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Contents

Angeliki Frangou's Navios Group operates 11 VLCCs, eight LR1s, 18 MR2s and two chemical/product tankers under the Navios Maritime Acquisition banner.

In addition, the company has another three VLCCs on order.

The Group has set up its own in-house shipmanagement company - Navios Tankers Management, which looks after some of the group's tankers but not all.

Navios also has interests in the drybulk and containership sectors, plus a logistics company in South America.

Not good news for tankers

We make no apology for not addressing the Iranian situation, as in a periodical, it is all too easy to get overtaken by events.

Instead, we will take a look at the growing de-carbonisation arguments.

An example is the UK's Department of Transport announcement earlier this year that it is seeking to introduce zero-emission vessels (ZEVs) by 2025, well ahead of the 2030 IMO requirement under the 2050 Greenhouse Gas (GHG) decree.

Maritime 2050, published in January, 2019, set out the UK Government's goal for zero-emission vessels to be commonplace globally by 2050 and under the Clean Maritime Plan, the UK expects that by 2025 all new vessels being ordered for UK waters operation will be designed with zero-emission propulsion capability.

Furthermore, by 2025 zero-emission commercial vessels will be fully operation in UK waters and that the UK will be building clean maritime clusters focused on innovation and infrastructure associated with zero-emission propulsion technologies, including the bunkering of low or zero-emission fuel.

Welcoming the plan's publication, Lloyd's Register CEO, Alastair Marsh said, "Climate change is one of the greatest challenges for the safety of our world. All participants in the maritime value chain must collaborate to accelerate the transition to low, or no, carbon operating models."

Maritime Strategies International (MSI) has produced a report on the consequences for shipping markets of a major shift in energy consumption away from hydrocarbons and towards renewables and biofuels.

This report was prepared on behalf of the European Climate Foundation. It projects two demand frameworks – 'Reduction' and 'Reference' – designed to provide broad narrative and structure to long-term global energy demand by fuel.

In the 'Reference' scenario, fossil fuels see an overall decline in their usage but this is nowhere near as severe as in the 'Reduction' scenario. Renewables see the biggest net gain across the forecast horizon, increasing from 5% in 2020 to 16% in 2050, whilst biomass/biofuels see substantial growth to 2030, rising to 12% of global demand, but see little proportional gain beyond that.

Global energy consumption in the 'Reduction' scenario is largely based on projections made for pathways consistent with limiting warming to 1.5 deg C above pre-industrial levels, as described in the IPCC SR1.5 report.

Under this scenario, global energy consumption is not projected to see significant growth out to 2050, but rather, fluctuate close to recent levels, with significant reduction during the 2020s.

Hydrocarbon use decline

Hydrocarbon use sees massive reductions with the most dramatic case being coal, which transitions from meeting about 25% of global energy requirements to less than 5% by 2050.

Over the same period the 'Oil+Liquids' share halves from about one third to less than 20%. Of the major hydrocarbon energy sources, natural gas sees the least relative reduction, but nonetheless drops from about a quarter of global energy to close to 15%.

Taking the 'Reduction' scenario as the focus of the report, MSI concluded that by 2050 world consumption of oil would halve, coal consumption would fall by 80% and natural gas demand would peak in the near term before declining.

Obviously, the tanker market is most exposed to the low carbon transition as its entire cargo base is made up of fossil fuels. Overall, MSI's models suggested that under the 'Reduction' scenario, tanker demand would fall by slightly more than a third.

Whilst falling demand is not unprecedented in the shipping industry, the sustained nature of the decline is. Setting aside the possibility of short-term factors driving spikes in demand, MSI's models suggest that tanker demand would fall year-on-year each year from 2025 onwards under the 'Reduction' scenario.

By contrast, although the collapse in tanker demand in the 1980s was of a similar scale at 39%, it was only five years before tanker demand began to pick up again.

Of course, such dire markets would provoke a significant supply side reaction, as owners slashed new ordering and scrapped uneconomic vessels. The tanker fleet would fall by around a third over the two decades after 2030.

As most owners would assume a minimum vessel lifespan of 20 years when evaluating an investment, investing in anything other than the oldest vessels today implies significant exposure to this transition. Notwithstanding this, discussion of these potentially disastrous demand-side dynamics is almost totally absent from the shipping industry, MSI said.

For many years, BP and Shell, plus others have issued annual reports trying to forecast hydrocarbon needs and production for decades ahead.

They have been accused of pandering to their shareholders but I'll let other people far more capable than me to pass judgement. However, it is noticeable that Shell in particular is now addressing renewables.

There is no doubt that the world's weather patterns are changing at an ever faster rate. Could this spell the end of the tanker sector as we know it?

I would certainly welcome any comments, which could take the form of a 'Letter to the Editor' to be published in a future issue of *Tanker Operator.*

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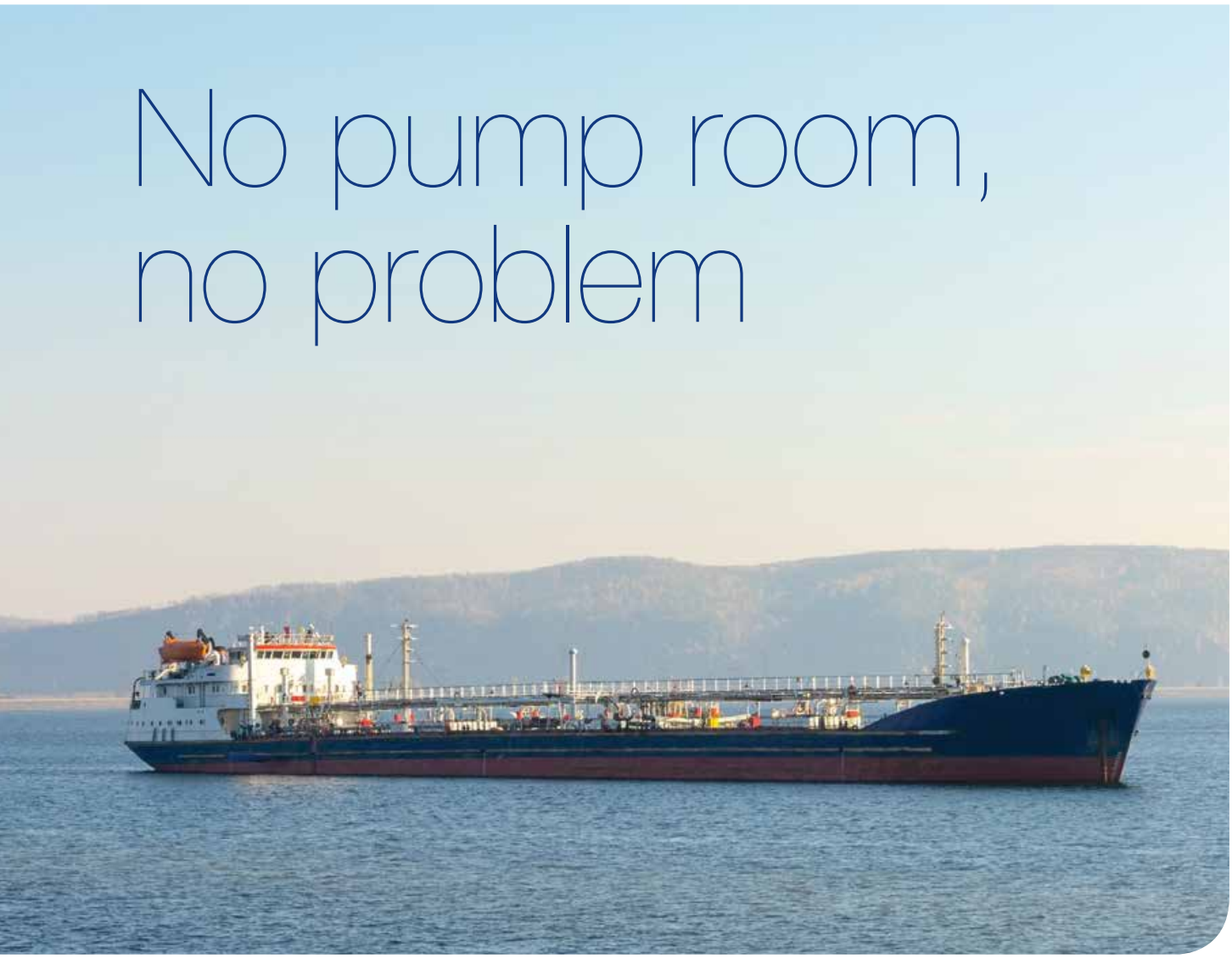
No pump room, no problem



