TANKEROperator

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Contents

***Front cover** - One of Wärtsilä's latest acquisitions, Guidance Marine, has produced the Artemis Mk6, which is a microwave reference system for use in long range DP applications.*

The system measures the range and bearing of a moving asset relative to a fixed position. It has an operating range of 10 km and is able to function in all weathers.

It is also claimed to be able to overcome GNSS scintillation.

Artemis is ideal for use when manoeuvring or connected to an FPSO/FSO while loading.

This year has not begun well

This year has not started on a good note for the tanker sector.

Late last year, the row over breaking sanctions against North Korea by shipping oil to the country escalated with flag states, management companies and trading houses all denying any involvement.

Somebody must have been involved and will probably be brought to book soon. In today's modern world of communications, it is almost impossible to escape detection for long, as the crew of the ships involved found out.

Then we have the sad case of NITC's laden Suezmax 'Sanchi', which at the time of writing (12th January) was still burning fiercely following a collision in the East China Sea.

She was loaded with highly flammable condensate and had a crew of 32 out of which only one body had been accounted for by the end of the second week in January.

Finally, the large crude oil tanker markets are not performing as they should at this time of year - the northern hemisphere winter.

In today's geo-politically unstable world, forecasts are almost impossible, but we all have to have a stab at them at some stage.

There are still a plethora of analysts prepared to have a go, mainly by reading into world growth forecasts from established organisations.

For example, BIMCO's analyst Peter Sand, well known on the conference circuit and respected by *Tanker Operator*, recently produced a report saying that last year was one of change in the shipping industry and 2018 will be one of caution.

He wrote that economic growth has accelerated in Europe, Asia and the Americas since mid-2016, and the IMF now expects the global GDP growth rate to rise slightly in 2018 to reach 3.7%, up from 3.6% in 2017. However, the IMF said that global GDP growth rates were forecast to stay around the 2018 levels into 2022, which is not particularly inspiring.

More bad news is that the world trade volume growth rate (goods and services) was expected to drop from 4.2% in 2017 to 4% in 2018.

Wishful thinking

However, Sand said that the shipping industry had adapted quite well to a lower level of demand growth over the past couple of years. The next challenge is to understand that this is as good as it gets, and to avoid wishful thinking that demand levels will increase significantly – as that will not happen, he warned.

The biggest risks to the forecast remain on the downside, ie that fleet could grow too much affecting the supply aside, or the demand will be too small to cope with supply.

The prolonged drawdown of global crude oil and oil product stocks proved to be a drag on tanker demand throughout 2017. While this came as no surprise, many PR departments from oil producers were busy telling us that the oil market fundamentals would balance "any day now".

In 4Q17, the oil producers gave in, playing the blame-game for a while before extending the OPEC supply deal into 2018. However, believing in the return of stronger tanker demand sooner rather than later, may have prompted tanker owners to postpone demolition.

Not until we see global oil stocks at a much lower level, can we expect a renewed interest in seaborne oil trading activities that will lift oil tanker demand from its current subdued level. However, the first half of 2018 may pass by before that happens, Sand said.

The rise of US crude oil exports to long-haul destinations was the most positive story in 2017. That development increased tanker demand on top of the expected increase of oil imports into India. Chinese imports of crude oil were also beyond expectations, increasing tonne/mile demand by as much as 13% in the first nine months of 2017.

Such a high growth rate is not expected for 2018, he warned.

As forecast, increased demolition activity amongst crude oil tankers and product tankers wasn't enough to prevent freight rates from falling. Recycling still reached a four-year high, but falling slightly short of BIMCO's scrapping forecast. Shipowners postponed the lion's share of demolition until the second half of the year, never really biting the bullet to reduce fleet growth significantly.

Tanker demand growth in 2018 is expected to prolong the trend seen in 2017; growing imports into the Far East and growing exports from the US. This is set to benefit VLCCs and to some extent Suezmaxes. The fate of Aframaxes is closely linked to regional Asian and European demand where the growth rate is expected to be lower.

BIMCO expected the crude oil tanker segment to see a net fleet growth of around 2% in 2018 (5.1% in 2017 estimated). The supply side growth rate of the oil product tanker fleet is expected to be around 1.8% (4.2% in 2017 estimate).

"We expect demolition of oil tanker capacity to be on a par with 2017. Overall, we see oil product tankers operating in an improved market, whereas crude oil tankers will continue to struggle," was Sand's rather grim prognosis. TO

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The upturn- this year or next?

We take a look at the state of play in the tanker markets, courtesy of Gibson Shipbrokers.

Last year was always expected to be a challenging 12 months. However, for the crude sector, the first half of the year generated reasonable earnings. In contrast, product tankers suffered heavily during the first six months of 2017, but did at least witness increased volatility later in the year.

This year looks set to be another painful period for tanker owners, with a continued wave of new tonnage and potentially challenging demand conditions.

On the supply side, the key issue is of course the number of deliveries expected for 2018. This year 40 mill dwt of crude and product tankers (over 25,000 dwt) are due for delivery, compared to the 35.5 mill dwt delivered in 2017, potentially making 2018 the busiest delivery year since 2010.

Delays are, however, expected to reduce the volume of tonnage entering the market this year. Interestingly, in 2017, slippage (taking account of the scheduled number of deliveries versus actual deliveries) across the crude sector fell relative to 2016.

Actual deliveries for VLCCs last year fell just 11% below the scheduled number, whilst Suezmax slippage was somewhat higher at 21%. However, delivery delays in the product tanker sector, which had a more challenging year relative to the crude market, ran significantly higher.

For example, in the crossover Aframax/LR2 sector deliveries fell 27% below the scheduled number, whilst LR1 slippage rose to 38%. MRs, which didn't fare as badly in the spot market as the larger product carriers, saw slippage of just over 28%.

Given the anticipated fundamentals for 2018, delivery delays are expected to remain a feature, and for the crude sector in particular, and could increase relative to 2017. However, the same fundamentals are likely to encourage scrapping activity; which, when coupled with slippage, could help offset some of the supply growth for 2018.

Supply is of course just one side of the equation. In terms of oil demand the IEA forecasts positive growth of 1.3 mill barrels per day; slower than recent years but above long-term averages. However, the consensus is that OPEC will continue to limit output until the end of this year, giving little opportunity for export growth from the Middle East and perhaps West Africa. The focus is therefore outside OPEC.

The US will remain one to watch over the year with the EIA expecting crude production to average 775,000 barrels per day higher in 2018, much of which expected to head for export. Elsewhere, output growth could be seen from Brazil, Kazakhstan and Libya. However, the threat of lower production exists elsewhere. Could Venezuela be 2018's wild card event?

For the clean market, there is little reason to expect 2018 to be any worse than last year. In the West, the year has at least started on a better footing, even if weather is the primary factor. More fundamentally, oil products demand looks good. Refined product stocks, which had become a key barrier to arbitrage trade, have come down significantly, particularly in Europe, and to a lesser extent in the key US Atlantic Coast region, which should improve fundamentals in the Atlantic.

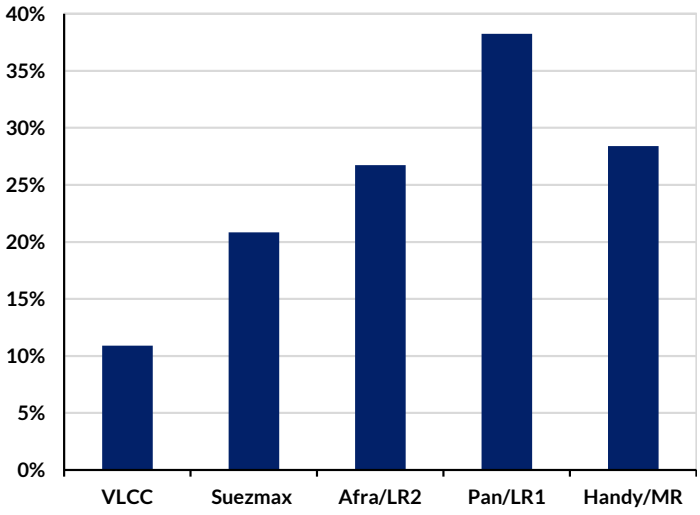
Higher diesel exports are expected from the Baltic, whilst demand from Latin America and West Africa looks set to remain a key theme.

The picture is a little more mixed in the East. In the Middle East, there are few refining developments set for this year, whilst repairs at Ruwais are expected to last into 2019. In the Far East, Chinese product exports could rise once again, following the issuance of higher export quotas in the first quarter, supporting regional tanker demand.

However, it remains to be seen whether these developments will be enough to make a real difference, Gibson said. Will the wait go on until 2019?

TO

Tanker Slippage in 2017



Supply is of course just one side of the equation. In terms of oil demand the IEA forecasts positive growthof 1.3 million b/d; slower than recent years but above long-term averages. However, the consensus is that OPEC will continue to limit output until the end of the year, giving little opportunity for expoert growth from the Middle East and perhaps West Africa. The focus is therefore outside OPEC. The US will of course remain one to watch over the year with the EIA expecting crude production to average 775,000 b/d higher in 2018, much of which expected to head for export. Elsewhere, output growth could be seen from Brazil, Kazakhstan and Libya. However, the threat of lower production exists elsewhere. Could Venezuela be 2018's wildcard event? Source - Gibson Shipbrokers.

European products picture

The European refining sector outperformed expectations last year.

This was due to regional crude supply rising on the back of higher output in major producing nations, pressuring feedstock costs for refiners and supporting margins, McQuilling Services said in a report.

Both regions supported clean product trading with tonne/mile demand out of Northern Europe over the first nine months of last year averaging 2% higher than 2016's full year average, while the Mediterranean observed significant growth of about 10.4% over the same period.

The rise of Mediterranean (Libya) and Black/Caspian Sea (Kazakhstan, Russia) crude supply coupled with strong growth in product demand, allowed for healthier margins for refiners and in turn, more product output. Tonne/mile demand was also supported by higher trading activity with distant importers, such as South Korea. As we move into 2018, however, we see a structural shift in fundamentals pointing towards a reversal of this scenario, McQuilling warned.

Focusing in on the main refined products (gasoline, diesel, naphtha, fuel oil, kerosene), the European balance was due to expand by about 115,000 barrels per day in 2017. This trend is expected to reverse in 2018 with the balance of products falling by 270,000 barrels per day, as demand continues to rise, while supply is expected to fall.

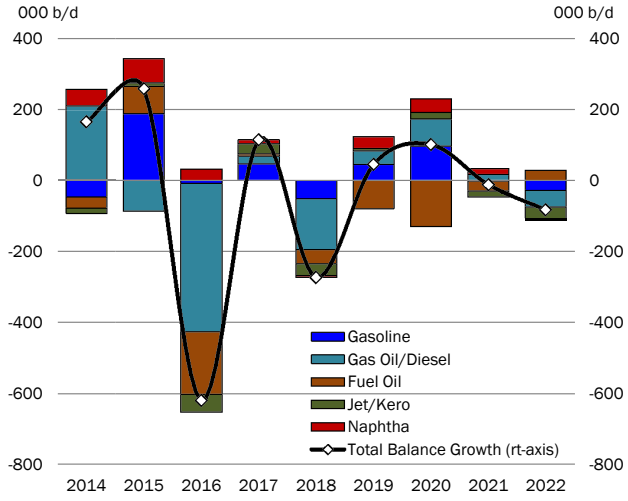
Both Northern Europe and the Mediterranean are expected to experience lower balances for export with the majority of declines projected to stem from the middle of the barrel, as the deficit of gas oil/diesel expands by 20% in 2018. This 140,000 barrels per day expansion is likely to be filled by increased import volumes, which McQuilling said, would likely come from the US and the Middle East with potential for higher Canadian volumes as well.

Trading activity in Northern Europe may also rise on the back of higher volumes from Russia into the continent. Over the 2019/2020 and even 2021 period, we are likely to see these volumes temper as European refining activity increases and shrinks the deficit, before 2022 brings another structural shift.

For gasoline, European demand is likely to increase slightly this year; however, McQuilling expected this to be the last year of growth, as pressure from higher fuel consumption efficiencies and environmental policy weighs on demand going forward.

The balance of this product is on track to average around 1.2 mill barrels per day in 2018, down 4% from 2017, before expanding to 1.3 mill barrels per day in 2020.

European Product Balances Annual Growth



Source: JBC Energy, McQuilling Services

Downward pressure

Export volumes are likely to feel downward pressure in 2018; however, over the long-term, the pressure subsides, as the balance for export expands by 1% annually to 2022.

The long- term outlook for naphtha balances will remain supported by 1.5% annual growth in supply through 2022, while demand increases by an annual 0.6%. Additional support is likely to stem from an expanding deficit East of the Suez; however, movements West to East will largely be dependent on favourable arbitrage economics.

The Middle East is likely to remain the major supplier of this market; however, the expanding balance of European naphtha may present arbitrage opportunities for importers East of the Suez.

Last year, the European jet fuel/kerosene deficit shrank by about 27,000 barrels per day, which supported higher import volumes from India, the Middle East and Southeast Asia.

Over the long-term, this deficit is expected to increase by 3.4% annually over the forecast period, fluctuating each year by no more than 31,000 barrels per day (JBCEnergy).

McQuilling expected a gradual increase in volumes from the Middle East, India and potentially the Far East, while Southeast Asia's balance is likely to become a deficit over the long-term hindering additional volumes out of this region. This trend is likely to be especially apparent this year, as the European deficit expands by about 10% year-on-year.

Fuel oil demand remains negatively affected by lower consumption in the power generation and industrial sectors worldwide, as nations seek to reduce greenhouse gas emissions. The same can be said for Europe, which is expected to see its fuel demand fall by 0.8% annually through 2022, while supply falls by a greater 2.5% each year over the same period.

On this basis, European exports of fuel oil are expected to continue to decline over the period; however, as we move past 2020 this trend has the potential to shift with regulations.

In total, CPP export tonne/mile demand out of Europe is likely to remain relatively unchanged (+ <1%) year-on-year in 2018 (more growth in the Med), mainly as a reduction in product balances will be affected by weaker refining fundamentals.

From an import perspective, McQuilling expected a different story, as strength in European product demand is likely to be served by higher inflows, projected to increase CPP tonne/mile demand into Europe by 10% year-on-year.

TO

Healthy eating leads to a motivated crew

Seafarer catering challenges were highlighted by Christian Ioannou, managing director of catering training provider Marine Catering Training Consultancy (MCTC) at Tanker Operator's October Hamburg conference.

He claimed that shipmanagers are wasting money on unnecessary costs in dismissals and food wastage in their ships' galleys.

Limassol-based MCTC trains catering crews from all over the world in all types of cuisine, through on board distance CBT and e-learning, plus onshore programmes at its training establishment in Makati, Phillippines. Another catering training centre is due to open in India next year.

Food is one of the biggest motivating factors for seafarers but there is still an industry-wide lack of nutritional knowledge within galley staff. This leads to owners/managers incurring further expenses through food waste, staff dismissals of under-qualified catering employees and bad health among crew members, Ioannou said.

Through employing trained and skilled catering crew members, managers could reduce their galley expenses dramatically by reducing food waste and performance dismissals, effective menu planning and good time management, he explained.

