points in the classic book 'It's Your Ship', by US Navy Capt Michael Abrashoff, is the importance of getting to know your people.

"You need to speak to people, face to face meetings, whether you are a captain or managing director ashore," he said. For example, BSM's senior management make a point of visiting ships. "That's the reason we train all our people on soft skills, to know how to manage people and get the best out of their people."

Theophanous said that he sees management as "doing things right" and leadership as "doing the right things". Under this definition, only a leader can work out which direction to go in. "We don't need managers, we need leaders," he said. "You can train people to become leaders." For example, most CEOs read a lot of books, to learn something new.

BSM has 620 vessels, so there are too many seafarers for the CEO to have a personal relationship with them all. But BSM does have company wide meetings for officers. The fleet is split into smaller companies, for example 40 vessels are managed from Greece, which means that Theophanous can personally meet all the Chief Engineers in the Greek managed fleet, when they visit the office.

## Examining risk

Turning to risk, a true risk assessment needs to take into consideration the context the work is being done in, for example how tired people are. It is not something that should be done once and then put into a file, stressed Lyras.

And people have been doing risk assessment ever since people existed, and probably doing it well because it was their own lives at risk. But somehow when it became a procedure, the way of doing it changed.

Risk assessments are a "sort of snapshot of what's on people's minds at the time, and something which creates a discussion." But "what's on people's minds at the time might not be reality."

Euronav's Malliaros said that the company has seen good results when it aimed to give people reasons for changing behaviours, rather than just telling them what to do. This might mean showing them how the safety methods are linked to specific risks, for example that they should take a helmet when they go to a certain place.

The company also aims to show people what might go wrong and how they can prevent it from going wrong, rather than just telling them about the consequences of an accident.

The company helps crew understand different risks with management and superintendent visits on board. This is something of a cultural change for companies. "This for us is quite challenging – it's not easy," he said.

One result of the work is that people are far more likely to ask for safety equipment, such as life vests and helmets, before they start work. They have more belief in the different risks and the importance of safety measures.

## Risk assessment dangers

Pouris said that the term 'risk assessment' can be dangerous, if people feel that because they have assessed a risk, they are now safe, and then they have an accident.

"Each person understand a situation differently, and assesses it differently. So we cannot rely on a subjective opinion of the captain or chief engineer or chief mate for a specific issue. We are advising to have a risk assessment team," he said.

The purpose of the risk assessment is "to trigger a discussion between senior staff on the ship on what may go wrong," he said. "It is not a full analysis. It depends on the individual people, what they may see or may not see."

**Chris Pastelidis**, director of Beacon Marine, said that perhaps what is needed is a simple identification of risks. "We have to gauge in our minds what could possibly go wrong or have an adverse effect on performance," he said. "Then having identified those factors, try to evaluate the impact of each and every single one on our overall objectives."

Capt Cassels said that perhaps the best form of risk assessment is a discussion between people before doing something, to try to work out what might go wrong.

OCIMF itself adopted this approach when it launched TMSA3, gathering the team together to discuss what might go wrong. The discussion highlighted "a bunch of things that could go wrong," Capt Cassels said. "We put quite a few fixes in place beforehand before we re-evaluated. When it was eventually launched and rolled out, it went fairly smoothly."

"I think we've overcomplicated it on ships," he said. "There are some risk assessments where you need HAZOPS (a comprehensive hazard and operability study) and a lot of people who understand the fine detail.

"[But mainly] you want seafarers who are going to risk assess a very standard operation before doing it. We've got to make it very simple so it is something they are quite happy to do. It's got to be fit for task, so that it becomes 'just the way we work around here', " he said.

TO

# TANKEROperator

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will be profiled giving their views on current legislation, recommendations and trends. These will include chief executives from all sectors of the industry from equipment manufacturers to the top shipowners

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about meeting oil major requirements (TMSA / vetting)

**DEVELOPMENTS** in management/ safety/ environmental best practice

**NEW TECHNOLOGIES**
and commercial industry developments

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