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Crude market - a six month round-up

Despite timecharter rates firming during the last few quarters, the market has failed to sustain any significant momentum, due to uncertainties on the demand side*.

US sanctions on Venezuela and Iran continue to affect crude supply and in April, the US announced that it would not renew waivers that allowed some countries to keep on buying Iranian oil despite the sanctions.

Supply has been further restricted due to planned production cuts by OPEC+ and in the last group meeting held in June, it was announced that the cuts would be further extended in to 2020, in a bid to boost oil prices.

Last year proved to be a weak 12 months for tankers overall with both spot and timecharter rates remaining relatively flat. However, towards the end of Q4, the market picked up slightly and earnings improved for the larger tankers.

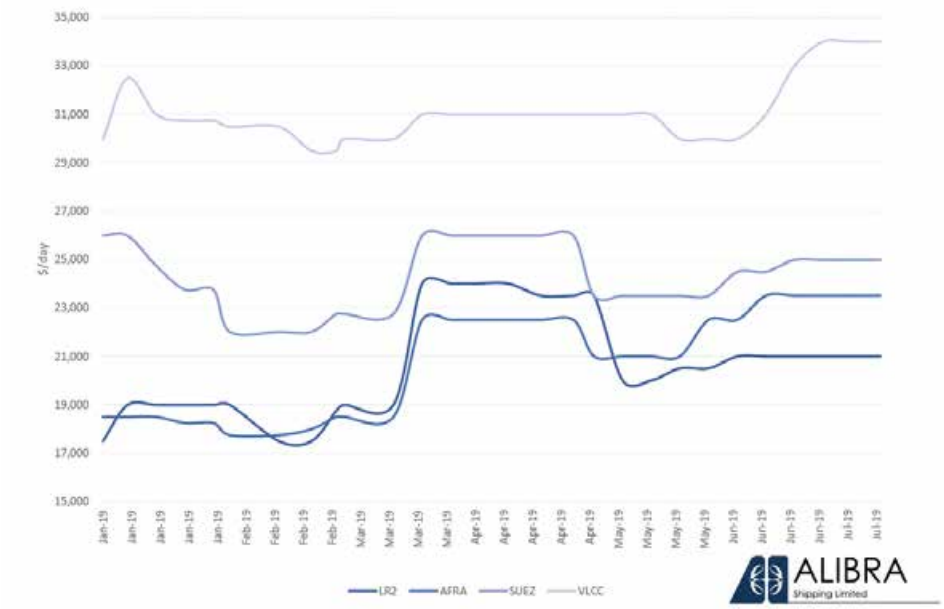
Although subdued, 1H19 saw the one-year rates for VLCCs increase by 35% from 1H18. The average for 1H19 was $30,720 per day. In June of this year, VLCC 12-month TC rates were up 38% from the same period last year to $32,000 per day.

Despite the improvement in rates, the number of period fixtures fell, compared to 1H18 as charterers were cautious about taking on longer period fixtures, due to uncertainty over the direction that the market would take, following the implementation of the IMO2020 rules.

The largest improvement in earnings so far this year was seen in the Suezmax sector. This sector witnessed an increase of 51% since 1H19 to an average of $24,240 per day for 12 month charters. In contrast, the lowest increase in earnings was in the MR sector, growing by just 2% from 1H18 to $13,938 per day for one year TCs.

Geopolitical issues have dominated the tanker market this year with tensions in the Middle East at the forefront in recent months. As yet, we have not seen any shipowners declining to accept voyages in and out of the Persian Gulf, as there is no other route for these cargoes, although insurance premiums have increased considerably**.

In terms of the period market, charterers were reticent to take on any new business, as some clarity was awaited. As is often the case with geopolitical issues, these incidents in and around the Strait of Hormuz has caused increased volatility in the market that is likely to have a positive effect on the market and push rates upwards.



1H 2019 Tanker (dirty) timecharter rates

Globally, there are concerns for a slowdown in economic growth, however oil demand continues to rise worldwide. Recent reports from the IEA have shown cuts in oil demand growth estimates this year of 1.2 mill barrels per day, adding that this is still a healthy figure and this slower demand growth was expected to be short-lived with a rebound at the end of this year.

The US is now the largest crude oil producer, having overtaken both Russia and Saudi Arabia and the crude tanker market will likely see a shift towards long-haul exports from west to east from non-OPEC producers in the Atlantic.

Supply

In terms of supply, there has been limited tanker ordering during the last few years, which is helping to bridge the gap between supply and demand. Currently, the orderbook accounts for 7.1% of the total fleet, which is welcome news for the tanker market as the balance between supply and demand determines the health of the market overall.

The largest orderbook is for the VLCC sector where it is currently 11% of the trading fleet. The average age of the VLCC fleet is 10 years indicating that this is a relatively modern fleet. In 1H19, there was an influx of newbuildings entering this sector with record deliveries seen in January, 2019.

So far this year, 39 newbuildings were added to the VLCC fleet, the same number seen for the whole of 2018. This is the highest number of deliveries entering this sector since 2011, as owners hope to benefit from the stronger market expected ahead of the 2020 regulations, which could see an increase in crude trade flows.

Recently, the VLCC sector has seen a trend where old vessels are used in the short-term for floating HSFO and LSFO storage. A number of older vessels over the age of 15 were fixed off Singapore for one to three months.

Spot fixtures

Looking at the spot market, Poten & Partners recently analysed the tanker spot fixture volumes for the first half of this year.

The overall volume of reported dirty spot fixtures showed an unusual decline, compared

2019 H1 Rank	Charterer	Reported Total Cargo (MT 000's)	% of Total Dirty Cargoes	2018 H1 Rank	2019 H1 Fixtures
1	Unipec 1	12,406	17.2%	1	523
2	Shell	26,153	4.0%	3	300
3	Vitol	25,604	4.0%	4	231
4	ExxonMobil	24,904	3.8%	7	191
5	Ioc	22,016	3.8%	2	134
6	Chevron	21,806	3.4%	5	198
7	Total	20,895	3.3%	6	126
8	BP	19,447	3.2%	8	169
9	Petrochina	14,907	3.0%	11	170
10	Lukoil	14,300	2.3%	9	108
11	Repsol	13,936	2.2%	12	112
12	Petrobras	13,895	2.1%	23	84
13	Glencore	13,395	2.1%	13	109
14	Sinochem	13,350	2.1%	17	55
15	BPCL	12,652	2.0%	15	101
16	Reliance	12,545	1.9%	10	68
17	Trafigura	9,275	1.4%	14	81
18	SK Corp	9,135	1.4%	33	39
19	PTT	8,800	1.3%	21	69
20	Hyundai	8,728	1.3%	22	35
	Top 20	418,149	66.0%		2,903
	Others	234,963	34.0%		1,720
	Total	**653,112**	**100.0%**		**4,623**

Source: Poten & Partners

to the same period in 2018 - down from 5,409 to 4,623.