He also highlighted MCTC's new galley management system (GMS) that the company is developing. The software will be available to the cooks on board to assist them in the day-to-day running of a galley. Ioannou explained how cost savings could be made while at the same time improving the quality of the food served. For example, he said that monitoring the food served on board would lead to increased hygiene, crew moral, crew retention and reduce the food-related diseases, thus cutting P&I costs.

Dismissals for non-performing crew also added to the costs by way of manning agency fees and an increase in P&I cases.He claimed that around 20% of the food on board is currently wasted and taking the case of a 25-vessel fleet and working on $8.50 per seafarer, the food bill would come to $1.6 mill per year. Wastage could put more than $500,000 on this figure arriving at a food bill of $2.1 mill per year.

Ioannou outlined seven ways of optimising food service on board ensuring a return on investment (ROI).

1) Reducing food waste.
2) Ensuring effective food ordering and menu planning.
3) Effective use of available provisions.
4) Minimising overtime schedules.
5) Minimising ready made convenient food and cooking from scratch.
6) Reducing performance dismissals.
7) Reducing P&I cases.

In reducing food waste, the challenges were lack of food handling and processing, de-frosting methods, which sometimes destroys the food, trimming the cooking losses and over calculation of the food needed. He saw the solution in a catering competency development programme, plus proper training.

Part of the cooks' education is ensuring effective ordering and menu planning.Ioannou also outlined an unnecessarily expanded provisions list, which can sometimes run to 1,200 items and which the cooks have little or no knowledge of. "Knowing the product and what should be used - a lack of weekly menus and nobody following this," he warned. "The solution is a development programme with weekly menus being developed and a GMS put in place.

Wrong provisions

The wrong provisions are often used on board for various dishes. There should be a provision optimisation plan put in place, for example, leftovers can be used to create different menus for different cultures often seen on board ship. To counter this, he said that MCTC offers distance coaching - support based on a vessel's current inventory - which can be developed on a weekly basis to coincide with the weekly menu development.

As mentioned, overtime also comes in play as as cook can be working for between 10-12 hours per day from morning coffee to evening desert for around 10 months. In this scenario, schedules should be developed to enable the cooks to implement time management. A lack of time management leads to increased overtime payments, Ioannou warned. He suggested a daily working schedule be introduced using the GMS plan to develop a time management system on board.

Essberger's Bjorn Borbe.

As for reducing performance dismissals and ensuring high retention rates, proper assessments should be made of a cook before he or she embarks to ensure there is no lack of basic knowledge, which could lead to low seafarer retention rates in a company, as the food on board is often a very important factor for a seafarer. One of the answers is to sit down with the cooks and plan - motivation and interaction through personal coaching - plus giving briefings, offering distance coaching and consultancy.

As for minimising ready made food, it is important to budget for cooking from scratch, especially for international recipes, to keep

MCTC's Christian Ioannou.

costs down. Excessive ordering of ready convenient foods leads to unhealthy items containing a high level of preservatives.

There is a lack of awareness on healthy eating habits and on the use of unhealthy cooking methods, he stressed. To counteract this, correct cooking methods should be used through the development programme, which includes weekly menu planning, a food safety and nutritional management course with a practical assessment day on board and culinary educational newsletters provided.

Thus far, MCTC has worked with 1,000 people on some 350 vessels and in 2015-2016 started working with John T Essberger on a project.

Ioannou was joined at the conference by Bjorn Borbe, Essberger's senior crewing manager who explained that the company manages 30 vessels, including 22 small chemical tankers operating in short sea trades.

He said that before engaging with MCTC, there was a problem in keeping within budgets. The cooks went away for a week's training but came back and soon got back into their old bad habits. Borbe said he was looking for a sustainable solution for both the Masters and Chief Cooks.

Essberger embarked on a catering competency development programme with MCTC. Included were specialised onshore upgrading courses - how to effectively run a small galley when a voyage lasts for around 36 hours with the vessels constantly loading and discharging.

"It was not so easy, as we needed to face the problems from a different angle," he explained. "Masters cannot monitor cooks."

Some of the officers in Essberger's fleet are Dutch, so a high standard of food was expected, while some of the cooks were formerly deck cadets who had been transferred to the galley to become messmen, eventually being promoted to Chief Cook.

Borbe said that the company found that around 20% rejected this approach but those who became involved benefited from a meeting with MCTC Manila's representatives when arriving and before leaving to join a ship.

"We have to invest in a cadet, or a junior officer without a health problem," he explained.

Extensive on board visits were made to the ships and a career development pattern developed together with galley staff planning. Assistance was given in galley staff selection, target settings and follow ups with specialised briefings and debriefings, instilling competence with assessments.

Families involved

Family workshops were also held for the seafarers to engender family health awareness, which is something that Ioannou said he was keen on.

Borbe said that Essberger's long term initiative was to have high crew retention rates, improve crew welfare and catering standards together with a competitive provision rate cost structure.

He said that there was a strong correlation between what a person eats and how he or she feels. "Suicide is one of the biggest problems for P&I clubs," he stressed. Being employed on a tanker, means that a seafarer needs to be at a higher level, thus Essberger tries to ensure that they are healthy.

Although any return on investment (ROI) will be measured in better health, higher job satisfaction and a reduction in P&I cases, he said that in five to 10 years, the company will see the benefits of a higher seafarer retention rate with good welfare reputation.

Ioannou said that when seafarers move companies, food is often given as one reason for dissatisfaction. "They care. Ensure that they get the food they need," he said.

Borbe concluded that with so many inspections now taking place, we need to keep high galley standards.

Digital platforms

Ioannou also recently claimed that technology advancements on board ships will lead to further training opportunities for seafarers this year.

He said that he believed ship operators must prioritise investing in the right tools to allow seafarers access to training while they are away at sea.

In 2018, MCTC will be launching new digital platforms to enable seafarers to manage their training online effectively.

Ioannou said:"These days there is a lot expected from the catering departments who are expected to now be experts on nutrition, as well as keeping to strict budgets and knowing how to cook a variety of healthy meals. They need to know how to cater for different cultures and tailor dishes for those crew members who may be suffering with health issues, such as diabetes or high blood pressure.

"It is important that shipping operators realise the importance of investing in technology to enable continued training for the crew members. E-learning is a vital aspect of the training we provide and I see future advancements in technology supporting this.

"This year we will be launching new software to assist seafarers with their training and learning how to create wholesome meals for their crews. I would also like to see more crews sharing knowledge and best practices with each other through digital communications," he concluded. TO

Giant Saudi shipyard complex project up and running

Saudi Aramco and partners - Lamprell, the National Shipping Company of Saudi Arabia (Bahri) and Hyundai Heavy Industries (HHI) - officially launched the International Maritime Industries (IMI) joint venture on 30th December.

When fully operational in 2022, this integrated maritime shipyard, which could be a threat to the repair yards at Bahrain, Dubai, Ras Laffan and Duqm, will be one of the world's largest full-service maritime facilities.

This new joint venture localises essential links for Saudi Aramco's supply chain related to offshore drilling and shipping activities, which will lead to optimised costs, reduced response times and improved services for Saudi Aramco and its affiliates, the Saudi energy giant said.

The almost 12 mill sq m facility will be the largest in the region in terms of production capacity and scale. This scope enables Saudi Aramco and its supply chain partners to meet their manufacturing and maintenance, repair and overhaul requirements for offshore oil and gas rigs, offshore support vessels, and commercial vessels, including VLCCs. Once built, the yard will have an annual capacity to build four offshore rigs, over 40 vessels, including three VLCCs, and service over 260 maritime units.

"By meeting Saudi Aramco's offshore production and transport needs, International Maritime Industries will serve our strategic intent to become the world's foremost integrated energy and chemicals company. Its combination of technology, supply chain efficiencies and lifecycle partnership will create a world-class company that offers customers a keen competitive advantage," said Abdallah I Al-Saadan, Chairman of the joint venture's management board and Saudi Aramco's senior vice president of finance, strategy & development.

"What is unique about IMI is the powerful synergy of manufacturing and operational excellence delivered by four established global and regional entities in the energy and maritime industries. International Maritime Industries already has orders for more than 20 rigs and 52 ships over the next decade, demonstrating the trust of the joint venture partners in the company's ability to produce quality, bespoke ships and rigs in line with national and global environmental requirements. This enables building an integrated supply chain that is localised and highly responsive," he added.

At the same time, the formal appointment of IMI's senior executives was announced, including Fathi K Al-Saleem as CEO.

Al-Saleem has more than 23 years' experience at Saudi Aramco and led IMI's feasibility and commercial development stages. He said, "International Maritime Industries is positioned to be a global competitor and a regional hub for maritime products and services. Through our combination of technology, integrated facilities and supply chain efficiencies, we are redefining what it means to partner with customers for maritime advancement."

Initial production and service operations are expected to commence in 2019, with the facility reaching its full operational capacity by 2022. This initiative will contribute towards localising expertise related to the maritime industry and job creation in the Kingdom, Saudi Aramco said.

The project is designed to:

- Contribute about $17 bill dollars to the Kingdom's GDP.
- Import substitution for maritime products and services by up to $12 bill.
- Create more than 80,000 direct and indirect jobs by 2030.

Located at Ras Al-Khair, near the Jubail Industrial City on Saudi Arabia's east coast, it will be the largest maritime industries complex in the Kingdom and the whole region in terms of production capacity and scale.

Saudi Aramco's plans to establish a giant maritime industries complex in Ras Al-Khair began in early 2013. Since then, Saudi Aramco has concluded a number of agreements with partners, notably an agreement in principle for the manufacturing of the first Saudi-made global offshore drilling platform by 2019 and the first VLCC by 2021.

As one of the world's largest shipping companies, Bahri will play a pivotal role in the localisation of the maritime transport industry and services in the Kingdom.

The complex will also include supporting facilities and services, such as centralised offices for employees and a centralised residential camp with recreational facilities.

New institute

As the Kingdom's maritime industry begins to evolve and grow, there will be a promising opportunity to develop an institute for maritime studies, research and development, with specialised curricula focusing on professions associated with the maritime industry. Plans are in place to build a new institute specialising in the development and training of young Saudis to operate the complex in particular, and develop the industry in general.

IMI will consist of four operating zones, which will include several drydocks and over 15 piers and wharfs of various types.

The first zone is to be dedicated to the repair and maintenance of ships and rigs, and includes maintenance drydocks and 12 berths, in addition to workshops fully equipped for all maintenance and overhaul operations, with the capacity to service more than 15 rigs and 130 ships annually, including VLCCs.

The second zone, will be dedicated to offshore support vessels, will have the capacity to build 25 ships and repair 115 offshore support vessels a year, and will consist of nine

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The third zone will have the largest area and is dedicated to the construction of commercial vessels. Comprised of VLCC-size drydocks and fully-equipped berths, this zone will have the capacity to build all types of ships using state-of-the-art manufacturing techniques. It will have the capacity to build three VLCCs and 15 commercial vessels of different types annually.

The fourth zone, the maritime operations zone, will have the capacity to build more than 11 fixed offshore platforms and four drilling rigs each year.

Saudi Aramco said it will link advantageous financing instruments and the obligation to buy Saudi products to ultimately create a system for the Kingdom's maritime industry that emulates an Export Credit Agency (ECA) approach.

As the complex enters the construction phase, Saudi Aramco will develop this concept, in co-operation with its partners and government agencies, as an integral part of the maritime supply chain localisation initiative.

The Saudisation level of the joint venture will exceed 50% by 2030, and will gradually reach more than 80% in senior, management and supervisory positions. To achieve this objective, an early hiring and training programme (in Saudi Arabia and abroad) will be created to provide trainees with the necessary skills.

Saudi Arabia no longer relies on its natural resources alone to achieve growth and prosperity; it has also started to exploit the energy of its citizens and their ability to innovate and generate creative ideas to build a sustainable and balanced national economy for future generations. The Saudi Government has supported the project by agreeing to fund the complexes infrastructure. It has also commissioned Saudi Aramco to implement the infrastructure project.

Ras Al-Khair was established by the Saudi company Ma'aden. It is home to a large number of mining facilities, such as aluminum and bauxite factories, and other industries. A water desalination and power generation plant has 1,025 mill cu m of desalinated water capacity and 2,600 MW of electrical output.

Dubai Drydocks restructures

Remaining with shiprepair and building yards in the Gulf, Dubai World subsidiary Drydocks World's creditors have given unanimous support to a restructuring plan, which will see Dubai-based ports operator DP World take control of Drydocks World.

On 18th September, DP World agreed to take 100% control of Drydocks World in return for a capital injection of $225 mill.

Under the terms of the restructuring plan, the cash will be used to pay the around $1.4 bill outstanding junior debt at around 23 cents in the dollar. The remaining $640 mill outstanding senior debt will be switched to a new facility, which will have a three-year tranche paying 200 base points over Libor and a five-year tranche paying 250 bp over Libor.

"Now that we have unanimous support the next step is to discontinue the Decree 57 and UK scheme processes and then we hope to complete the deal by early January," a source reportedly told Reuters.

Around 75% of creditors have a stake in the junior and senior debt that was originally taken in October 2000 to fund Drydocks' expansion in Singapore. At that time it comprised a $1.7bn three-year loan and a $500 mill five-year loan.

Discussions about the latest restructuring plan began in March, 2015 and after a previous restructuring of the debt in 2012 when Drydocks used Decree 57 to restructure and extend the maturities of the $2.2 bill loan. Following that restructuring scheme, a new $800 mill senior facility was put in place, which had an August, 2017 maturity and a $1.5 bill junior tranche.

The $800 mill senior debt tranche is trading at 95.2 cents in the dollar on Europe's secondary loan market – up from 79.75 cents on the dollar on 2nd January – according to data from Thomson Reuters LPC.

Restructuring advisers Moelis have been advising an institutional bank group, comprising Davidson Kempner, Emirates NBD, Goldman Sachs ESSG and Mashreqbank, on the deal. Drydocks is being advised by Citigroup and law firm Clifford Chance.

OSMC to ramp up third party business

Last October, Oman Ship Management Company held a second annual conference in India.

It was organised at a time when OSMC had revealed major growth in its managed fleet, expanding from 27 to 38 vessels in the last two years. This was largely down to expansion in its chartering business.

More than 100 delegates joined the Officer's Conference in Mumbai. The two-day event involved seafarers from OSMC's managed vessels, office staff, crewing agencies and industry experts, such as from Shell, P&I Clubs and Lloyd's Register.

OSMC's Chief Operating Officer, Capt David Stockley explained that the annual event provided a platform for seafarers to connect with the firm's senior management to discuss a broad range of pressing maritime matters.

He said: "The conference performs an extremely important role each year, as OSMC strives to deliver best practice on all vessels within its fleet.

"We selected Mumbai as the host location for a second year running. This is due to our large proportion of Indian seafarers, as well as the region's reputation as a major international shipping hub.

"The conference provides a unique opportunity for seafarers and company's top management to discuss a range of key issues for an extended period. This includes current and future trends in the maritime industry, regulatory development and practical problem solving at sea.

"Attention was devoted to matters, including human resources management, oil pollution, technical faults and breakdowns," Stockley said.

He continued: "This year (2017) we also received insightful presentations from Shell on resilience and dealing with crisis at sea, as well as an outline of Shell's criteria on ranking. Our delegates further benefited from a fascinating presentation from Capt Tony Field of Lloyd's Register on fuel oil testing.

"Our valued seafarers were also given a fleet overview while addressing lessons learnt from incidents in the last year. A session dedicated to customers feedback and a reflective learning workshop also proved highly useful for staff development," he added.