Also declining was the total cargo volume fixed on spot voyages, which fell by 13%, similar to the decline in overall cargo volumes (using AIS data), mainly due to lower AG exports and lower imports into the US Gulf.In the VLCC segment, Poten reported.

Unipec continued to be in a league of its own, although the number of spot fixtures fell, but smaller ship fixtures increased and Unipec's total cargo volume also rose.

More reported VLCC fixtures are attributed to the Chinese giant than to the next eight largest VLCC charterers combined, Poten said. However, It should be noted that reported fixture activity does not always equal market presence, as charterers with a large controlled fleet and/or a preference for private deals, keep a low profile in these rankings.

The total number of reported VLCC spot fixtures decreased to 1,156 from 1,193 recorded in 1H18 (-3%). In the Suezmax segment, Shell took over the top spot from Chevron. Unipec was a notable newcomer to the top Suezmax charterers list, mainly due to increased Suezmax imports from more intra-Asian shipments.

Exxon also increased its position, primarily due to higher US Gulf exports to UK/Cont. The total number of reported Suezmax spot fixtures in 1H19 (1,287) was significantly lower than in the first half of 2018 (1,628) and more in line with 2017 levels (1,320).

In the Aframax segment, Shell and Vitol changed places. Unipec also made the Aframax list this year, as the charterer became more active in the Atlantic trades. The total number of reported Aframax spot fixtures declined in 1H19 to 1,809 fixtures from 2,039 in 2018 (-11%), Poten reported.

**This article was written by Rebecca Galanopoulos Jones, commercial analyst, Alibra Shipping Ltd.*

***This was written before the Iranian authorities seized the Stena IMOIIMAX 'Stena Impero' in retaliation for Gibraltar arresting the VLCC 'Grace 1'.*

TO

Operating shuttle tankers in Brazil

Demand for shuttle tankers is growing. However, their operational practices vary from region to region.

In an industry note, DNV GL took a closer look at Brazilian shuttle tanker operations, which has replaced the North Sea as the biggest single market.

DNV GL recently invited the major players to a shuttle tanker workshop to share experiences and take a closer look at the market as well as new developments and technologies that can be adapted from other areas, such as the North Sea.

Jonas Mattos, Business Development Manager, DNV GL South America, explained the background: "These gatherings are important for us as we get all relevant stakeholders together to learn from best practices and discuss potential measures to further enhance the efficiency and safety of shuttle tanker operations. In a developing area as diverse as Brazil, where the field operators develop their own framework of operational regulations, making decisions that are normally left to authorities in other regions of the world, it is of utmost importance to get a better understanding of what is going on in the market."

Catrine Vestereng, the class society's Business Segment Director Tankers, talked of the emergence of shuttle tankers: "These ships are deployed to areas where subsea pipelines are not feasible, such as harsh climates, deepwater or remote locations. 'Traditional' shuttle tankers with bow loading and dynamic positioning initially started operating in the North Sea. They are now spreading to all corners of the globe, from Brazil, Russia and Canada to West Africa and various locations in Asia.

DNV GL's tanker expert Catrine Vestereng

"While they feature varying technologies and safety levels, depending on weather conditions and traded volumes, they all benefit from the experience and technology developed for the North Sea," she explained.

The shuttle tanker fleet has been growing steadily since the first 'boom' in the mid-1990s. There are currently 86 ships in service and 17 on order, which are expected to be delivered by 2021. Vessel sizes range from 35,000 to 170,000 dwt, with the majority in the 140,000 to 160,000 dwt category, a typical size for Brazilian waters.

Teekay Offshore and Knutsen NYK Offshore Tankers (KNOT) are the two biggest owners of shuttle tankers. Samsung Heavy Industries is the biggest builder, and DNV GL the leading class society with a share of 64% of the fleet in service and a newbuilding market share of 88%.

Brazil leads

With around 35 shuttle tankers in operation, Brazil is the largest deployment region and will remain so in the foreseeable future. According to Clarksons, there are at least 22 new oilfields under development in the probable or the discovery phase worldwide. Brazilian oil companies have indicated that as many as 14 FPSOs will be installed by 2023. These will require a large number of shuttle tankers for offloading.

The biggest player in the Brazilian market is Petrobras, but other multi-national oil and gas companies are also present, including Equinor, Total, Chevron, Shell and ExxonMobil, Repsol and Galp.

Transpetro, a wholly owned subsidiary of Petrobras, illustrates the expanding Brazilian shuttle tanker market, having performed offloading operations since the mid-1970s, and specialised in offloading since 1996.

The company currently operates 14 shuttle tankers under timecharter for Petrobras, moving crude oil from FPSOs to terminals. The company is planning to upgrade its shuttle tanker fleet with new DP2 Suezmax vessels. Transpetro's 2019–2023 strategic plan anticipates more Suezmax shuttle tankers being hired on a bareboat basis in the coming years.

Shuttle Tankers - Areas of Operation	
Americas (Brazil)	35
Americas (other)	3
North Sea	25
Russia	11
Baltic	2
West Africa	2
Southeast Asia	2
Indian sub-continent	2

Source: Clarksons February 2019.

AET is one of the newcomers in the shuttle tanker business in general and the Brazilian arena in particular, having placed several newbuilding orders lately, which will be chartered by Petrobras and Shell.

Bringing their experience from the North Sea, Teekay Offshore and KNOT Management Do Brasil are today among the main shuttle tanker operators in Brazil. They operate fleets of seven and 12 (plus two more in 2020) vessels, respectively.

New designs

Shuttle tanker designs have evolved considerably over the years, with the main focus on safe and environmentally friendly operations as well as manoeuvrability and positioning in rough weather, optimisation of loading procedures and systems, and reduction of emissions to sea and air.

New generation shuttle tankers entering the market today feature sophisticated bow loading and DP equipment. Some of the new shuttle tankers operating in the North Sea will use LNG technology. The Teekay E-Shuttle tanker types will operate on both LNG, as the primary fuel and a mixture of LNG and recovered volatile organic compounds

(VOCs), as secondary fuel for dual-fuel engines.

Jose Elias, Teekay Brazil managing director, said: "LNG-powered shuttle tankers is a new concept. LNG is environmentally friendly and will become a trend in the future." However, in the short term it will probably not be seen in Brazil, since local requirements are less stringent in the area than in the North Sea.

"Developments in the North Sea usually cascade to Brazil at a later time. Stricter emission regulations in the North Sea force shipowners to reduce emissions drastically. Furthermore, LNG bunkering stations are available there, enabling the use of those cutting-edge vessels in the North Sea," Elias added.

IMO regulations applicable to shuttle tankers are more general and identical to those for crude oil tankers. In addition, IMO has developed guidelines for bow loading and vessels with DP systems.

Based on its decades of experience, DNV GL has developed rules to ensure a much higher safety standard than the non-mandatory IMO guidelines for DP, offshore loading and vapour recovery systems.

Most of the oil companies and operators therefore refer to class rules, especially those issued by DNV GL, as the standard for shuttle tanker design. For Brazil, Petrobras has its own specifications and guidelines, which are based on years of experience, as well as knowledge transferred from the North Sea.