Captain David Stockley.

OSMC is a subsidiary of Oman Shipping Company (OSC). Stockley explained: "We look after OSC's in-house shipmanagement. We have strong experience in technical management and have formed effective working structures to enhance the link between vessels and offshore support through crew, operation and HSE departments. This event is a clear testimony of company's commitment to continually enhancing the safety culture.

"However, we are always aiming to improve. This latest conference highlights OSMC's continuing and constant commitment to safety, best practice and environmental responsibility. Through shared knowledge and experience we are able to strive for the very highest safety standards and ensure continued development of all staff, at all levels," he said.

As at the beginning of January this year, OSMC had 16 VLCCs, 15 product and chemical carriers, six LNGCs and four bulkers on its books.

In conversation with *Tanker Operator*, the company confirmed it was looking to expand into third party shipmanagement.

OSMC's strategy is to manage the different ship types from separate departments, which includes separate superintendents. The company normally relies on outside academies for seafarer training. There are a mix of nationalities serving on board the ships and onshore and the company added that it was training local Omanis to enable them to take over as many jobs as possible.

Speaking about mentoring and motivation, and illustrated by the annual conferences, OSMC said that developing the human element was one of the company's top priorities. "We do this through coaching, mentoring, motivating shadowing, internal and external training," the company told *Tanker Operator,* adding that it also gets involved in the charterers' training/development programmes.

Most of the vessels in the fleet are on timecharter, including 10 MRs on period charter to Shell, which are all managed in-house.

The company also claimed that it was an advantage to be located in a more stable regime, such as Oman, compared with some of the country's near neighbours.

OSMC's strategy going forward was to be the best shipmanager in the region, to manage third party blue chip owners' vessels and to maintain high standards of safety and quality, the company concluded. TO

Long standing IMO Council member - Cyprus - speaks out

Registries are gearing up to encompass digitalisation as their roles change with the times.

On 1st December, 2017, the 30th IMO Assembly elected the following states to be Council members for the 2018-2019 biennium:

Category (a) - 10 States with the largest interest in providing international shipping services: China, Greece, Italy, Japan, Norway, Panama, Republic of Korea, Russian Federation, UK, US.

Category (b) - 10 States with the largest interest in international seaborne trade: Australia, Brazil, Canada, France, Germany, India, Netherlands, Spain, Sweden, UAE.

Category (c) - 20 States not elected under (a) or (b) above, which have special interests in maritime transport or navigation and whose election to the Council will ensure the representation of all major geographic areas of the world: Bahamas, Belgium, Chile, Cyprus, Denmark, Egypt, Indonesia, Jamaica, Kenya, Liberia, Malaysia, Malta, Mexico, Morocco, Peru, Philippines, Singapore, South Africa, Thailand, Turkey.

The newly elected Council met on 7th December and voted Xiaojie Zhang (China) as Chair for 2018-2019. The election of the vice chair was postponed until July, 2018. Zhang replaced Jeff Lantz (US).

Representing one of the long standing Council members, Ioannis Efstratiou, Acting Director, Cyprus Department of Merchant Shipping (DMS), commented: "Our re-election to the IMO Council is of great significance to Cyprus. The main remit of the Council is to supervise the work of the organisation and it is also responsible for co-ordinating the activities of the organs of the IMO. Our continued participation will allow Cyprus to have an active role and voice during the decision-making process, supporting the IMO's mission of promoting safe, secure and efficient shipping on clean oceans.

"The Cyprus Registry is committed to safety, security and excellence, and we continue to work closely with regulators and shipowners to ensure proactive compliance. Cyprus' continued participation in the IMO Council enhances our reputation as one of the leading international shipping powers, directly involved in addressing and shaping industry issues, challenges and regulation," he said.

Cyprus became a member of the IMO in 1973 and has been a member of the Council since 1987. Since becoming a member of the IMO, Cyprus has played a positive and constructive role in the organisation's endeavours to achieve the objectives of maritime safety and environmental protection, and improve the living conditions of seafarers on board ships, the registry said.

Cyprus will continue with determination to contribute consistently to the efforts for improving the strategic objectives of the IMO, by always bearing in mind that shipping remains, first and foremost, a business endeavour, which delivers an essential public service to the world at relatively low cost, while operating under many varying regulations in different jurisdictions, the registry said.

Talking with *Tanker Operator*, Efstratiou said; "Ranking as the 11th largest merchant fleet worldwide and the third largest fleet in the European Union, Cyprus flags over 1,000 oceangoing vessels with a total gross tonnage exceeding 23 mill. Currently, Cyprus flags 98 tankers with a total tonnage of over 2.8 mill, which represents 12.05% of the Cyprus fleet."

Changing role

Commenting on flag choice, he said; "The shipping industry is no stranger to pressure. But in the context of today's challenging market conditions, the development of new and evolution of existing regulations is having a significant impact. Now more than ever, tanker owners and operators are actively exploring ways of improving margins, and this is driving changes in what they need and expect from flag states.

"There is no doubt that the role of flag states is changing. However, the provision of proactive support, technical advice and consultancy is not something new and leading flags, such as Cyprus, have been doing this for many years. With ships checked, vetted and surveyed to such a level that they are generally operated to a higher standard than required by IMO conventions, tanker operators set high standards. This is why tanker operators look for technical ability and a good reputation when choosing a flag.

"Ease of registration, low registration fees, strategic geographical location, robust regulatory protection, and the only open registry in Europe to have a tonnage tax system (TTS) approved by the EC are all key considerations. As Cyprus aims to consolidate and further develop its role in world shipping, it is these benefits and more that will continue to support tanker owners and operators in their quest for compliance and commercial efficienc,." he said.

Turning to the question of the future of digitalisation, he said; "The Cyprus flag is continuously working with regulators and shipowners to employ innovative solutions that help ensure efficient and cost effective compliance with regulations. As one example, Cyprus employs an online Electronic Seafarer's Application System (e-SAS) for the submission of applications for the Seafarers Identification and Sea Service Record Book (SISRB).

"Under the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), it also issues endorsements attesting the recognition (EAR) of non-Cyprus certificates of competency issued by countries whose certificates of competency are recognised by the Republic of Cyprus electronically.

"Electronic oil record books (EORB) are also

now permitted on board Cyprus-flagged vessels, helping to eliminate any unintentional human error that could expose shipowners to the risk of both crippling fines and criminal prosecution. By enabling operators to accurately record ORB entries in an electronic format, this helps shipowners and crews mitigate the risk of costly delays, penalties and fines that can run to millions of dollars," Efstratiou said.

He added; "We know that a personal approach and continuous flow of communication is extremely important to tanker owners and operators. To enable this, the Cyprus flag has maritime offices in Piraeus, London, Hamburg, Rotterdam, and New York City, comprising a highly skilled and multilingual workforce.

"We pride ourselves on our 24/7 accessibility and personal, consultative approach. And as Cyprus has registered tankers for many years, it is well versed in understanding and dealing with the issues that tankers may encounter, and has many technical experts with the knowledge and expertise to effectively answer technical queries in a timely manner.

"Inclusion in the 'White List' of the Paris, Tokyo and other MoUs for Port State Control is critical to avoiding unnecessary surveys, inspections and delays. It also provides assurance that a flag has the right, knowledge, experience and technical competence. But accessibility and a fast, consistent response to questions and emergencies of a technical nature are also imperative.

"Time matters when owners need a quick decision over a dispensation because of a fault in a piece of equipment, for example. It may not always be possible to arrange a repair in the next port, and therefore a dispensation is needed to allow the work to be delayed by a short period.

Speaking of regulatory input, he said; "From a leading flag, ongoing and pro-active communication and sharing intelligence in the form of circulars and seminars, for example, is expected. But, in addition, owners and operators are increasingly looking for a flag that isn't simply an industry spectator and aggregator of information, but rather directly involved in addressing and shaping industry issues, challenges and regulation.

"From the Ballast Water Convention to the European Union's Monitoring, Reporting, Verification (MRV) regulation, they want an influential champion that pro-actively ensures that their best interests are effectively represented.

"In an industry continually challenged by new and increasingly rigorous regulation, the key for flag states is to ensure that they can field a knowledgeable team of experts with a detailed working understanding of the legislative requirements. This enables the provision of guidance to help shipowners achieve compliance while managing costs and any impact on operational efficiency," Efstratiou concluded.

Cyprus' Ioannis Efstratiou.

Risk profile

A warning that risk profiling was becoming more important to port state control (PSC) inspections was recently given.

PSC inspections are increasingly focusing on the risk profile of the ship under inspection with PSCOs singling out the performance of the shipmanager and the flag state recognised organisation (RO) as major factors to concentrate on.

Petros Achtypis, CEO of Cyprus-based Prevention at Sea (PaSea), said PSC inspectors were changing the way they inspected ships with greater emphasis being placed on a vessel's risk profile.

Many PSC Memoranda of Understanding (MOU) were starting to draw direct parallels between the risk profile of the ship and the performance of the shipmanager and the RO.

Panos Kirnidis, CEO Palau International Ship Registry. argued; "PSCOs don't work to a common standard or control for PSC inspections; the selection of ships to be audited does not follow random sampling and therefore does not reflect the real situation; the mathematical formula used is biased against smaller registries.

"There is no substantial historical evidence to show that there is direct relationship between the calculated target factor, age, flag or RO and the standard of the ship. There needs to be a more intense look at how PSC operates in some parts of the world.

"There is very little doubt that political influences can play a damaging part in local PSC detentions. Add into this volatile mix corruption and sheer incompetence in some parts of the world and it's not hard to see why there needs to be a tighter control on PSC and the economic and management issues they directly affect.

"Despite the fact that the majority of PSC inspections are conducted on a highly professional, transparent, and equitable basis, incidents of corruption have been unofficially reported at a number of ports worldwide, notably in the Black Sea region. Some of these cases show that the PSC was used as geopolitical leverage for specific time period. Therefore, if a registry had several vessels trading in the Black Sea region and other registries had no ships in that area, the picture will not be a genuine reflection in regards to the performance of the two registries. It is important to stress that the MoU should be an agreement between maritime administrations and not governments, as stipulated in all memoranda.

"Another major issue is that it can be proven statistically that local PSC favours their national registered vessels or vessels with their national RO. For instance, the statistical performance of Russian flagged ships detained in Russia; or France flagged ships detained in France; or Italy flagged ships detained in Italy.

"The shipping industry needs solutions on how to tackle this alleged corruption among some port state control officers (PSCOs) who are forcing ships to make large payments to avoid having their vessel fail inspections and be detained in port," he claimed. TO

Approach voyage obligation comes before the Court

An owner's obligation to commence approach voyage in a voyage charter - whether the obligation is absolute or due diligence - was the subject of a legal case last year.

Capt Siddarth Mahajan of Tipco Maritime analysed this case - CSSA Chartering and Shipping Services SA v Mitsui OSK Lines Ltd (the 'Pacific Voyager') (2017) EWHC 2579 (comm).

The background concerned the VLCC 'Pacific Voyager', which was chartered on a SHELLVOY 5 for a voyage from Rotterdam to the Far East. The cancellation date under the charterparty was 23.59 on 4th February, 2015.

During an intermediate voyage before beginning this charter, on 12th January, 2015, she suffered water ingress in No 1 starboard ballast tank and developed a seaboard list while transiting the Suez Canal. The cause of the damage was contact with a submerged object connected with dredging operations underway nearby.

There was no suggestion that the vessel or owner were at fault or could reasonably have prevented what transpired. Charterers were informed by the owner that the vessel was due to drydock on 8th February, 2015 for repairs and that the repairs would take months. A day later, the charterers exercised their right to terminate the charterparty and then brought a claim of $1.2 mill.

The owners did not give an estimated time of arrival (ETA) at the loading port and no date of expected readiness to load (ERTL) to the charterers. However, the charterparty stipulated a laycan range.

Details of the anticipated timetable for completion of the previous charter were given in the following terms;

'Position: ETA Ain Sukhna 9th January, 2015 (port of discharge).
ETA Suez Canal 10th January (transit).
ETA Sidi Kerir 12th January (reloading).
ETA Antifer 25th January (discharge)
All above BSS IAGW/WP'.

The issue here is that if the charterparty contains only a cancelling date/laycan range but no ETA or ERTL date, are the owners under an absolute obligation to commence the approach voyage or do they only have to exercise due diligence?

Monroe obligation

The English Court of Appeal in Monroe Brothers Ltd v Ryan (1935) 2 KB 28 held that where a charterparty contains an obligation on an owner to proceed with all convenient speed to the loading port and gives a date when the vessel is expected to load, there is an absolute obligation on the owner to commence the approach voyage by a date when it was reasonably certain that the vessel will arrive at the loading port on or around the expected readiness to load date - known as the Monroe obligation.

This obligation was held to arise where -

(i) The owners obligation is simply to proceed to the lading port without any reference to speed or despatch., it being implied that such obligation is to do so with all convenient speed or utmost despatch (Louis Dreyfus & Co v Lauro (1938) 60 LI L Rep 94).

(ii) What is given is an estimated time of arrival at the loading port rather than of expected readiness to load (The Myrtos (1984) 2 Lloyd's Rep 449).

(iii) Where the vessel is at the time of charter still performing her previous service (Louis Dreyfus v Lauro) to the knowledge of the parties (The North Anglia (1956) 2 Lloyd's Rep 367).

The 'Pacific Voyager's' owners contended that a cancelling date was not equivalent to an estimate by owners of an arrival date at the loading port, but was merely a contractual option afforded to the charterers if the vessel should not arrive by that date.

Owners were only obliged to exercise due diligence to get the vessel to the loading port by the cancelling date. The charterers contended that the laycan window was equivalent to an ETA for the purposes of the Monroe obligation.

The decision

The Court held that the owners were under an absolute obligation to commence the approach voyage by a certain date, which is to be decided basis other charterparty terms. Since the owners had given the ETAs for intermediate ports, which the vessel will be calling in the current charter service, they were obliged to commence the approach voyage at the end of a reasonable discharging period, were the vessel to arrive at Antifer on 25th January, 2015. The charterers were entitled to judgment in the agreed amount of $1.202,812.50.

The Court also considered the hypothetical situation where no ETAs for intermediate ports under the previous charter were given. In such a case, the owners would be under an absolute obligation also to commence the approach voyage by a date when it was reasonably certain that the vessel would arrive at the loading port by the cancelling date.

For the purpose of the Monroe obligation, there is therefore no difference between a cancelling date and an ETA/ERTL date.

In conclusion, it must be noted that permission to appeal this case was granted. We will have to wait and see whether the extension of the Monroe obligation is upheld. Meanwhile, owners and charterers are advised to ensure that they draft their charterparties with clarity and make explicit reference to ETA, Capt Mahajan said. TO

Demurrage claim time bars subject of arbitration

A recent London Arbitration Award again considered the question of time bars in the context of a demurrage claim.*

Whether by rider clause, under its own heading in a standard form, or perhaps built in to some other provision, time bars are a standard charterparty feature. Most have an overall limit for all matters, and voyage charters often set shorter ones for certain claims.

Such provisions typically say that charterers will not consider a claim unless it has been submitted in writing with supporting documents within (mostly) 30, 60 or 90 days of completion of discharge. Best known in respect of demurrage, they can also apply to many other types of claim.