A typical class notation for shuttle tankers and their high-risk operations is the Bow Loading notation. DNV GL's rules for this cover the overall requirements for state-of-the-art offshore bow loading systems including fire safety, and requirements regarding telemetry and emergency shutdown (ESD) systems.

Today most shuttle tankers comply with DP redundancy as a minimum, which is similar to the IMO DP Class 2 requirements or higher. Local DP requirements, however, depend on industry practice in the respective region.

For example, in Brazil, IMO DP Class 2 is today's minimum requirement, which corresponds to the DNV GL DPS(2) notation. In other parts of the world with harsher environmental conditions, eg in the North Sea and in UK and Canadian waters, DYNPOS(AUTR) has been established as the required minimum. DNV GL thought that this trend will continue, which means that DYNPOS(AUTR) may also become a requirement in Brazil.

The DP class notation spells out the required system redundancy, rather than the DP capability of the vessel, which depends on what the client needs and where operations take place, so naturally that decision is up to the Brazilian oil operators. For DYNPOS(AUTR), DNV GL requires the DP capability of a vessel to be documented.

A typical notation string for a modern shuttle tanker intended for operation in Brazil would be:

- 1A Tanker for Oil ESP CSR E0 DPS(2) BOW LOADING F-M NAUT(OC) SPM TMON VCS(2) BIS BWM(T) COAT-PSPC(B,C) CLEAN RECYCLABLE LCS.

By comparison, a typical North Sea shuttle tanker operation might have the following notations:

- 1A Tanker for Oil BIS BMON Bow loading Battery(Safety) BWM(T) CCO Clean(Design) COAT-PSPC(B, C) COMF(C-3, V-3) CSA(FLS2) CSR DYNPOS(AUTR) E0 ECA(SOX-A) ESP ESV(DP[HIL-IS]) F(A, M, C) Gas fuelled HELDK(S, H, CAA-N) HMON(A1, C, G1) LCS NAUT(AW) Plus Recyclable RP(2, 50%) SPM TMON(oil lubricated) VCS(2).

Offloading operations

Shuttle tanker operations in Brazil differ from North Sea in a number of ways: In the North Sea, and in Norway in particular, all offloading operations and consequently all DP activities are regulated by the Petroleum Safety Authority Norway (PSA) and DP systems are compulsory.

A Teekay shuttle tanker on voyage from Asia to Canada

"In Brazil, operators have the choice between DP operations or the old way, like taut hawser offloading for example," explained Lars Ole Hagland, KNOT Management Do Brasil general manager. Some oil operators in Brazil have already decided to operate with DP2 systems in all their fields, which means they also make all related decisions regarding DP operations.

"If an incident occurs involving a DP system on a shuttle tanker operating in Norway, it needs to be discussed with the authorities. In Brazil, no authorities need to be involved as long as there is no serious damage to the environment. In case of a severe incident ANP and Navy will be informed and need to decide on further investigations," Hagland explained.

On the Brazilian continental shelf, DP operations involving FPSOs can either be performed with spread mooring, or using a turret without heading control. Unlike the North Sea, where FPSOs weathervane around an internal turret with the shuttle tanker following, most FPSOs in Brazil are spread-moored in a fixed position.

During loading, the shuttle tankers must therefore maintain a fixed position relative to the FPSO in the face of wind, waves and particular currents, which can be strong and variable in this part of the world. KNOT for example performs about 86% of its offshore connections with FPSOs in Brazil using spread mooring but only about 14% using a turret.

Since many shuttle tankers handle up to 50 loadings per year, discharging through ship-to-ship (STS) operations, they are hardly ever seen alongside a terminal. This harsh routine is stressful for both crews and operators, and it is difficult to allocate time for maintenance, DNV GL said

Operational challenges

Brazilian operational safety is improving steadily, mainly in response to Petrobras' drive to develop appropriate guidelines. However, in the absence of a regulatory body or authority dictating requirements, some operational processes differ quite substantially from other parts of the world, ie the North Sea.

Considering KNOT's 31 years of experience operating shuttle tankers, the workshop organisers in Rio de Janeiro asked KNOT's management to share their operational experience and indicate potential areas that could benefit from revised processes.

One typical area, which may benefit from improvements is the standardisation of equipment on board FPSOs, for example, the introduction of standard requirements for a wireless Offloading Monitoring Telemetry System (OMTS), which includes an automatic remote shut-off feature for platform pumps to stop the flow of oil between the FPSO and the tanker.

These systems establish a 'green line' between the FPSO and the tanker's bow loading system, which sends an 'all clear' signal for offloading after the monitoring circuit has verified that all valves and couplers on board the tanker are in correct position and that the mooring system and hose connections are properly secured.

This system has not been fully implemented as an additional safety measure in Brazil thus far but will be installed on more vessels over time.

Communication between FPSOs and shuttle tankers is one of the daily challenges in Brazil, not only because of the language barrier but also due to the fact that it is done via VHF radio. Installing telemetry and switching to UHF will improve communication and help prevent accidents.

Another focus area is emergency towing systems on the aft end of shuttle tankers. "It is important to test the equipment on board the shuttle tanker and tug and to train the crew properly. If these items are not documented, a finding during vetting is very likely to occur," Hagland said. In Brazil training is not mandatory yet but some field operators have started requiring it for safer operations.

"The safety of shuttle tanker operations in Brazilian waters is everybody's concern, and there is genuine interest in the industry to share operational experience to enhance operational safety and reduce downtime.

"The everyday challenge is to do what it takes at the right time. Nevertheless all the operators indicate their commitment to 'safety first!', which goes well with DNV GL's objective 'safeguarding life, environment and property at sea'," Vestereng concluded.

How to avoid accidental activation of marine breakaway couplings on FPSOs

The FPSO market is expected to witness significant gains over the next few years.*

According to a report published earlier this year by Global Data, more than 60 planned and announced FPSOs are expected to start operating by 2025. Six of these were ordered from world shipbuilders in 2017, and a further 11 were announced last year– significant figures, given that in 2015 and 2016, no new orders were placed.

Another report, by Transparency Market Research (TMR), predicts that the FPSO market will reach $66 bill by 2026.

Indeed, in the face of the new normal, where finding cost efficiencies means the difference between thriving and just surviving, operators are now turning to FPSOs more than ever before, leveraging the economical and efficiency benefits of floating production that storage and offloading vessels can deliver. New design concepts, fabrication and integration innovations from shipyards, creative financing options, and industry partnerships, according to Rystad, are all contributing to an upswing in orders.

But as the interest in FPSOs continues to grow, so too does the need for companies to invest in safe practices - particularly with regards to offloading operations – to guarantee the successful and reliable performance of the cargo transfer.

There are a number of inherent safety risks that operators of FPSOs must mitigate. For offloading transfers, these include a collision between the FPSO and the tanker, tanker drift-off, unexpected pressure surges, and transfer failure.

All of these can result in asset damage, injury to operational personnel, and product spill. To mitigate these risks, operators often use a marine breakaway coupling (MBC) or an emergency release coupling (ERC).

Fundamental differences

While superficially similar, there are some fundamental differences of which operators should be aware. At Trelleborg, we would advocate the use of an MBC for a number of reasons, as opposed to an ERC.

First, unlike the ERC, the MBC requires no manual activation from personnel, eliminating the potential for possible operator failures. At the same time, the MBC is superior in mitigating the risk of surge pressure, and offers greater overall protection of the offloading hose in the event of tanker drift-off.