Some of these clauses are very specific, listing the actual documents to be provided, such as NOR, SOF, NOP and pumping logs. Some are less so, stipulating all material created by the vessel or otherwise, which is relevant to whatever gave rise to the claim. Others are wholly, and maybe dangerously, general, simply calling for all documentation substantiating each and every constituent part of the claim. Sometimes, also, documents must be signed, perhaps by a particular person, such as a ship's officer or terminal representative, or otherwise validated.

Their purpose is to achieve early finality and certainty in a worldwide industry where operational changes are as rapid as they are continual, by ensuring that charterers quickly get a package with which they can check the validity of the claim, without having to make any separate investigation.

Tribunals and Courts regularly say that such clauses must be complied with strictly and carefully, but the standards of strictness and care can vary. London Arbitration 22/17 [(2017) 985 LMLN 4] is probably another example of that ebb and flow, but it is also a reminder of the dangers for owners and of the need always to act swiftly and according to the requirements of the clause.

Under an amended Asbatankvoy form charterers were released from any claim unless (within 30 days of completion of discharge) it had been presented to them "in writing with supporting documents." They argued that the documents needed to arrive simultaneously with the written claim. Two loadport NORs had not, though they had already been provided, and their relevant content was anyway plain from other documents that owners had sent with the claim.

Owners retorted that (unlike many) this clause did not stipulate "all" documents, or specify which were needed, and did not say that they must accompany the claim. The Tribunal rejected charterers' argument and ruled that the material supplied was sufficient for them to evaluate owners' claim, which had thus been presented "with supporting documents." The deadline was a cut-off for providing the material, but it did not have to come simultaneously with owners' claim.

Comment

One view is that a ruling for charterers would have been very harsh on owners. Charterers did not dispute that they had previously received the merely two documents that owners had not later attached. It is hard here to see any rationale for documents having to appear hand in hand with the claim, and charterers certainly had the factual material they needed.

Certain general guidelines can be given, but all depends on the wording of the particular clause and the facts and circumstances. In one case it might, for example, be very unjust to allow charterers to pounce on the absence of material that they had already been given. But it might be different if owners presented a claim in many stages over a long period, with documents attached progressively and perhaps confusingly.

Moreover, the risk of defaulting under a barring clause like this falls squarely on owners, and it would be wrong to misinterpret this ruling as signalling greater flexibility. Where a clause specifies certain documents, those must be provided, and with any required signature or stamp. Owners must identify any vital document which is not self-evident, and should be aware that Tribunals and Courts remain largely unsympathetic to what is called the *de minimis* exception - the argument that an omission is so small that it does not matter. It usually does.

Post-voyage commercial analysts have wide experience, and routinely plan ahead and seek and collate the required materials in good time. This is essential, but tackling these issues starts at the pre-fixture stage. Owners should first consider if they could in fact obtain the proposed required materials, and how long it might take, depending perhaps on the relevant location and in some cases the time of year. They should also check that they are adequately back-to-back in any chain, with the deadline above always shorter than the one below, and preferably with enough overlap to ensure that all material can be passed along in good time.

Sensible drafting, careful reading and strict compliance must always be the rule. TO

**This article was written by C Demurrage.*

C Support service

C Support is a scheme whereby legal advice and assistance is offered to all those engaged in the shipping industry, on a fixed annual fee basis.

This service provides:

- Unlimited legal, commercial and claims advice on a 24/7 basis in respect of any problem or claim, not restricted to demurrage.
- The handling of all problems and claims to the point where litigation or arbitration is commenced.
- Review and advice of contract wording.
- Advice on the collection and preservation of evidence.
- Crisis, media and casualty response advice.
- Appointment and liaison with salvage brokers, average adjusters and other experts.
- Advice in connection with the preparation, formulation and submission of any claim on the Hull and Machinery or Protection and Indemnity policies.
- Letters of demand/letter before action. In mediation, where a dispute arises concerning the amount or validity of a claim, the dispute can be put to a C Demurrage's independent arbitrator to adjudicate the claim.

This dispute resolution is performed as a paper review of the documents and any other submissions from either party and is performed at a low fixed cost of £2,000 (with costs awarded against the losing party) and also performed quickly.

If both parties accept to have the claim adjudicated in this manner, they will also accept that the result is final, binding and not subject to appeal. No reasons will be given.

Similar to a retainer scheme, C Support provides legal, commercial and claims advice for a fixed annual fee up to the point that proceedings are commenced. It is not seen as an alternative to FD&D insurance.

C Solutions is appointed to deal with matters arising under the C Support scheme. This service is staffed by lawyers, experienced claims handlers from the P&I and H&M sectors, Master Mariners and insurance industry professionals with nearly 200 years of collective experience. C Solutions has offices worldwide. ■

Who is liable under OPA 90?

P&I and insurance company Gard has issued a warning courtesy of US lawyer, David Reisman, a shareholder in Liskow & Lewis' New Orleans office in his summary of the recent United States v American Commercial Lines decision.

The US Fifth Circuit Court of Appeal has reminded US owners who charter or otherwise turn over the control of their vessels that they potentially remain liable under OPA 90 for the negligent, and even illegal, acts of the bareboat charterer/operator.

In July, 2008, nearly 300,000 gallons of oil spilled into the Mississippi River in New Orleans when a tug towing an oil-filled barge veered across the river into the path of a deepsea tanker.

American Commercial Lines (ACL) owned the tug, which it bareboat chartered to DRD Towing Co (DRD) for $1 per day. ACL then timechartered the tug from DRD.

At the time of the collision, the tug was pushing ACL's barge DM-932, which was fully laden with oil. The tug's Master had abandoned the vessel several days earlier, leaving the helmsman (who was not licensed to operate the vessel without the direct supervision of a Master) in charge. The helmsman was allegedly asleep at the wheel, as he had been working for nearly 36 hours non stop.

The tanker 'Tintomara' collided with the barge, causing it to break away and ultimately sink in the Mississippi River. As the owner of the barge, ACL was deemed a responsible party under OPA 90.

In the liability trial between the vessel interests, the judge held that DRD was 100% responsible for the collision and that ACL and the 'Tintomara' were free from fault. DRD was also prosecuted and convicted of violating federal laws in connection with its operation of vessels, and destruction of evidence.

The US Government filed suit against ACL and DRD under OPA 90 seeking to recover the $20 mill in clean up costs incurred in connection with the spill. This was in addition to the $70 mill that ACL had already paid. DRD filed for bankruptcy, and a judgment was ultimately issued in favour of the Government and against ACL for the additional $20 mill.

ACL appealed, but the Court was not persuaded by ACL's argument that DRD's conduct was not "in connection with" the contractual relationship despite the fact that DRD's acts and omissions violated applicable law and directly violated the terms of the contracts. Accordingly, the Court held that ACL was NOT entitled to the third-party defence from liability under OPA 90.

The 'Exxon Valdez' - the cause of OPA 90.

Rejection

The Court also rejected ACL's argument that it was entitled to limit its liability. The Fifth Circuit therefore affirmed the district court's granting of summary judgment finding that ACL was not entitled to any defences under OPA 90 and ordering ACL to pay the $20 mill in cleanup costs in addition to the $70 mill that ACL had already paid.

Putting the case into global context, Gard said that liability and compensation for spills of persistent oil are governed by the Civil Liability Convention (CLC) (with the notable exception of the US). The CLC channels strict liability for spills including clean-up costs to the registered owner of the spilling vessel and the channelling provision shields charterers, from claims. Furthermore, the CLC 92 Protocol allows the registered owner to limit liability unless the claimants prove that the pollution damage "resulted from a personal act or omission committed with intent to cause such damage or recklessly and with knowledge that such damage would probably result."

CLC also provides a complete defence if the registered owner can show that the spill was "wholly caused by an act or omission done with intent to cause damage by a third party." The limitation amount is secured by mandatory insurance generally provided by P&I clubs.

In contrast, OPA 90, provides for "joint and several liability", so the US statute contemplates the possibility of more than one responsible party with each individually responsible for the total of the clean-up costs and compensation. Thus, although ACL was factually without fault because it did not employ the crew, it was nonetheless liable because, as the vessel owner, it fell within the definition of "responsible party". This result would have been the same under the CLC regime.

In Gard's view, the greater significance of the opinion is in the interpretation of the limitation provision. The Fifth Circuit does not differentiate between the two charterparties between ACL and DRD. In determining that ACL could not limit, the Court may have had the timecharter in mind because that is the charterparty that required DRD to tow ACL's barge and carry the oil cargo.

Despite DRD's breach of this charterparty, ACL was saddled with the gross negligence of DRD and its employees, which meant that it could not establish a right to limit. The result would have been different under the CLC because the CLC does not refer to contractual relationships in the limitation provision.

The Fifth Circuit's ruling highlights the need for vessel owners to carefully vet their charterers/operators from both operational, solvency and insurance points of view, Gard warned.

TO

Benchmarks in technical and commercial perfomance

As fuel performance monitoring becomes more widespread in the tanker industry, the gathering of quality data concerning at sea consumption is only the beginning.

Through analysis joined with historic data, it is possible to establish realistic technical baselines, as well as commercial benchmarks, thus enabling a closer communication between technical and commercial departments.

This standard is often denominated 'baseline' or 'benchmark curve'. It is, however difficult to find a definition for these concepts, and even more difficult to find nominal values for such standards.

The purpose of this article is to clarify matters and establish some principles for a numerical determination of benchmarks to be used by PDI in Propulsion Dynamics' CASPER reports.

Baseline - In the patented CASPER performance analysis reports, the baseline reflects simply the resistance of the new, clean ship.

This resistance is relatively well-defined, and the 'base line' is therefore a value, which may be regarded as constant over time. If this resistance is given the value 1 at design draft and at design speed, the actual 'added resistance' is simply the factor, which shows the actual increase of resistance (of hull and propeller) in relation to the baseline resistance, when all other parameters, such as wind, waves, sea current, draft/trim and speed, have been corrected for.

The baseline may of course be changed over time, either if it is found that the initial clean ship resistance was erroneous, or if the ship has been modified (such as installation of energy saving devices).

A sometimes called 'Dynamic Baseline' behaviour expresses that the 'new ship performance' can not be maintained over time, even with the best possible maintenance husbandry. This can, however also, and more correctly, be reflected by a suitable benchmark curve, as shown in the following.

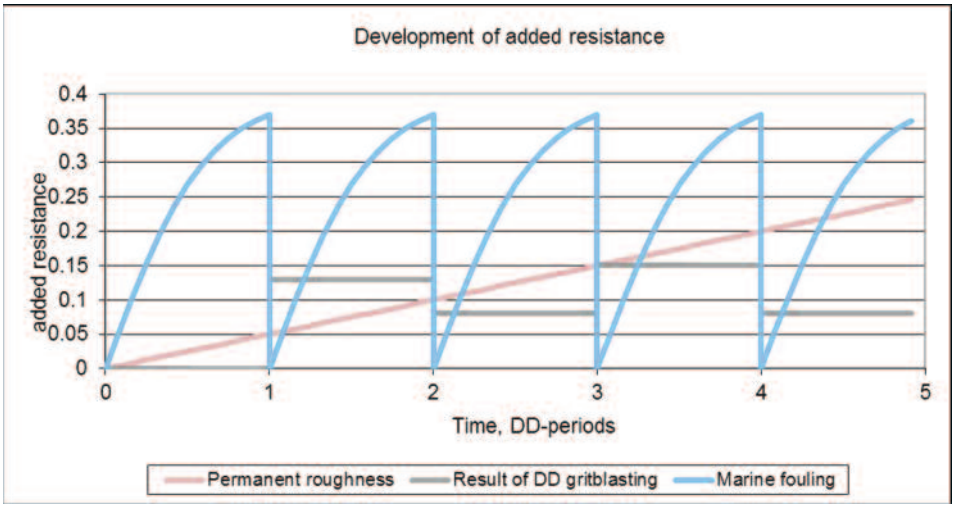


Fig 1. Added resistance components.

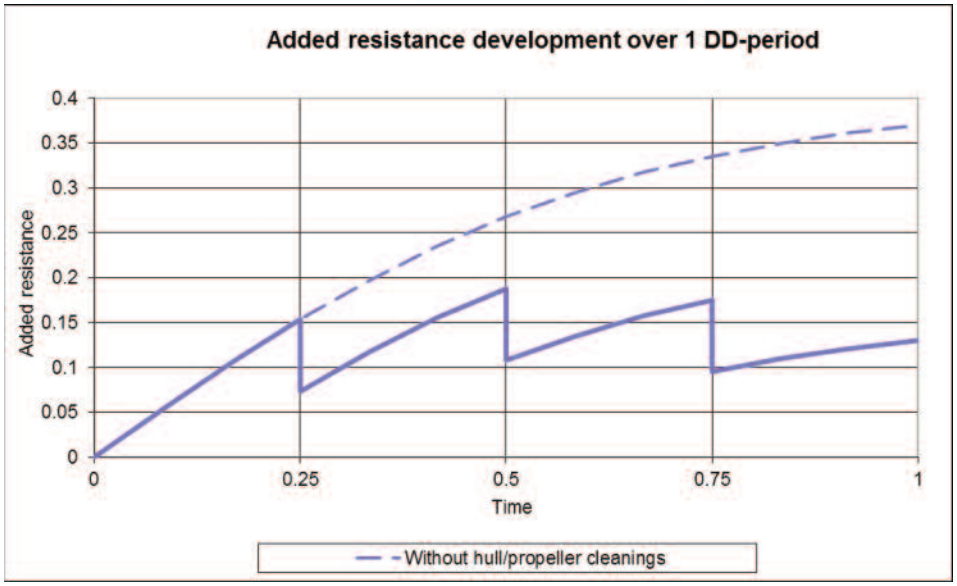


Fig. 2. The effect of cleaning on added resistance development.

Benchmarks - The definition of a benchmark is that it represents some kind of a standard, to which something could be compared. A technical standard for comparison could be based on the PDI experience with ships of similar type. This is reflected in the following diagrams.

Benchmarks may of course also be established based on commercial standards, such as common charterparty requirements, or

possible an operational benchmark whereby (anonymous) competitors' best practice for shipping companies that wish to participate in anonymous benchmarks is compared.

In the following it is mainly the technical benchmarking, which is described.

Figure 1 shows the different kinds of CASPER added resistance.

It is seen that there is the so-called permanent added resistance, which covers the permanent degradation over time of the wetted surfaces. The permanent added resistance may be removed, but that will normally require large investments in drydocking time in order to replace of a large part of the shell plating, smoothing of weld beads, etc.

There will also be a kind of semi-permanent added resistance (or basic roughness), which may mostly be removed by extensive blasting in drydock. Full 'white metal' sand blasting will, however normally only take place every 10 years.

Finally, there is the added resistance caused by marine growth. It will increase over a docking period, unless some kind of in-water cleaning of hull and/or propeller is carried out.

Figure 2 shows how the marine fouling added resistance develops over a docking period, if nothing is done. It also shows how the added resistance is influenced by hull/propeller cleaning.

Finally, Figure 3 shows how the development over a 25 years lifetime could be for a typical tanker.

A mean benchmark curve is shown, and proposed validation areas are indicated by colours, amber for 'normal', green for 'good' and red for 'bad', respectively.

The curves and the colour zones reflect only some of the principles. The real curves and zones to be utilised should be determined in co-operation with the tanker owner, when a strategy for the use and the maintenance of their ships has been determined.

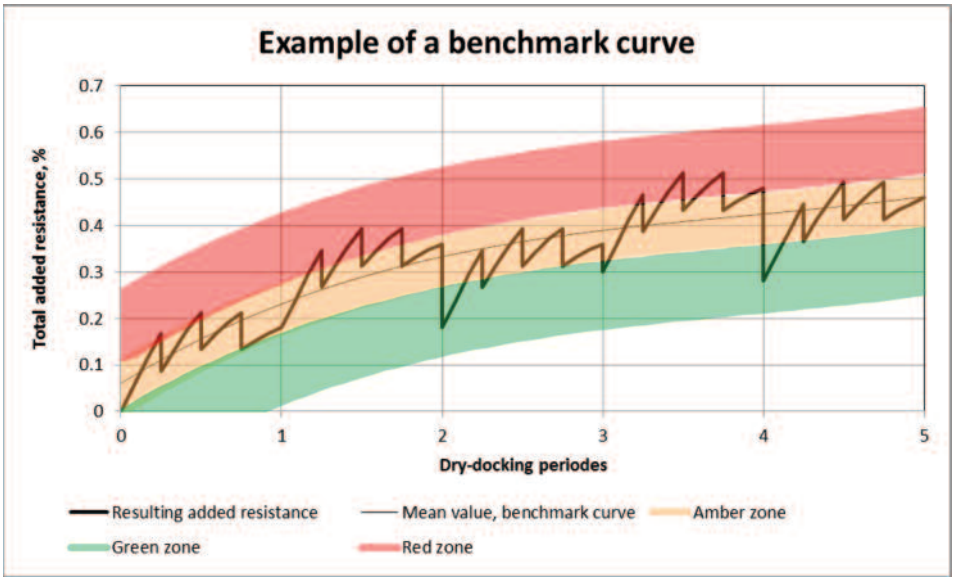


Fig 3. An example of an expected added resistance development curve over a ship lifetime and a corresponding proposal for benchmark curves and 'traffic-light-zones'. While the above graph illustrates the added resistance over time, the added resistance figure can be transferred into speed-fuel tables power for any speed, draft and weather allowance.

Conclusion

Benchmark curves drawn for the purpose of fuel saving and maintenance guidelines should normally reflect general experience, however, it is obvious to rely especially on detailed experience with similar ships, similar hull surface treatment and similar procedures for maintenance.

The first thing to do, therefore is to decide on a strategy for hull/propeller maintenance, including the choice of hull coating types and intervals for drydocking and underwater cleanings and then determine the benchmarks in such a way that it can be checked whether the goals of the strategy is reached or if further action is required.

In CASPER, the results of over 4,000 ship-years; tracking daily or weekly hull performance and 1,000 drydockings together with hull cleanings and propeller polishes, have been analysed, and therefore it is easy to evaluate the efficiency of the hull coatings and aforementioned maintenance activities.

Benchmarks can be drawn that are purely technical (with sea trial performance as a basis) or benchmarks that are operational (using values for similar ships of similar age and time-out-of-dock). Further, benchmarks can also reflect commercial goals (using charterparty figures for speed, fuel consumption, weather, etc) and can be defined accordingly.

It is therefore likely that different departments within a tanker operation will need different kinds of benchmarks. This is possible and will be reflected by the CASPER presentation of analysis results.

TO

**This article was supplied by Propulsion Dynamics.*

Highly efficient shuttle tankers ordered at Samsung

A new shuttle tanker concept has been developed by the world's largest provider of shuttle tanker services - Teekay - in close co-operation with Wärtsilä.

This design is claimed to offer a new level of ecological and economic solutions by using Wärtsilä's smart technology in innovative ways, the company claimed.

The concept has already been endorsed with orders for up to four vessels for Teekay at Samsung Heavy Industries. Each vessel will feature a broad assortment of Wärtsilä's latest technology, which are central to the concept's overall performance gains. The Wärtsilä equipment contracts, worth in excess of €110 mill, were booked in December, 2017 and January, 2018.

Teekay's new vessels are expected to reduce annual emissions of CO2 equivalents by more than 40%, compared to conventional shuttle tankers. In addition to operating on LNG as the primary fuel, the dual-fuel engines will also be able to run on a mixture of LNG and recovered Volatile Organic Compounds (VOC) – the gas evaporating from the oil cargo tanks during loading.

By using the recovered VOC as fuel rather than venting it to the atmosphere, the harmful emissions will be eliminated and the ships' bunker needs will be significantly reduced. The concept also means that NOx emissions from the engines' exhaust will be reduced by more than 80%, SOx emissions will be almost entirely eliminated, while particulate emissions will be reduced by more than 95%. These environmental benefits will be matched by a significant reduction in fuel consumption, compared to conventional solutions, Wärtsilä claimed.

"Together with Teekay, we have developed a concept that takes the shuttle tanker sector into a new era, and which is further evidence of Wärtsilä's ability to transform shipping by developing and utilising the very latest technologies. These ships will have tremendous operational flexibility with unmatched manoeuvring capability, and will achieve what all operators are striving for today, namely optimal economic and environmental performance," said Roger Holm, Wärtsilä Marine Solutions president.

"This new shuttle tanker design will set new standards for both fuel consumption and CO2 emissions," added Terje Rusdal, project manager at Teekay.

Among the many innovative features to be fitted on board the vessels is the Wärtsilä hybrid system, on which the power distribution will be based. This system uses batteries for fuel savings, peak load shaving, and added overall system redundancy, which directly impacts the main machinery, resulting in fewer running hours with correspondingly lower maintenance time and costs.

Automation system

Also to be fitted on each ship is a full electric and automation system, which includes the Wärtsilä low loss hybrid (LLH) system and batteries, the Wärtsilä LNGPac fuel storage and supply system, the Wärtsilä VOC system for recovering and liquefying the VOC with a storage and supply system, Wärtsilä 34DF dual fuel gas engines, the fuel mixing system with liquid VOC and LNG as the main fuel for the engine, gas turbines to handle the surplus gas, Wärtsilä cargo and ballast pumps and a Wärtsilä inert gas generator.

In addition, Wärtsilä subsidiary Eniram will install a vessel performance management system to provide a data collection platform to optimise the vessel's operations, while also providing Teekay with analytics and reporting.

In a paper, business manager, Wärtsilä Gas Solutions, Stein Thorsager, explained that the main task for a shuttle tanker is to transport oil from offshore fields to land-based oil terminals. As shuttle tankers operate in offshore conditions, these vessels are the most advanced commercial vessels with a variety of unique operational modes, including loading in dynamic positioning (DP) condition, transit in laden, unloading and ballast conditions.

All of these operating modes have their own requirements, but in traditional shuttle tankers, this has led to equipment installed on board not being used efficiently in the various operation modes.

He explained that the new shuttle tanker will have the following three features, compared with a conventional shuttle tanker:

- Reduced emissions: VOC emissions from the cargo will be eliminated, the NOx from the engine exhaust will be reduced by 84% which is well below IMO Tier III levels, while the SOx emissions will be practically eliminated, and finally the particles will be reduced by more than 96%.
- Operation flexibilities: an efficient use of the installed machinery and propulsion systems in the vessel secures an unmatched manoeuvring capability while the built-in system redundancies ensure an inherent system robustness when managing unexpected events.
- Improved economics: 22% reduction in total fuel consumption and with the use VOC as fuel, resulting in considerable reduction in bunkering needs, and combined with fewer running hours hence lower maintenance costs for machinery.

During operations, conventional shuttle tanker design has high levels of emissions, mainly from VOCs entering the atmosphere during loading, storage, and transportation of crude oil. For instance, the storage and loading of crude oil onto ships are responsible for more than 50% of Norway's VOC emissions. The Norwegian authorities have thus implemented stringent emission reduction regulations for all shuttle tankers loading crude oil from offshore processing platforms located in the Norwegian

Teekay has ordered a series of environmentally friendly shuttle tankers that will be fitted with a Wärtsilä equipment package.

continental shelf.

The loading operations involve crude oil being loaded directly via a hose connected to an FPSO, fixed platform or via a loading buoy. This operation can take place in harsh environments and with difficult sea stages. The crude oil needs to be loaded with high transfer speed to ensure predictability in weather conditions throughout the DP operation.

During the offshore loading, VOCs emerge from the cargo tanks and must be captured by a VOC recovery plant. Wärtsilä has long experience in developing VOC recovery plants that can satisfy the requirements from the Norwegian authorities and has recently designed a new generation of VOC recovery plant that will also satisfy the more stringent authority requirements expected from 2030, Thorsager said.

Wärtsilä's VOC recovery plant uses compression and cooling phases to liquefy the heavier hydrocarbons to liquid VOC (LVOC), which is stored in a tank located on the deck of the vessel. The lighter hydrocarbons that are not liquefied, referred to as surplus VOC (SVOC), which mainly consists of methane gas, will be burnt in a gas turbine for electricity generation. This method is chosen as it has twice the efficiency of a traditional boiler with a steam generator.

From a typical North Sea platform installation, each crude oil loading of a 850,000 barrel cargo cargo will recover 100 tonnes of LVOC and 10 tonnes of SVOC. By avoiding these amounts of VOC escaping into the atmosphere, the yearly reduction of emission goes from 43,000 to 25,000 tonnes of CO2, ie a reduction of 42%, assuming around 32 loadings per year.

Today's shuttle tankers are equipped with direct propelled 2-stroke diesel engines running on heavy fuel oil (HFO) or marine gas oil (MGO) and the recovered LVOC has so far been considered as a waste product. The 2-stroke engines are mainly used for propulsion during transit, and the 4-stroke auxiliary plant provides power for the extensive thruster systems used during DP operation.

Electric propulsion

With an average of 100 tonnes of recovered LVOC per loading, this amount could represent up to 30% of the total fuel consumption of the shuttle tanker should the LVOC be used as fuel. Teekay has therefore replaced the conventional 2- and 4-stroke engine configuration with fully electric propulsion with generator sets driven by Wärtsilä 4-stroke dual-fuel (DF) engines.

As the electric main propulsion motors and 4-stroke DF generating sets are the only power plant on board the vessels, flexibility and overlapping functionality is achieved. This power distribution concept is part of Wärtsilä LLH concept, reducing the total installed power on board from 26 to 23 MW with further reductions in fuel consumption and resulting in an increased overall efficiency of the vessel.

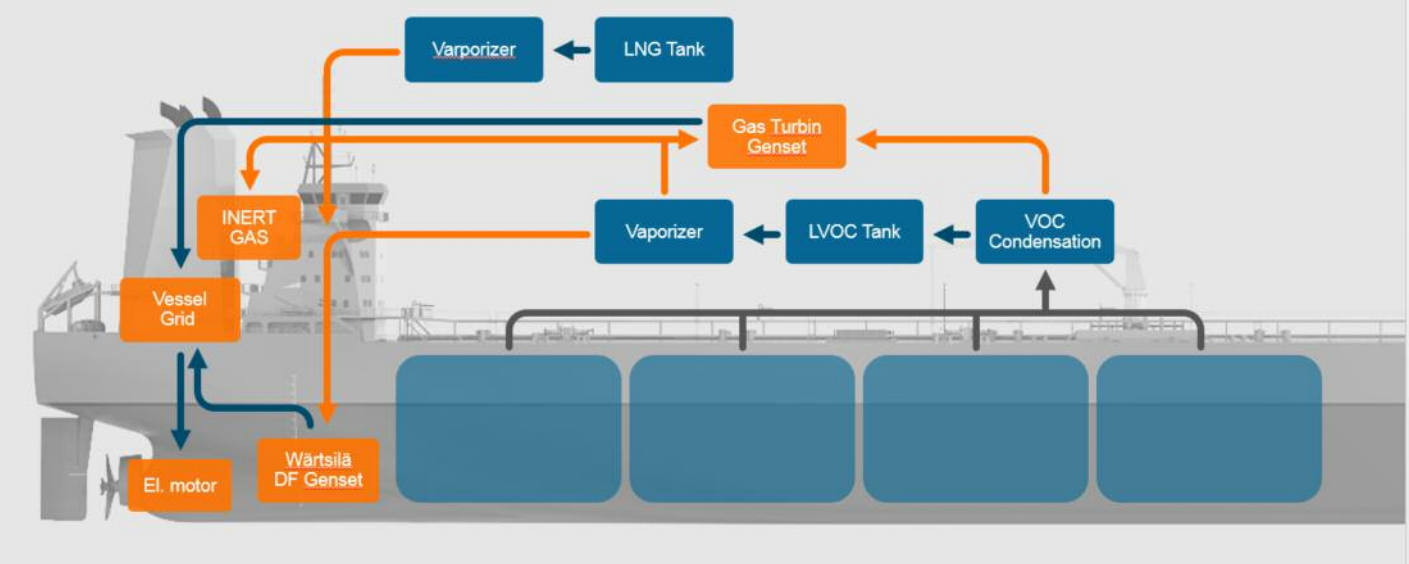
To achieve full SECA and NECA compliance, the new shuttle tankers will be equipped with Wärtsilä LNGPacs to enable operation in gas mode throughout the shuttle tanker operation with LNG as primary fuel for the engine. With both LNG and LVOC on board, Wärtsilä started to develop and performed testing of the possibility of mixing LNG with LVOC in gas form for potential fuel for the engine.

LVOC comprises heavier gas hydrocarbons, such as propane and butane, which have relatively low methane number (MN) of 25, making them less suitable as fuel for Wärtsilä's gas engines (to avoid knocking). By mixing the LVOC with LNG with an MN between 70 and 90, an acceptable MN will be achieved for the gas engine at any required power.

Depending on the LNG MN, the engines will run a maximum continuous rating (MCR) of less than 100% due to the de-rating mode. This de-rating mode is fully acceptable due to the operational flexibility built into the new shuttle tanker concept. Using LNG as the primary fuel and LVOC as secondary fuel, the new tankers enable the use of 100% of the recovered LVOC as fuel for electric power generation.

The power distribution system will be based on the Wärtsilä LLH system using batteries for further fuel savings, peak load shaving and added overall system redundancy.

Wärtsilä LLH does not only offer the highest efficiency over all electrical components, but a great benefit comes from its superior capability to minimise the impact of a failure during DP operation, Thorsager claimed. In addition to the required trial speed of the vessel, the size and functionality of the power plant is determined from the power requirement in DP condition. While a traditional electrical distribution system could lose more than 50%



With an average fuel consumption of 8,750 tonnes per year, 3,200 tonnes will be generated and used on board as LVOC.

of installed power and several thrusters, an LLH will lose only 25% of the installed power and not more than one thruster.

As a result of the new shuttle tanker design, the total energy consumption will go from 110 GWh to 75 GWh per year, compared to a traditional shuttle tanker.

With increased efficiency, the DP (manoeuvring) capability will also be improved. A conventional system will use 60% of thruster power, whereas using an LLC system, only 40% will be used.

Moreover, the LLH electric equipment room is more compact, compared to a conventional electric room. The tankers' power distribution system uses a low voltage arrangement with an excess of 23 MW of installed power, which will again have a large benefit for the crew on board.

Batteries fitted

When installing batteries on board, the vessels have a hybrid energy system that will continuously support the dynamic capacity of the energy production system and, through the stored energy of the batteries, enable engines to operate in a load area where fuel consumption is optimal.