However, despite its advantages, it is well known within the industry that there are a number of major challenges when using MBCs in combination with a hose reel – specifically the unintended parting of the MBC during the reeling operation. This often happens when an operator uses a standard double carcass nipple hose that, when an MBC is added, creates a stiff section that might be longer than 1.7 m. When the hose is stored on the reeling application, the stress placed upon the stiff section becomes too great, resulting in the unexpected MBC release.

To overcome this challenge, Trelleborg Oil and Marine has developed a solution specifically for reeling applications on FSPOs. Using Trelleborg's unique nippleless design, our REELINE dual carcass hoses contain reinforced compact flanges and integrated bending stiffeners – which means more flexibility, higher resistance to tension and collapse, and no stress concentration in the flange area.

This design is ideally suited for integration with an MBC in the submarine or floating string, substantially reducing the risk of accidental activation during reeling/unreeling operations.

The results speak for themselves: Since 1997 we have installed more than 60 REELINE offloading lines globally – 14 of which have featured an integrated MBC. Of these, we haven't received a single incident report regarding accidental activation.

This design also means that, even when operating in challenging sea conditions, the REELINE offloading solution has an unparalleled track record in terms of long service life, making offloading operations safer and more reliable.

The combination of Trelleborg's REELINE hose and an MBC offers far greater protection during operation, and mitigates the risk of oil incidents or damage to equipment, particularly when compared to the use of a manually activated ERC.

At the same time, the amount of maintenance required is significantly reduced, as are overall operating costs. As a result, we can see how crucial it is to critically examine fluid handling systems in order to fully realise the economic benefits of FPSOs.

Trelleborg Oil and Marine's Vincent Lagarrigue

**This article was written by Vincent Lagarrigue, Director, Trelleborg Oil and Marine.*

TO

Piraeus-based registry aims for the top

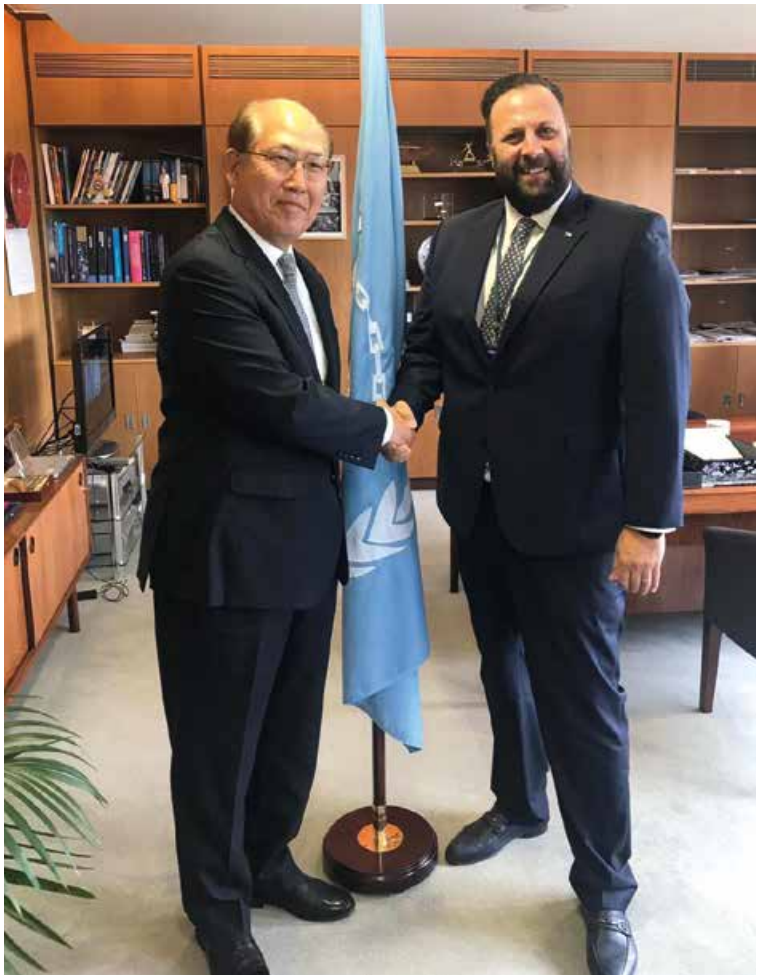
News that Piraeus-based organisations, Palau International Ship Registry (PISR) and the Hellenic Shortsea Shipowners Association (HSSA) had signed an agreement to strengthen their close ties prompted *Tanker Operator* to have another look at this fledgling ship registry.

PISR CEO Panos Kirnidis explained that the registry was created in 2010. The Palau Republic is a presidential republic, with a Compact Agreement of Free Association (COFA) with the US, concluded in 1986 and entered into force on 1st October, 1994.

"We have created a registry that provides the highest standards of administrative, legal, technical and support functions to shipowners and managers for documenting the ship and registering it under the flag of the Republic of Palau.

"As a new flag, we follow a process of maturity which impartially includes building solid relationships with the international shipping community based on confidence, honesty and credibility. One of the real benefits of being new into the arena is that we have had the time to hire several experts with more than 30 years' experience. We have analysed the industry, identified and maintained the strengths of the competition and rectified the weakness, while avoiding the early errors, and mistakes made.

"We are building on our experience and knowledge and maintain the highest possible standards. We know that success comes by meeting customer needs in all aspects of their business by providing smooth, faster, efficient and cost effective services, with full administrative support and tailored customer services. This is our commitment and this is what we have been working diligently on," he said.



IMO's Kitack Lim greets PISR's Panos Kirnidis

In January, 2017 PISR announced the expansion of its US, Houston Head Office to Piraeus, Greece – now the European Head Office. This network expansion and the new office is part of a comprehensive plan to develop the registry. "It is a strategic move that gives us the opportunity to increase our range of services and the move is a strong indication of the registry's commitment to the Greek and European shipping sectors, as well as providing worldwide support to shipowners," he explained.

"Technology is the recognisable driving force in world shipping and one of the reasons we call ourselves the SMART Registry is because we have embraced IT systems that offer our shipowners and managers a different and comprehensive solution to remain sailing with minimal delays. It is this new technology that allow us to offer a truly more efficient and reliable service and to be highly cost effective for owners/manager and a prime example of this is our online platform – ePISR – along with the eCertificates.

"We have been at the forefront of the drive to offer faster, more efficient and cost-effective online registry services because paperwork is not the way of the future. The industry is moving quickly and we have adopted and adapted our IT driven operations to offer a real 24-hour service and same day delivery, Kirnidis said.

Speaking about the HSSA tie-up, he said that in shipping the emphasis and general focus is often on the deepsea operating ships and yet the bulk of the world's shipping needs are catered for though short sea shipping providers. This is never more obvious as the global economy tends to move from globalisation to regionaliaation.

HSSA members include an important number of tankers and we have partnered with them to develop a range of services that are relevant and affordable and provide meaningful benefits for all their ships, including their tanker members. Short-sea shipping has always been of great importance in the Greek shipping world and

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the country is renowned for its tankers.

Continuing of the tanker theme, Kirnidis said tankers form an important part of the Palau fleet currently standing at 14% and this number is expected to rise, as a recovery in the oil product tanker freight market is seen.

"Tankers have always played an important part in our thinking and with our Greek associations it is rather fitting that we are pushing for more tankers to register with the PISR fleet by offering dedicated services to remove some of the burdens faced by the owners/operators of tanker fleets.