The batteries will handle the dynamic load variations and the engines will get a stable load and therefore could operate in a higher load area without risking the startup of additional generators, due to transient load variations. The new shuttle tankers will be the first ship of this size to use batteries for improving efficiency during transit operation.

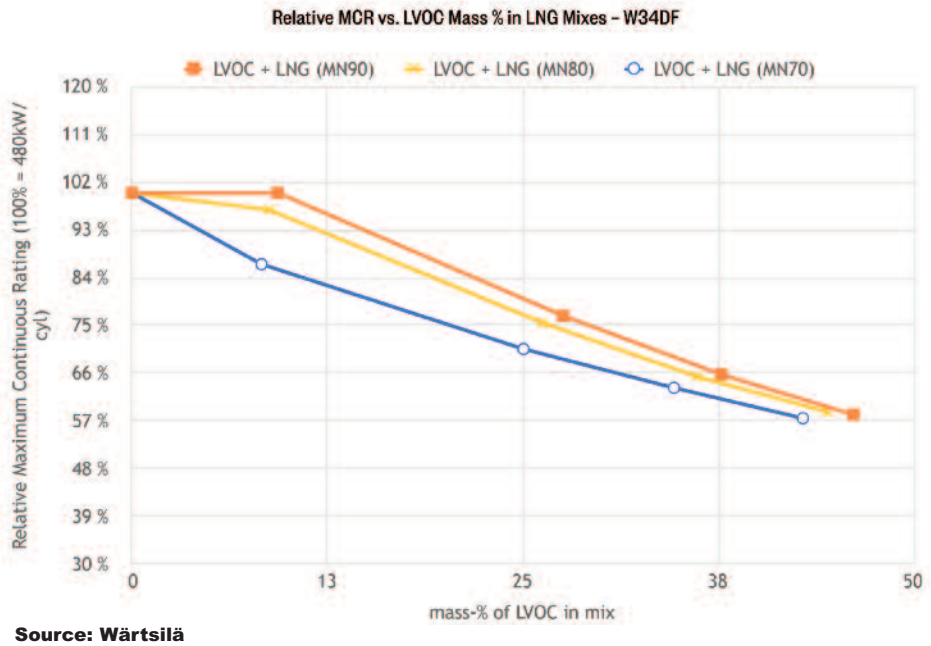
For crude oil offloading operations at the onshore terminals, Wärtsilä can supply either electric-driven pumps for pump room installation, or electric-driven deep well cargo and ballast pumps that enable a distributed pump solution, eliminating the need for a separate pump room and interconnecting pipelines in the cargo holds.

The space gained from eliminating the pump room can be used either to increase the cargo capacity or to shorten the engine room with a shorter hull, giving lower building cost and better DP capability thanks to the leaner side profile. With the efficient and environmentally friendly electric power plant installed on board the vessels, electrical-driven pumps for cargo off loading and ballast are used in the most efficient way.

In connection with ballast pumps, Wärtsilä can also supply its patented AQUARIUS EC ballast water management system (BWMS). This uses an in-situ chlorine generation technology known as electro-chlorination (EC).

Wärtsilä can also offer support and provide active assistance during the new shuttle tankers operations, to accomplish a total life-cycle solution to the owner. This will comprise both training of the crew and the officers for the equipment and the systems on board, together with varied technical and operational real-time online support and monitoring.

Teekay has thus far contracted two firm and two options at Samsung. Wärtsilä has estimated that half of all offshore oil production in Norway and the UK will be transported to land using shuttle tankers. About 40% of the existing shuttle tanker fleet is ready for replacement, due to the 20-year age limitation placed by charterers/operators. TO



Source: Wärtsilä

Ballast water analysis and monitoring to take centre stage

We make no apology for continuing to look into ballast water treatment systems and their usage, as interest from owners and operators increases ahead of judgement day.

Another string to the ballast water bow is ballast water discharge analysis/monitoring through testing systems, which are now gaining approval, given that the dates for the BWM Convention have been set in stone.

For example, French-base aqua-tools started to gain recognition last year. The company gave guidance to Saudi Aramco's Environmental Protection Department inspectors on how to verify that ships entering Saudi ports are discharging ballast waters in accordance with the IMO's D1 and D2 ballast water discharge standards.

While the Kingdom's port state control authority has yet to confirm which class-approved ballast water testing system it will use to analyse the water, aqua-tools revealed its had provided a series of training modules on how to use its B-QUA indicative test kit.

"All ships visiting Saudi Arabia's ports and terminals from international waters have been required to provide samples and report on ballasting operations since 16th August (2017), so we are delighted to have been invited to the Kingdom to ensure port state control inspectors have the knowledge and understanding required to quickly analyse the ballast water," said aqua-tools CEO, Marc Raymond.

"The ability to quickly sample, monitor and analyse ballast water is absolutely crucial in ensuring ships are not delayed and preventing port congestion and increasing additional cost," he added.

Following the Saudi training courses, aqua-tools' management team travelled to the UAE to provide training to Inspectorate International and SGS Gulf, which both provide independent inspection, sampling and testing services from a network of laboratories around the world.

Raymond said: "We outlined the various techniques that can be used for monitoring the microbiological content of water and explained why indicative methodology is widely seen as the only viable solution for providing rapid and reliable results.

"We are confident that the latest Adenosine Tri-phosphates (ATP) testing methodology, such as that intrinsic to our B-QUA test kit, will prove to be the optimum solution for quantifying and qualifying the efficiency of ballast water treatment systems in meeting international discharge standards," he said.

Raymond explained that while there is a myriad of different technologies and techniques available for analysing ballast water, there is concern that some may not be as effective as others, providing spurious readings and potentially resulting in costly litigation for shipowners.

Monitoring differs

According to a recent paper, 'A Shipboard Comparison of Analytic Methods for Ballast Water Compliance Monitoring', researchers found that while there were several available for monitoring ballast water compliance, they differ in their sensitivity, robustness, output, costs, training requirements and processing time. Aqua-tools' B-QUA test kit has been developed to monitor =50µm plankton, =10 to <50µm plankton and bacteria, since all three of these factions provide important information on the functioning of the ballast water treatment system. Non-compliance of the =50µm faction, for example, indicates a problem with the filtration unit of the treatment system, while non-compliance of the =10 to <50µm and bacteria factions indicate problems with the disinfection unit.

Elsewhere, the Finnish Transport Safety Agency (Trafi) published a review of methods available for analysing treated ballast water, concluding that ATP, or Pulse Amplitude-Modulation (PAM) technologies, should be used to detect the effect of ballast water treatment in 'a simple, quick, portable and relatively cheap manner'.

An aqua-tools test kit.

Although the study focused primarily on the water conditions and characteristics found in the Baltic, it evaluated the efficiency of various test kits to assess their reliability in waters of low salinity and temperature and high turbidity. The objective was to compare the advantages and disadvantages of various methods and to provide recommendations as to the most suitable systems available.

Researchers found that the use of these methods – both indicative methods that provide a direct measurement of a representative sample from the ballast water tank – increased the reliability of ballast water sampling where different types and sizes of organisms were detected.

However, while both methods were considered reliable indicative monitoring tools, the Trafi study found that ATP technologies had the 'essential benefit' of being able to measure and detect all organism categories (bacteria, >10 to <50µm and > 50 µm) listed in regulation D2 of the BWM Convention. PAM measurements were found 'somewhat limited' as they only detected the presence of

phytoplankton.

"The benefit of ATP method over PAM fluorometry is the ability to evaluate the concentration of all organism size categories including autotrophic and heterotrophic organisms," the report said.

The Trafi study - 'Literature Review of the Indicative Ballast Water Analysis Methods' - also provided important recommendations on how best to prevent the over- and under-estimation of organism concentrations during sampling; a problem that can result in an incorrect evaluation of ballast water treatment systems efficiency.

Other than reliability and performance efficiency, user-friendliness, training, and procurements costs were also assessed in the study, with Trafi suggesting 'indicative analysis sampling devices should cost less than $100,000, with a maximum analysis time of two hours.'

For example, aqua-tools said that its ATP-based monitoring kit costs below $5,000 and less than $100 per sample analysis for the three factions. The price range for the PAM sampling devices assessed, however, varied between $4,000 and $15,000.

The IMO has already set quality standards for discharged ballast water, which define the permitted levels of organisms. The organisms defined in the standards are:

- Planktonic micro-organisms, ie, organisms greater than 50µm in size and organisms between 10 and 50 µm (often organisms >50µm are referred to as zooplankton and between 10-50µm as phytoplankton, but this is incorrect, both size classes can include both types of organisms).
- Bacteria (less than 10µm in size); ie, vibrio cholera (the toxic and infectious serotypes O1 and O139), Escherichia coli and intestinal Enterococci (species that indicate faecal contamination).

Several methods have been developed, and continue to be developed, to analyse ballast water before and during discharge. A series of trials were carried out in 2015, using the German state research ship 'Meteor', on a voyage from Mindelo, Cape Verde to Hamburg.

Meteor is equipped with an Optimarin BWMS consisting of a filter and UV reactor, and multiple sampling ports to facilitate sample collection for compliance monitoring. Around 20 international researchers undertook 28 different tests to provide a comparison between different methods for measuring concentrations of organisms in the >50µm, 10-50µm and 10µm ranges. It was thought that this was the first occasion when multiple sampling devices and monitoring solutions had been tested in sea conditions.

The tests showed up significant disparities between readings from the various sampling methods and analytical tools. The results were published in a report (Bradie, J. METEOR Voyage M116/2: Report on performance of ballast water collection and analysis devices, published by BSH (German Federal Maritime and Hydrographic Agency, 2016) and the findings were summarised in a further research paper (Bradie, J et al, A Shipboard Comparison of Analytic Methods for Ballast Water Compliance Monitoring, published in the Journal of Sea Research in 2017.

Three sampling methods and a number of analytical tools were tested. The samples were collected by two skid devices and one plankton net. The analysis results were compared with results obtained by microscopy and various high-end scientific methods in order to establish whether quick, indicative on board sampling could prove to be consistent and reliable.

Traditionally, plankton nets have been employed for sampling during type approval testing of ballast water treatment systems, but these require a large volume of water to be collected for assessment, and the 'waste' has to be disposed of, which can be impractical on board. The alternative is a sampling skid system, which allows sampling to be carried out in a much smaller space, and, in the case of 'closed' systems, the water can be returned to the ship's ballast tanks post-sampling.

Test timescale

Several analysis methods are available, the most accurate of which, such as microscopy, needs sophisticated equipment, skilled observers, and a relatively long timescale to obtain results. Therefore, there has been an emphasis on indicative methods, which can be used on board by ships' crew. These do not rely on an accurate count of the various organisms but rely on indicators to assess biomass and/or viability, thus providing a quick indication of compliance or non-compliance with BWMC discharge standards.

The 'Meteor' tests were designed to support efforts to establish uniform methods for ballast water sampling and analysis under the IMO Convention. Data was collected for four principal comparisons:

- Ballast water sample collection methods (plankton net, and two sampling skid systems;
- Ballast water analysis methods for measuring abundance of organisms >50µm;
- Ballast water analysis methods for measuring abundance of 10-50µm organisms;
- Analysis methods for organisms <10µm (bacteria).

Aqua-tools CEO Marc Raymond.

One of the two sampling skids was provided by SGS of Switzerland, while aqua-tools supplied an ATP analysis tool. The two companies have since joined together to market the B-QUA test kit, which provides the requisite equipment to perform 100 analyses for each faction - >50µm; 10-50µm and bacteria.

Verified in the 'Meteor' trials, the aqua-tools' monitoring kit can provide measurement readings in under 1 hour. Organisms in the 10-50µm and >50µm ranges are analysed within 50 minutes, while results of bacteria analysis can be provided in 15 minutes. Aqua-tools claimed that minimal training is required to use its patented ATP 2G, while other monitoring protocols involve knowledge of microscopy and detailed awareness of the taxonomy of zooplankton and/or phytoplankton.

Only the SGS/aqua-tools ATP method was able to detect all 'living' bacteria, whereas competing systems for the bacteria fraction was specific to only one bacteria species and used a selective substrate that did not detect slow growing or injured cells.

According to aqua-tools, there is no 'one size fits all' ballast water sampling and analysis method. But having decided what the operator wants to know, what he needs to measure, how the results should be analysed, and the required budget, operator skill set and timeframe, ATP 2G represents a viable solution that meets IMO and USCG guidelines. It is the only system capable of addressing all D2 organism size groups, the company said. TO

BWTS integrity and crew training key to compliance

The implementation of the Ballast Water Convention (BWC), agreed by the IMO's MEPC at its 71st meeting in July, 2017, is likely to gather pace this year.*

Ships under construction whose keels were laid on or after 8th September, 2017 must conduct ballast water management that at least meets the D-2 standard from the date they are put into service.

For existing ships, the date for compliance with the D-2 standard is linked with the first renewal of the ship's International Oil Pollution Prevention (IOPP) Certificate after September, 2019.

To date, 67 states have ratified the BWC, representing nearly 75% of the world's merchant fleet tonnage (Malta, Jamaica, Portugal and the Seychelles have committed to accession since the Convention entered into force in September and Argentina ratified in August).

Some states are already moving ahead of the regulators, driving enforcement of the BWC ahead of the IMO timeline. For example, Since 21st June, 2012, the US Coast Guard (USCG) ballast water regulations have required vessels that discharge ballast in US waters to either install a treatment system or manage their ballast water in another approved way.

In September, 2017, the California State Lands Commission issued a letter to clarify the new requirements for vessels arriving at the country's ports on or after 1st October, 2017, making clear its position on compliance with the Convention.

Shipowners choice

This move is already being followed by other leading maritime nations, including Saudi Arabia, and moving into 2018, it is highly likely that more nations will follow suit. This leaves shipowners and operators with a fundamental choice - to invest in a BWTS and retain full access to markets and countries, or to delay investment and risk the consequent loss of trade.

It is no secret that there are concerns around the performance and accuracy of BWTS, and this is a key factor in shipowners' investment decisions. At a recent conference in China, one representative reported unsatisfactory performance based on experience with the BWTS fitted on 36% of its fleet. This has caused crews to lose confidence in the treatment systems and has induced a fear of additional commercial risk amongst shipowners.

Spot checks

Chelsea Technologies Group (CTG) has direct experience of ballast water management and compliance with the high standards demanded by regulators. CTG's FastBallast compliance monitoring system was identified by Saudi Aramco's in-house marine biology experts as the most accurate solution in the market for the sampling and testing of ballast water, and will be used to conduct spot checks undertaken by third-party sampling companies.

FastBallast is the only technology capable of operating in a continuous flow-through mode, while providing a high degree of accuracy with a representative report on discharge compliance.

It is capable of determining the phytoplankton cell density of ballast water to IMO D-2 & USCG Discharge Standards (10 to 50 µm range), with an equivalent degree of confidence as laboratory analysis.

Installing BWTS is a costly undertaking, and confidence in the reliability and integrity of the monitoring systems is critical. False readings could lead to delays with port state control, fines and potential reputational damage.

Chelsea Technologies Dr Brian Phillips.

Crews need the training to give them the knowledge and expertise to spot any issues with the compliance data, as failure to do so will prolong damage to the marine environment and will have a significant impact on a company's brand and reputation.

For shipowners, this will lower profitability and reduce the available share of the market.