"One of our first innovations was to design in-house and introduce the registry's unique Deficiency Prevention System (DPS) to ensure a vessel's compliance with international conventions, rules and regulations. DPS aims to prevent deficiencies on vessels while inspected by PSC authorities, mainly in the Paris and Tokyo MOUs. DPS is part of a continuous monitoring system that we apply on board vessels to deal with any deficiency imposed by class, RO and previous PSC inspections.

"With DPS, PISR monitors and screens vessel operations without disturbing shipowners or managers until the moment that the risk indicator for each vessel calling at a Paris or Tokyo MOU port is identified," he said.

The PISR team receiving the STCW accreditation from Kitack Lim

Deficiency monitoring

Shipowners also have access to ePISR that allows for the monitoring the status of the vessel's open and previously imposed deficiencies at any time. To become a registry of substance, we had to answer the question – "Why would a shipowner register his/her vessel under the Palau flag rather than with one of our competitors?"

"As times change and technology develops, our clients are looking for traditional registry support, but they are always open to new technologies and developments in legal matters, welfare issues and maritime regulations. So we have made significant investment in our IT systems and we have developed a unique SMART.Registry® solution that is fully integrated with SAP Business One ERP system and SalesForce CRM system.

"This allows greater operational and cost-effective flexibility for the shipowners for processing all applications and work flows and accessible by different levels of industry stakeholders. With, PISR the shipowner and manager has the power on their desktop to process all their inquiries to PISR and retrieve key performance indicators of their fleet," Kirnidis said.

"Although the Greek market is one of our key focuses, we believe we have through our smart shipping philosophy something that will help all shipowners and managers globally. That is why we have established our head office in Greece, but also invested in engaging highly skilled network of 39 Deputy Registers in 24 countries," he added.

STCW compliant

On 10th June, PISR was recognised by the IMO as to fully comply with the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). Palau is the latest ship registry to be approved under the STCW White List status to offer maritime training under the Convention.

"We are now able to offer maritime training to a uniform standard, which is an important part of the IMO's drive to raise the standards in global shipping. Our training credentials are under constant review, as regulations change and new opportunities open up for seafarers. Using our own IT designed applications and qualified staff, we have been providing services for our fleet personnel for many years and this new approval will further enhance our training provisions," he explained.

"Being able to offer seafarer Certificates of Competency (CoC) enables us to be a more comprehensive registry in so many ways. I have always believed in the human element in shipping and this remains a core part of our services: combining PISR's new technology with the skills of real people," he added.

In addition, PISR's new e-certificates will carry a unique identification and authorisation number along with the PISR emblem and they will automatically be uploaded onto the IMO GISIS website. The e-certificates will also contain a Quick Response (QR) Code to facilitate the verification process, which can be done online either by using the QR Code found in each electronic certificate or by visiting our website and entering the unique tracking number at the online verification system.

"We have also created a fail-safe option in the event of a system downtime that will allow us to authorise the issue of paper certificates to avoid any service time delays and these will also be able to be verified through the online process. What is also

very important is that shipowners need to maintain their due diligence when it comes to the entry and clearance requirements of individual ports," he said.

Looking at Greece, Kirnidis said he could not see a reason why Greece will lose its premier position in the global shipping sector. Choosing to open a Piraeus head office made so much sense in terms of location and heritage and its paying dividends for everyone connected with PISR.

As Petrofin Research data showed, the overall number of Greek vessels has risen from 5,281 to 5,508. But the real increase in the Greek fleet is in deadweight tonnage terms. The total DWT of the entire Greek fleet in 2018 is 412,310,405, compared to 387,256,616 in 2017, 361,934,047 in 2016, 328,254,495 in 2015, 303,579,176 in 2014 and 281,467,983 dwt in 2013.

This increase by 25 mill tons dwt or 6.5% is significant. This growth has come from adding primarily good quality younger secondhand tonnage, as well as newbuildings of increasing average vessel size.

In its analysis, Petrofin said that in order for Greek shipping to grow, it requires three necessary elements.

First, the commitment towards continued shipping investments of an immense size in order to enhance owners' position, competitiveness and continuous investment in staff and systems. Second, its shipping markets enjoying or promising sound returns on investment and third, the necessary finance and equity.

What next for PISR? We have been working with the IMO on a number of issues and this STCW White List approval is yet another example of how far we have come as a registry in this most competitive of maritime sectors.

Everything we have accomplished over the past few years has been another step forwards refining our services and credibility as a responsible, technologically advanced and diligent ship registry.

There has been a gradual and recognisable development in our services and profile and so we expect a dramatic increase in our fleet size in the next 12 months. This is a long-term project to create a digital registry that relies on innovation and catering to the real needs of shipowners.

PISR has a permanent IMO representative along with a team of alternative IMO representatives. They participate in all the meetings of the Assembly, the Council, the Committees, the Sub-committees, the inter-sessional working group and meetings and the correspondence group when required.

Panos Kirnidis

Panos Kirnidis was appointed PIRS CEO in 2016.

He has gained experience in ship registration and ship classification business being involved for more than 15 years operations, technical, regulatory, marketing and finance.

His experience is supported by a Master's Degree Msc in Engineering Business Management from the University of Warwick – UK, a Bachelor's Degree BEng in Marine Engineering from the University of Newcastle Upon Tyne – UK, a BTEC HND in Mechanical and Manufacture Engineering from Newcastle College – UK and a BTEC HND in Naval Architecture from Southampton College – UK.

BSM's Theophanous outlines the attraction of being in Greece

***Tanker Operator* spoke with BSM Hellas Managing Director, Theophanis Theophanous about the opportunities existing in the Greek market and how BSM fits in.**

He said that Bernhard Schulte Shipmanagement (BSM) is one of the few, lucky, third party managers that have established a place in the Greek shipping market.

"Over the past 14 years in Greece, we are proud of the close collaborations, shipmanagement support and strong partnerships with local owners that have been and are still being forged. This has probably been helped with our belief that a professional shipmanager should combine both the traditional or let's say 'family way' of vessel operations, keeping those good features of the past but also pushing forward using innovative ideas to be ahead in the market," he said.

He continued that despite the maritime crisis of the recent past, Greece has managed to retain its position as one of the most significant and substantially sized maritime industries worldwide. Well known for a drycargo ownership focus, there are an abundance of companies with significant tanker fleets and undoubtedly the gas sector and specifically LNG will further strengthen the tanker segment of the local market.

BSM Greece has a varied fleet of drycargo ships, oil and chemical tankers together with a number of gas vessels and LNGCs. A third party shipmanager's fleet frequently changes as the owners renew and expand their vessel portfolio.

"Such diversity undeniably puts one in the fortunate position to being able to continually extend knowledge gained from the unique working conditions of each vessel and apply lessons learned throughout the remaining fleet for continual improvement.

"Most certainly, the greatest advantage which also results from a varying fleet, is having trained and experienced crew and onshore teams to both operate vessels of any type but also provide knowledge, knowhow and ideas between our colleagues locally along with the other BSM offices.

"Needless to say that such expertise and flexibility provides the basis for BSM to be able to offer necessary support to owners, no matter what the vessel segment. However, in the tanker field is where the demands of management operations require the utmost proficiency to ensure the smoothest of operations," he said.

BSM Hellas Managing Director, Theophanis Theophanous

Explaining the scope of services offered in Greece, he said that BSM Greece presently provides both full technical and crew management services and is also the local link for clients wishing to take advantage of the additional range of maritime solutions available via the Schulte Group.

Comprehensive services

The comprehensive range of evolving services are tailored to meet specific requirements and enable customers to increase competitiveness in the following areas; technology solutions, port agency & bunkering, newbuilding/conversion/ retrofit, consultancy & vessel inspections, hospitality services, seafarer & corporate travel, drone inspections, fleet maintenance & repairs.

Addressing the Greek shipowner's uncanny knack of playing the S&P market successfully, he said that Greek owners are skilled in knowing when and where to invest, a rich maritime history and proficiency in using market trends to support their asset management is what makes the local market so dynamic.

"This is perhaps where a third party shipmanager can really play a crucial role. Outsourcing either the full or crew management allows owners to expand into sectors where they may have not necessarily have the in-house expertise, or to simply be free to buy and sell as they see fit without having to worry about expanding or decreasing their existing office resources.

As for raising finance, he said that as a consequence of the financial crisis a decade ago, traditional major ship finance markets have been on a steady fall, a number of established banks severely reduced their shipping portfolio and some even terminated their shipping presence altogether by offloading bad loans to private equity funds.

Nevertheless, the adjustment process by overleveraged and hard-line banks has come close to the end, with few banks nowadays nurturing sizeable bad shipping loans. Consequently, the surviving traditional banks of the West and the recent entrants from the East are expected to once again drive ship finance higher albeit at a low pace and on a path laid with challenges.

Other methods of finance are also emerging to counterbalance the post crisis status. Stock markets still remain a popular and sort after source of finance but there is also competition from Far East leasing. Chinese lenders have strongly developed the ability to address the requirements of smaller owners and offering declining finance costs that in many cases is now on par or even lower than the banks.

Private equity funds on the other hand are currently not as attractive, mainly due to their elevated cost, despite offering more substantial loans than banks.

Theophanous said that recovery is

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to be anticipated in the ship finance sector albeit slowly, as banks are still constrained by capital restrictions and have developed increasingly demanding risk and compliance departments. Furthermore, lenders commitment will, in the future, be determined by the performance of the various shipping sectors, as well as overall global economic and geopolitical factors.

In response, third party shipmanagers have up to now and will certainly continue, to tailor their service provisions, efforts in OPEX control and first class vessel management to fully match the challenging market circumstances. In addition, flexibility combined with global scope will assist shipmanagers to further nurture collaborations with entities formed, as a result of the ship finance squeeze, such as private equity funds, that do not necessarily have shipmanagement knowhow or a consolidation of owners that need an established manager to gain from economies of scale and even via joint ventures offered between managers and owners.

When there is a crisis, there will also be opportunities. Greek shipowners have traditionally preferred to manage their ships in-house as a matter of pride. That notion is gradually shifting however, especially amongst the younger shipowners who can see a benefit in outsourcing to professional third-party shipmanagers and investing more of their time and energy on other ventures, rather than being tied up in the day to day 'nitty gritty' of vessel technical and crew operations.

"Long term success surely depends on adaptability, which is essential for any business to prosper and BSM Hellas certainly remains firmly focused on a progressive future. By striving to develop even more dynamic service provisions, adoption of new technology, using economies of scale and global synergies to assist each owner and potential owner to achieve their unique strategic goals we are certain that no matter what the need we can fulfil the requirements each owner has from us," he explained.

As for training, Theophanous said that BSM reviews and amends its training procedures to meet the ever growing demand and expectations of seafarers and the industry.

"Fortunately, we have six in-house dedicated maritime training academies that are used for familarisation and training requirements. Based on experience, the advice we would like to offer to owners is to ensure that all training needs are identified as early as possible so appropriate planning can be drawn up, allowing crew and office staff as well, to be prepared on time to meet regulatory deadlines and fulfil their roles proficiently," he stressed.

On the whole expansion can be expected in the fields of digital automation and regulation, that will demand more energy efficient ships with stricter operational performance. Most likely this will present a real challenge for smaller companies and perhaps thus provide an increase in demand for the services of a professional shipmanager and focused maritime software provider. BSM is very proactive in this respect, with our own dedicated maritime specialised software company, MariApps Marine Solutions as well as a fast-developing Corporate Fleet Performance division, conveniently located in Athens. TO

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Constant bridge warnings create 'alarm fatigue'

Frequently sounding bridge warnings, especially false ones, can create 'alarm fatigue' and hinder watchkeepers in carrying out their vital role, a new survey supported by InterManager revealed.

Responding to the findings, InterManager has called for manufacturers to work with ship operators to address seafarers concerns and develop better ways of communicating bridge warnings.

Respondents highlighted that there was a problem with too many similar sounding alarms and revealed a need for alarms to be easily identifiable so that urgent warnings can be recognised over simple notification bells.

The findings were recently released by P&I Club, Shipowners Club, which conducted the survey in conjunction with the Department of Psychology at Royal Holloway, University of London, ISWAN and InterManager.

The survey was largely responded to by Masters and senior officers from a wide variety of vessels, which demonstrated that the concerns are apparent to experienced and well-qualified seafarers.

Key findings included:

- 89% of participants thought false alarms were a problem.
- 66% said the alarms were not easily detectable.
- 57% of respondents disagreed that alarms are graded by sound.
- 50% of participants reported some frustration with the format of the alarms themselves. Of particular concern was the fact that sounds are frequently the same tone for all alarms with no distinguishing factors between alarm systems.
- 77% of crew do not want to be disturbed from their watchkeeping duties.
- 24% of participants reported that they never or seldom engaged the Bridge Navigational Watch Alarm System (BNWAS), due to their concerns at frequent false alarms.

The main issue raised was frequent alarm fatigue, followed by the fact that alarms are hard to identify, and then concerns over the design of alarm system or the bridge itself. The results also showed a reoccurring theme regarding the grading of alarms to assist the watchkeeper.

Another factor was the crew's readiness to silence alarms without investigation, due to 'alarm fatigue' caused by repeated alarm soundings for no apparent reason. Some 85% of participants reported they were aware of the alarms, the systems they represent and their location.

Alarms silenced

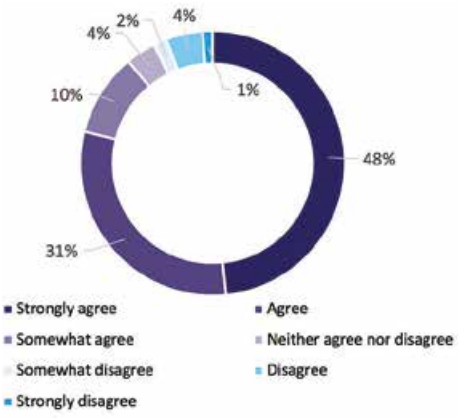
However, 45% of the respondents agreed that frequent alarms are often silenced, and when this was analysed by the level of role, 44% of Masters, 41% of Chief Officers, 48% of Second Officers and 60% of Third Officers agreed, showing that this practice was prevalent among all ranks.

The report concluded: "It is evident from the feedback of these seafarers that the current regulations and arrangements relating to bridge alarm monitoring and systems can be improved upon. Doing so will improve the working environment of seafarers and assist with the reduction of related claims."

Capt Kuba Szymanski, InterManager secretary general, said: "At present, as an industry we are creating an environment for failure and then we are surprised when our seafarers fail!

"We can and must break this vicious circle. Look at the findings – 50% of our seafarers are frustrated by frequent alarms! Seventy seven per cent want alarms to be useful alarms and not a nuisance. They are extremely busy people, because we ask them to be 'jacks of many trades'. Therefore, in my opinion, quite rightly they expect alarms to be useful and effective."