TO

**This article was written by Dr Brian Phillips, Managing Director, Chelsea Technologies Group.*

Ballast Water treatment using proven technology

Shipowners, managers, and operators should aim for training excellence, rather than just attaining the minimum standards required.

Several shipowners and managers have spoken out about the risks of installing ballast water management systems (BWMS) that may pass tests to gain the necessary approvals, but fail to do the job when installed on a ship.

For example, Ioannis Stefanou, Wallem Shipmanagement' group technical director, which has managed more than 40 BWMS-equipped vessels, wondered if they actually work.

"By work, I am not referring to if they treat the water to the desired level, I mean whether or not they are operational. The answer to this is that unfortunately many don't, at least not in such a straightforward way as many manufacturers would like us to believe," he explained.

Wallem has used five different treatment systems, from various manufacturers. "Only two thirds of the systems installed were fully operational on board within the first six months – on some vessels they were not fully operational even after a year. The problems weren't inherent to a specific type of technology or manufacturer," Stefanou said.

However, he did identify that in his experience one technology exhibited a 100% record in being problem-free. Stefanou believed his company's experience is mirrored among other users.

Reederei Nord is another early adopter of BWMS technology, deciding in 2013 to fit filter/electrochlorination BWMS to a series of four tanker newbuildings. Reederei Nord's technical manager David Cox told the 2017 'European Ballast Water Treatment Technology Conference' in Amsterdam that the systems have been in use since the ships were delivered, with few problems.

Indeed, despite all the controversy and conflicting information concerning BWTS, there is one technology that is claimed to be proven and robust: electrochlorination – the core technology behind most industrial water treatment systems installed over the past 50 years and incorporated in the patented SeaCURE BWMS developed by US-headquartered Evoqua Water Technologies.

This system is geared to larger vessels, typically tankers and bulk carriers. The technology has evolved from the water treatment systems Evoqua has supplied to the municipal and industrial sectors, as well as the company's 40-plus years' experience with its patented Chloropac marine growth prevention system (MGPS). Both the SeaCURE and Chloropac systems use electrochlorination technology to limit marine growth in ballast water, seawater piping and heat transfer systems of ships and offshore installations.

Both Evoqua's Chloropac and SeaCURE systems are installed on board to produce sodium hypochlorite from seawater, and so there is no need to transport and store potentially hazardous disinfectant chemicals. Sodium hypochlorite is a powerful biocide that is capable of reliably destroying or incapacitating microbial contaminants and invasive species.

In addition to proven in-situ production of biocide from seawater via electrochlorination, Evoqua's SeaCURE system also combines prefiltration in a unique way. In ballast water treatment applications, the produced hypochlorite is combined with a filtration stage pre-treatment, which first removes larger organisms and sediment. SeaCURE is designed to protect the filter from blockage and biofouling by use of a unique patented 'trickle dosage' operating process, which maintains a chlorine residual at the filter.

Small footprint

A further feature of the latest SeaCURE system is its compact size and small footprint, an important consideration for cargo-carrying vessels — particularly when retrofitting in existing ships. Evoqua has re-engineered the system, reducing the number of components and resulting in a significant reduction in size and weight. The result is a skid-mounted 'plug

Evoqua's SeaCURE BWTS has a small footprint.

and play' system that is 76% smaller and 85% lighter than earlier SeaCURE equipment.

According to Evoqua's Global Vice-President, electrocatalytic business, Ian Stentiford, this new modular system is capable of reducing installation time and complexity while enhancing operation and service. The re-engineering has, in addition, significantly extended the life of the system, reducing maintenance costs, he claimed.

A single SeaCURE unit can treat flow rates of up to 6,000 cu m per hour though for most ships the smaller 3,000 cu m per hour capacity unit will suffice. If on the other hand, even greater flow rates are needed, then systems can be installed in parallel. This means that any concern about finding space for all the components is alleviated with the remodelled SeaCURE system, which makes for a much easier installation, the company said.

SeaCURE uses a proprietary control algorithm to optimise flow through the system to achieve maximum flow rates. Re-growth during long voyages in ballast is mitigated and re-growth tests required by the latest IMO G8 standards have been carried out successfully. Independent laboratory tests have shown that all USCG requirements can be met.

In addition, as the SeaCURE system only needs to treat the ballast water during the uptake/ballasting operation, there will not be any flow constraints during cargo loading and de-ballasting. Tests have been undertaken and proven in real water conditions, with real organisms, to verify that this feature works in real world environments. SeaCURE systems are fully type-approved to IMO requirements, and have been engineered to meet the USCG type-approval standards, for which it has completed initial certification testing through an independent laboratory.

The USCG waiting game for full approval appears not to have deterred some shipowners and shipbuilder from investing in electrochlorination technology. Last year, a South Korean shipyard ordered 3,000 cu m per hour capacity units to be fitted on two Aframaxes under construction for a Singapore-based shipowner, scheduled for delivery in 2018.

While the SeaCURE system has been installed on a number of newbuildings, it is also making headway as a retrofit solution. Several system retrofits have been carried out, including to the Suezmaxes 'Montestena' and 'Montesperanza', operated by Spain's Ibaizabal Tankers.

Shipping analyst Clarksons Research estimated that around 30,000 ships would need to be retrofitted, representing a market that could be worth around $60 bill over the next five years. Evoqua claimed that it has not yet come across a ship where there is insufficient space for one of its SeaCURE systems, but the key to a successful retrofit is to allow sufficient time for planning, with engineering provider, system supplier class and owner closely involved through the process from the earliest stage.

Matt Granitto, Evoqua's SeaCURE business manager, said: "As with all ballast water retrofit projects, timing and planning are the most crucial aspects. Certainly, the absolute minimum time to plan for a retrofit installation is five months prior to undertaking the actual work. Anything less and it's unlikely the project will be completed during the vessel's scheduled drydock.

"Pre-planning ultimately minimises the risks involved and allows all parties to optimise their time and resources appropriately so that no further steel cutting and hot works are required when the system is installed and commissioned at a later date," he said.

Hazardous areas

One important aspect for tanker owners in particular, is the need to consider when planning a retrofit the cost and time associated with de-gassing any hazardous areas. This complicated procedure can take several days to make pump rooms and other hazardous areas safe before any hot work or bulkhead penetrations can be carried out in drydock.

Evoqua also advocates the early procurement of filters, valves and other third-party equipment to ensure that suppliers have enough lead time. Any delay in delivering key components will result in significant costs to the owner. Effective planning also allows the owner and shipyard to get the necessary approvals in place and fabricate filter foundations and other structures prior to the vessel docking down. It also helps to mitigate any minor works or the ergonomic re-siting of components for maintenance practicality.

One additional BWMS aspect thought to be unique to SeaCURE is its dual functionality. Because of its evolution from, and similarity to, the company's established Chloropac marine growth prevention systems (MGPS), this system can be configured to also work as the ship's MGPS, protecting against the build-up of marine biofouling in seawater cooling systems. When installed at newbuild stage, or during upgrade or replace the MGPS during retrofit, the SeaCURE product can provide both ballast water treatment and marine growth prevention capabilities.

"This configuration provides return on investment as shipowners no longer need to invest in two separate systems," explained Stentiford. "I don't know of any other system that combines ballast water treatment with marine growth prevention."

Last December, Evoqua initiated the second phase of its partnership with Chinese marine equipment supplier Hai Cheung Trading.

In what marks an important development to the partnership agreement signed in February last year, and which initially covered the sale and supply of the SeaCURE system into the Chinese market, Hong-Kong based Hai Cheung will now manufacture and distribute the BWMS solution under licence in China.

Speaking at Evoqua's exhibition booth during December's Marintec exhibition, where the agreement was officially endorsed, Lars Nupnau, Evoqua's director for global business development, ballast water, said: "We are delighted that we have found in Hai Cheung a competent partner that has the technical expertise and know-how to manufacture the SeaCURE system on our behalf."

Randolph Zhang, President of Infinitus Holdings, Hai Cheung's parent company, said: "The evolution of our partnership with Evoqua is an important milestone in the Chinese ballast water treatment market. The Asia/Pacific region is expected to witness fast growth for BWTS installations. Hai Cheung can now provide that market with Evoqua's electrochlorination technology built locally.

"The Chinese ballast water treatment sector is expected to experience rapid growth over the next several years and the agreement we have signed we expect will enable both Evoqua and Hai Cheung to be at the very forefront of that market," he said. TO

Evoqua's Ian Stentiford.

Unique steering gear room BWTS retrofit

SCF Management Services (Dubai) asked Argo Navis Marine to undertake a 3D scan and survey on the Ice Class Suezmax 'Aleksey Kosygin' to prepare for a ballast water treatment system retrofit.

Argo Navis co-owner, Andreas Zontanos, said," We use a standard approach for the ship surveys and 3D scanning of ship spaces ─ visit specific areas on the vessel, look for auxiliary systems, gather information and follow a checklist of criteria. In 95% of our surveys [more than 150 ships], we have considered the steering gear room (SGR) as an optimal space for installation, but up until the 'Aleskey Kosygin' retrofit it has never been chosen by the shipowner."

"The BWTS manufacturer is typically not involved in 3D scanning, but in the case of the 'Aleksey Kosygin', the owner requested that we perform our own vessel survey in addition to the engineering integrator's 3D scan due to the custom designed arrangement of our treatment system for this particular installation," explained Leif Melhus, Ecochlor Senior Mechanical Engineer on the project.

"The benefits of a treatment system installation in the SGR are obvious ─ savings in installation and maintenance costs, and a reduction in cabling and piping. The greatest benefit is the elimination of building a deckhouse for the treatment system either on a free funnel superstructure or the main deck. Until now, there has been very limited knowledge of this type of modification for a retrofit and the ease and comparative success of this installation was one of the most important factors of this project," said Zontanos.

Aleksey Kosygin is a 163,545 dwt crude oil tanker built in 2007 with an ice class notation.The installation was subject to DNV GL, Liberia Flag and owner representative inspection and approval.

The Ecochlor BWTS, consisting of the ClO2 generator, treatment system control panel and chemical storage tanks with secondary containments, was installed within a new BWTS dedicated space at the port side of the SGR, separated from the rest of the SGR by a new bulkhead.

The chemical filling and ventilation station was located above the SGR on the upper deck. The filtration system consists of two filter units mounted vertically and installed inside the cargo pump room (CPR). A third filter unit for aft peak tank (APT) treatment was installed in

the engine room and an Ecochlor remote monitoring panel was connected inside the cargo control room, close to the control console/computer.

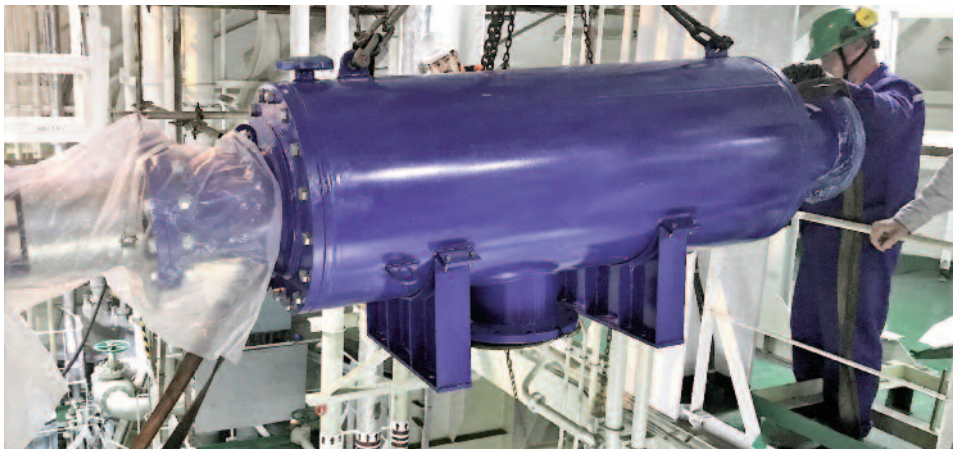
"There were not any special challenges in this project. The Santierul Naval Constanta in Romania was a shipyard that we had not previously worked with, but after they understood the extent and difficulties of the project, they worked carefully and effectively," said Zontanos. "As the project integrators, we feel communication between all the stakeholders starts well before the ship arrives in the shipyard. We met twice with the shipyard representatives before the commencement of the project at drydock. Our role was to assist the superintendent, who is the project manager, to familiarise the shipyard with the entire retrofit project: starting with the engineering drawings; sequence of work; scheduling; and familiarisation of the crew with the new piping arrangements, power supplies, other auxiliaries, etc. and their function."

Pre-drydock

The first day boarding the vessel, six days prior to the scheduled drydock, the Ecochlor representatives met with the shipyard, integration engineering firm, superintendent and crew to introduce themselves and discuss plans with the yard personnel and superintendent. Group meetings were scheduled for each morning of the drydocking to discuss the goals of the day.

Daily reports and photos of each day's progress, including any installation successes, issues and/or delays, were provided by Ecochlor and Argo Navis. These reports allow non-present supporting members of the installation for the BWTS manufacturer and the shipowner to maintain up-to-date information on the installation. Foreseeable issues and delays were discussed beforehand to allow for changes in procedures to make for a smooth and successful installation. The consistent, open lines of communication are a critical factor for the success of any retrofit project.

Transport of port filter.


Lowering of AP filter.

The BWTS equipment had been delivered to the shipyard and the Ecochlor team immediately started on the inventory. Crates were generally found in good outer condition, but some had moisture and water traces inside requiring an additional check of the valves, flow meters and injection quills.

During the pre-docking period, the shipyard started the pump room hatch and SGR opening preparations, cut and opened the APT deck areas, set up scaffolding, and constructed the chemical tank and ClO2 generator foundations.

Drydock period

On the seventh day, the access openings in the steering gear room were temporarily closed, the gangway was removed, and by early afternoon the ship started manoeuvring for drydock operation.

Once in drydock, the work started to move quickly. The Ecochlor commissioning engineer arrived on board and foundations of the treatment system and aft peak filter were lowered into their respective locations. Welding started for the chemical storage tank containments and foundations for the filters, as well as the treatment system. The new bulkhead installation in the SGR was also initiated.

Two weeks into the drydock, the bulkhead construction was inspected and approved by the class surveyor, the foundation welding and aft peak filter transfer were complete, and piping and cabling were in progress. The transfer of the treatment system and filters were now in place.

Prior to the final - and often very rushed - drydocking days, the Ecochlor team leader took the ship's crew on a training tour around the vessel to the various installation points of the BWTS, (ie engine room, steering gear room, pump room) to familiarise them with the system components. Further hands-on training took place with the startup of the system and commissioning.

A second shift was added to the shipyard schedule to allow for the completion of cabling, piping, welding platform supports and painting. During this time, the commissioning team started electrical testing, aft peak tank filter equipment checks and ballast pipe pressure testing. The results of the tests were presented to the class surveyor and the commissioning was successfully completed as scheduled.

Conclusion

"Regular, open communication among the stakeholders is the most important factor for the success of the project. Any consequence of mistakes, poor design or planning can by eliminated when communication is effective. Even the best preparation can be diminished due to poor communication and co-ordination during the actual working period," explained Zontanos.

"Even though our system is fairly simplistic, our experienced installation team needs to be working at the drydock alongside the shipyard, superintendent, engineering integrator and crew to ensure that the ballast water treatment system is retrofitted properly and operating effectively at commissioning.

"Our company philosophy is that the sale and installation of an Ecochlor system initiates a relationship with the shipowner and operator that will last for the life of the vessel and this co-operative relationship begins at the installation!" said Tom Perlich, Ecochlor founder and president. TO

Keeping the hull clean

Ever since our predecessors first took to the water, it was realised that smooth surfaces glide through the water much more efficiently, and consume less energy, than rough surfaces.*

Unfortunately, even if a surface starts out smooth it will soon attract weed, slime, barnacles and other forms of growth, which increase resistance and make the vessel harder to push through the water.

Years ago, the solution was to keep the bottom of the ship clean. With wooden hulls this was not easy, ships either had to be scraped by divers or beached for a more thorough scrubbing. Then, it was found that if a coating of copper was applied, fouling was reduced, as well as the surface being easier to clean.

Anti-fouling paints were introduced around 65 years ago. The best anti-foulings contained tin compounds – commonly tributyl tin (TBT) – which was designed to act as a biocide; ie over time the tin compounds leached out of the paint to kill off any biological life forms that attached to the hull.

As is now known, their effectiveness was their downfall, causing undue harm to the marine ecosystem in places where there was a high concentration of biocides in the water. The highest concentrations tended to be where a lot of pleasure boats were moored, such as in marinas, as a high concentration of boats meant a high concentration of toxic tin in the water. This led to a ban on TBT paints for pleasure craft, closely followed by an IMO blanket ban across all vessels.

With TBT paints, the difficult task of hull cleaning largely disappeared. The nature of the coating meant that its effectiveness diminished gradually over time as the biocide leached out, thus needing drydocking and recoating every few years, rather than a frequent cleaning regime.

Industry efforts then concentrated largely on finding a less-toxic alternative to TBT. The obvious answer was a return to copper. Cuprous oxide was initially substituted for TBT in biocidal coatings. This did the job, but nowhere near as effectively, and still led to contamination. Copper may be less harmful than tin, but it is still toxic, and its widespread adoption has meant that in many ports, copper levels in water have risen well above the perceived safe limits.

The problem was exacerbated by the fact that because copper-based paints are less effective than TBT, recreational craft in particular have increased the frequency of their hull cleaning regimes. As well as removing fouling, the action of in-water cleaning releases additional biocide. Estimates suggest that up to 50% of the pollution is a direct

result of in-water cleaning. The result is that application and in-water cleaning of copper-based coatings on pleasure boats is now becoming subject to restrictions and bans.

Washington State in the US was the first to issue a ban on copper anti-foulings for recreational craft under 19.8 m in length, with California likely to follow. Europe is travelling down the same path, with restrictions in Sweden, Denmark and the Netherlands. It seems inevitable that copper will go the same way as tin, with talk of a ban for leisure craft by 2020 and a universal ban sometime after.

Foul release coatings were another significant development. These are claimed to be non-toxic, relying on a smooth, slippery surface on which it is difficult for fouling organisms to gain a hold. When a ship travels at speed through the water, the fouling is displaced.

Most of these paints rely on silicone-based polymers for their effectiveness, but silicon itself can contaminate its surroundings. The paints can be difficult to apply, and tend to be less durable than the harder biocidal coatings. Because of their slippery nature, and the need for primers, tie coats and top coats, they are difficult to repair.

With shipping, keeping fuel consumption at an optimal level is crucial not only to economics, but also to emissions. But the environmental benefit of an effective means of minimising fouling extends beyond the atmosphere. Heavy fouling on ships hulls can lead to introduction of invasive species, in similar fashion to the transport of non-native species in ballast water.

A fouled hull is likely to offer around 20% more resistance than a new hull, and a 20% increase in fuel costs is an intolerable burden in today's economic climate. Cleaning can easily remove 30% or more of an antifouling coating, which not only adds to local contamination but also significantly shortens the lifetime of the paint.

With conventional paints, in-water cleaning using divers with scrapers, pressure washers or self-propelled hull cleaning devices is therefore impractical. Estimates suggest that full blasting and repainting will be needed at least every three to five drydockings, that is to say every 10 years or so, probably more frequently with foul release type coatings.

Repairs needed

Any hull coating is likely to need local repairs in drydock to rust, scratches, chips and general wear and tear. Such repairs are likely to result in a less-than-ideal surface, so a repaired hull will never be as smooth as a newly-coated one.

So, accepting that no coating has yet been invented that is completely resistant to fouling, and some maintenance will always be needed, Subsea Industries said it can offer a solution that goes back to basic principles – a hard, smooth coating that will last the lifetime of a ship, and, using modern technology, can be kept clean with a minimum of time and effort. This solution is centred around the use of non-toxic surface treated coating (STC) combined with routine in-water cleaning.

Subsea Industries' Ecospeed is a durable, one-coat system based on a glass flake vinylester formulation. It can be easily applied using conventional equipment, in two coats of 500µm thickness, with no primer or tie coat required.

Its durability has been well proven by its adoption for the hulls of ice-going ships. It has been employed by the British Antarctic Survey (BAS). It was applied to BAS 80 m-long 'Ernest Shackleton' in 2009. When this ship was drydocked in Frederikshavn, Denmark, in 2017, the coating was found to be in very good condition.

BAS superintendent, Andrew Webb, said; "'Shackleton's' hull condition is the best I have seen after typical ice year operations. We tend to account for touch up coats every other year to areas impacted by the ice, but this year we needed to repair even less surface area than expected, despite the vessel encountering heavy Antarctic ice."

This experience led to the choice of Ecospeed for the hull of the 15,000 gt 'RRS Sir David Attenborough', a new Polar research ship under construction at the Cammell Laird shipyard at Birkenhead, UK.

Webb added: "The shipyard initially wanted

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to apply its preferred supplier's coating system, but based on our experience of this coating on the 'James Clark Ross' and 'Ernest Shackleton', we wanted Ecospeed. We already had this system on the entire hulls below the water line of both research vessels and found it much easier to repair. It doesn't need to be applied under strict environmental conditions or require the hire of any specialist application equipment."

Cold and warm seas

This experience is echoed by Hamburg-based Interscan Schiffahrt, which applied Ecospeed to one of its Arctic vessels, the 3,000 dwt Patriot, during a routine drydocking in 2005. The coating has now lasted well over its 10-year warranty period. Interscan has since applied Ecospeed to the hulls of six more of its ships.

Such a coating is highly suitable for Polar conditions, where the sea temperature is too cold for fouling to be a problem. But one of the Interscan ships, the 6,288 dwt Karin, operates in warmer waters.

Interscan head of chartering, Michael Tensing, said: "'Karin' sails in warm waters and in those conditions it might need an underwater cleaning every six months but it is an easy procedure because the coating is very tough. Cleaning takes only six to eight hours."

In-water cleaning may have gone out of fashion but Subsea Industries has developed its own equipment, that is offered on a worldwide basis through a network of strategically-located stations.

The systems are designed to remove fouling without causing damage to the coating – in the case of a hard coating like Ecospeed this is no problem, and the smooth nature of the Ecospeed surface means that fouling is removed easily, often in a matter of a few hours to thoroughly clean the whole underside of the ship.

Hydrex said it is company policy not to carry out underwater cleaning activities where these might result in an increase of pollution, but as Ecospeed is non-toxic, such problems are limited to other manufacturers' coatings. The equipment can additionally be made available to shipowners wishing to arrange their own underwater cleaning.

An Ecospeed application and the cost of regular hull cleaning is easily offset by the reduction in drydocking time and costs along with the lower fuel costs an optimally smooth, foul free hull provides. Further savings arise because the coating is intended to last the lifetime of the ship, so there is no need to blast and re-coat at drydocking, with any necessary repairs able to be carried out simply, cheaply, and durably.

There is an additional bonus – the absence of toxins, lower emissions and reduced risk of non-native species benefits the environment, adding to an operator's 'green' credentials.

Antwerp-headquartered Subsea Industries was established in 1983 and claims to be a pioneer in the development of hard hull coating systems and hull and propeller cleaning systems.

In 2002, after three years' extensive research and development, the company introduced Ecospeed as an environmentally safe underwater hull coating system, capable of improving ship performance, providing long-term fouling protection and reducing the impact of ship operations on the environment. Ecospeed now has more than 700 marine references.

The coating is type approved by Lloyd's Register as an abrasion resistance coating for Ice Class ships and has DNV GL approval for use as a coating in ballast water tanks. TO

**This article was taken from a paper written by Subsea Industries.*

How to keep staff happy and motivated

Tanker Operator's Hamburg conference covered a lot of ground in discussing keeping seafarers and shore staff happy and motivated.

Kicking off proceedings, **Martin Shaw**, managing director Marine Operations and Assurance Management Solutions (MOAMS) said that the industry is now more complex and less predictable.

In a presentation entitled 'Putting People at the Centre of Ship Operations' he said that often the answer was to create more processes, thus creating more complexity and work, trapping people on board ship in an unyielding structure that punishes initiatives.

He described the complex tanker sector in a series of graphics and showed an industry of conflicting goals and duplicate and/or conflicting requirements.

People add value - they're not just an 'error prone' component, he said. "Should we be thinking of a new paradigm," he asked. "The

Martin Shaw.

onshore paradigm has moved on. Do we need to look at it and change it? If so, be careful not to loose the good bits."

He showed the septagon model in which all the various sectors of vessel operation are joined up with operating problems and causes.

New technology introduces more different ways to have an accident. More complexity means more work that kills the passion for the job, he warned. Many things have happened in the shipping industry over the past 20-30 years when people concentrated on safety and avoiding pollution, but now there is a higher level of complexity.

As for this complexity, Shaw split it up into simple, complicated and complex - Simple, he explained was understood with predictable changes; complicated - could be understood to a certain extent; complex - cannot be understood.

Management systems - a vision of what the machine is that introduces processes on board ship. There is a lot of information but how does a company file it? He warned that a computerised Q&A session is not necessarily a good thing for the user, as it could gives him or her the wrong conclusions.

Some KPIs are good but some are bad, he said.

Resilient

A resilient system is one adapted to work for a company and gives an understanding of what to do to keep the organisation running properly.

In conclusion, he asked - Is it complex, or did we make it complex? Don't just serve the machine or workload, otherwise it will go out of control. A high workload and prescriptive systems mean low resilience, he warned.

Systems, people and technology need to be joined up to deal with complexity. The late 20th century paradigm is based on a prescriptive process and 'unruly technology' with limited application for the person. If you want resilience then put people at the centre and design hardware and processes around them, he stressed.

People add value. On board ship, they can either make it or break it. Serve the machine and it will go out of control. The man-machine interface has not been well research, he stressed.

Hamburg Tankers' **Stephan Polomsky** gave some thoughts for discussion in his presentation, which covered shipping's consolidation and the move towards autonomous ships.

Stephan Polomsky.

He gave an illustration as to how the container sector has consolidated down the years, pointing out that by 2014 almost 80% of the teu capacity was controlled by the top 20 players up from around 65% some 10 years before.

In the tanker sector, the consolidation had fallen to around 30% in 2014 of the capacity being controlled by the top 20 players, from 38% recorded in 2004. However, there has been a bit more consolidation since then - Edit. The figures were taken from Clarkson Research.

The current drive towards autonomous shipping could be explained by the elimination of human error, reduced accidents and their related costs. This move could also solve qualification and training problems, reduction of costs- for example crew costs account for around 50% of OPEX - increased safety on board, increased system reliability and in some cases, manufacturer driven.

For example, around 80% of accidents were

caused by human error, but he warned we were approaching this a little bit too quickly. This was driven partly by manufacturers and partly because seafarers were no longer interested in the job. He said that some research institutes were predicting around 250 autonomous vessels in service by 2025.

Human errors from ship to shore was more risky as maybe the office was handling 100s of vessels at the same time.

He said that there had been some very ambitious figures published. For example, an Allianz study said that human error was responsible for around $1.6 bill damages in five years - will they totally disappear? Polomsky asked. Another example was the Rolls-Royce claim that about 22% of costs could be saved per transported tonne, based on a 20,000 dwt vessel.

The risks to autonomous ships include cyber attacks, such as suffered by Maersk and BW Maritime recently and data accuracy, which could cause problems. He also highlighted sustainability, as ships and software have different business models - for example, ships are built for around 25 years whereas software can last for just six months before it is outdated. The replacement system might not be compatible, he warned.

He also cited social responsibility, as there are around 1.65 mill seafarers with 20% from the Philippines who send around $5.5 bill home each year, sometimes supporting seven to eight people. There would also be heavy impact on schools, training centres and agents. He also pointed out that up the end of May last year, some 9,500 refugees out of 60,000 who tried to cross the Mediterranean needed rescuing.

How will an autonomous ship be insured? Who will be responsible for any incidents - software developers, system suppliers, interface suppliers, builder or control centres? “A pilot won’t like to board an autonomous ship, as he or she will be responsible for everything,” he pointed out.

There could be several different types of autonomous’ ship operations. For example a dedicated pier-to-pier application, a partial application whereby the engines could be operated remotely and an autopilot used for deepsea ships. A mixed application could see a manned vessel be operated by remote control autonomously and A1.

There would be extra costs involved in an autonomous ship, as despite loosing the crew, the vessel will need thousands of sensors fitted.

However, he warned that there could be no ‘all inclusive’ autonomous application, due to the need for pilotage, mooring services, etc on all vessels.

He gave another example of tanker broking, which will still need a certain amount of human intervention, unlike containership broking, which could be undertaken autonomously.

Matthias Imrecke.

Holistic approach

The question of autonomy needs a holistic approach, Polomsky stressed, with all parties needing to be included in the innovation and development circle - manufacturers, builders, owners, operators and customers.

Shaw said that people program the systems - are they infallable, he asked? Who will monitor the software programs? “We should steer in a smart direction. It needs to be a sensible application,” he said.

Capt Matthias Imrecke tackled topics around the shore organisation, questioning whether the staff is ready for reflective learning, mentoring, safety leadership and to put passion back into shipping.

He said that he hears a lot of superintendents and HSEQ managers complaining about the standard of the crews. It is too easy to point fingers at the crew though. People should always remember when doing so, three fingers point back at them.

Although there were regulations dealing with shipboard activities, such as ISM, STCW, MLC, etc, it was still up to the officers and management to instil a sense of involvement on board.

By cost cutting, not only is quality lost but also time. He gave an example of an engineer superintendent going on board a ship saying that he knows the way to the engine room and then fixed the problem and disembarked without engaging properly with the seafarers on board.

Imrecke engaged the audience in discussing the impact and message of such behaviour.

Hence the shore organisation needed to take a leading role to improve the standard. Oil majors, such as Shell, have discovered that resilience, ie the care for people and an active leadership together with reflective learning and learning engagement tools are vital to reduce incidents.

The good thing is that reflective learning and mentoring is free, he said. It just needs someone to undertake it by sharing and transferring their knowledge. Some 70% of a seafarers knowledge comes from experience.

While seafarers generally know the theory they are not gaining experience, if we do not teach them, he said. Knowledge can be handed down from the organisation and its management.

“If we don’t teach the youngsters we will fail,” he said, adding; “We can also learn from the youngsters.” calling this reverse mentoring.

“However, it is a top down process throughout,” Imrecke said, “From a scale of nothing to everything.”

What it needs is a culture of change in the organisation and selecting and training those staff who are gifted with the ability to mentor others.

A mentor should have the skills set and be able to gauge a feeling for the individual being mentored, as to what he or she needs, he concluded. TO

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