Welcoming the report, he said: "This



Frequent false alarms are a problem

is brilliant – I cannot praise Shipowners' enough for undertaking this ground-breaking research and drawing excellent conclusions. In particular I am pleased that they checked with the end users – that is very proactive and, I would say, pioneering. Honestly, this is one of very, very few surveys which actually asks seafarers themselves."

Action needed

Capt Szymanski said action is now needed to address seafarers concerns and called on manufacturers to work with ship operators and crew representatives to identify which alarms are particular problems and to produce more effective methods of alert.

"Seafarers are tired of being blamed for everything," he said. "It is important that we take a human-centric approach to this and find solutions that benefit our crews in the workplace rather than hinder them when carrying out vital tasks."

The survey was conducted during 2017 and 2018 via a questionnaire, which was circulated widely throughout many maritime sectors, via InterManager, ISWAN and UK Chamber of Shipping.

New threats in the Arabian Gulf

Explosions on four tankers at the Fujairah anchorage in May led to many headlines in the international media and many headaches in shipping companies around the world.*

In June, there was even more cause for concern when the 'Kokuka Courageous' and the 'Front Altair' were attacked while transiting through the Gulf of Oman. While nobody has claimed responsibility for those attacks, it is believed that Iran's government was instrumental in ordering them.

Aerial photos of the fire ravaging the LR2 'Front Altair' were widely published. Many articles mentioned the 1980s 'tanker war' in the Arabian Gulf during which hundreds of merchant ships were damaged or even sunk, leading to the deaths of more than 400 seafarers.

At the moment, the situation in the Arabian Gulf is unlikely to deteriorate to a similar level. Nevertheless, it is prudent for shipping companies to prepare for different scenarios. The current situation already benefits tanker operators with a risk appetite for trading in the Arabian Gulf.

Commercial opportunities, however, have to be balanced with security considerations as the situation remains volatile and should be monitored, helping to minimise the risks to crew, vessel and cargo.

High-ranking US officials have stated their aim to reduce Iran's oil exports to zero following the reinstating of crippling sanctions at the end of 2018. In response, Iranian military officers have repeatedly threatened to block the Strait of Hormuz, resulting in the US sending additional military forces to the region and in predictably tough statements from Donald Trump who said that the strategic waterway would not 'be closed for long'.

Whether the US administration is really prepared to protect international shipping remains an open question. In mid-July, Joseph Dunford, the US Department of Defense's most senior general, stated that the US aims to build a coalition to ensure freedom of navigation both in the Strait of Hormuz and the Bab el Mandeb.

Dunford explained that the US would provide 'command and control ships', other countries are supposed to protect their own merchant ships. However, he failed to mention the commercial realities in the shipping industry. Which country would take responsibility for a Panama-flagged tanker that is owned by a Greek company, chartered to a Switzerland-based commodities trader and managed from Singapore?

Tit-for-tat actions

In the meantime, tanker operators have already noted the potential impact of tit-for-tat actions. When the VLCC 'Grace 1' was detained in Gibraltar, Iranian officials described it as an act of piracy. The ship was allegedly transporting crude oil from Iran to Syria, breaching sanctions imposed by the European Union. Six days later, the Isle of Man-flagged Aframax 'British Heritage' was approached by several Iranian vessels while passing through the Strait of Hormuz under naval escort, highlighting the potential for a quickly escalating situation.

Similar incidents and even further attacks against merchant ships – and particularly against oil and gas tankers – are possible at any time. The most likely scenario, at least in the short term, is a continuation of the current tensions with Iran looking for options to demonstrate its resolve to the US and its regional allies, and to pressure other countries – as well as the European Union – to grant economic and political concessions.

These options could include harassment of vessels, highlighted by incidents involving the MR 'Stena Impero' and the VLCC 'Mesdar' on 19th July, but further attacks similar to those against the 'Kokuka Courageous' and the 'Front Altair' cannot be ruled out.

Given these possible scenarios, and due to the high threat level in the Arabian Gulf, maritime operators must consider upgraded mitigation measures, yet these may not be sufficient in all cases to limit risks to acceptable levels.

Most mitigation measures are geared towards reducing the vulnerability of vessels, for example BMP measures that were introduced as a response to the threat of piracy. Some recommendations can also help to limit the consequences for crews and ships in case of direct or indirect involvement in an attack. Moreover, mitigation measures can be identified on the company level to further reduce the consequence of attacks and improve recovery activities.

Various vessel-specific measures have been published in recent weeks by flag states and industry organisations. In addition, a comprehensive security risk assessment – including vulnerability and consequence assessments – is an invaluable tool to identify measures, procedures and policies, which have to be adopted for operations under current threat levels in the Arabian Gulf.

This includes an ongoing evaluation of contingency plans, transit instructions and on board emergency guidelines to minimise the risks to crews and vessels.

Risk Intelligence's Senior Analyst, Dr Dirk Siebels

**This article was written by Dr Dirk Siebels, Senior Analyst at Risk Intelligence.*

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GIANT STRENGTH

By Rotortug

Examining a Notice of Readiness (NOR)

A Notice of Readiness (NOR) tendered by the ship decides the commencement of laytime, writes Leena Asher.

NOR is a key to the commencement of laytime, since it determines when it actually starts.

The ambiguity around acceptance of a valid NOR and its unilateral agreement has a direct impact on the commencement of laytime, which has been an area of debate in the English courts in several cases and can cause substantial amounts of money to change hands.

A valid NOR is determined after several factors have been satisfied. However, charterparties contain different parameters of what constitutes to be a legal and fully acceptable requirements for a valid NOR to be served:

1) The vessel is an "Arrived" vessel at the "designated" charterparty port;
2) The NOR is tendered by clear channels of communication, ie. sent to all the nominated email addresses;
3) The vessel tendering NOR is prepared in all respects to load or transfer or discharge the cargo;
4) NOR is tendered as stipulated in the charterparty (with details of Port Name, Product Grade(s), Quantity(s), if any;
5) The vessel tenders NOR as per the time acceptable in the charterparty.

There are in effect, two types of charter party contracts – Berth Charter party and Port Charter party.

Berth Charterparty

If the charterparty agreed between shipowners and charterers is based on a Berth charterparty, the vessel can tender NOR only when she is alongside the berth nominated under the charterparty.

If the vessel is fixed under a Berth charterparty, it will have details about the name of the berth that will be nominated by the charterers for the loading or discharging operation.

Charterers or their representatives, ie supplier, buyer, agent, etc are under contract to berth the vessel at the nominated berth.

Time does not commence until the vessel has tendered a valid NOR at the nominated berth specified in the charterparty.

Port Charterparty

Under a Port charterparty, the vessel becomes an 'arrived' ship for calculating laytime once she arrives within the port confines rather than the berth.

In this case, the deciding test is whether the vessel is at such a place within port and that she is at the 'Immediate and Effective Disposition of the Charterers'. When the vessel arrives at a place within the port, she is considered to have arrived, which means she can tender a valid NOR, unless specifically mentioned in the charterparty.

In the Port charterparty, if a vessel tenders NOR and the berth is available, the vessel will only be an 'arrived' ship when she is all fast at the berth. This is where it differs from the Berth charterparty.

The reasons are - if a vessel is unable to proceed directly to the berth because of congestion, tides, bad weather, the lack of availability unavailability of tugs, etc. she will still have arrived at her agreed destination under a port charterparty if she has satisfied the Lord Reid test above: ie, she has reached a position within the port and at that position she is at the immediate and effective disposition of the charterers

Charterparties may specify the NOR's format to display how, addressee and time and NOR. Failure to comply may not render the tender to become invalid, however, close attention needs to be paid to whom the NOR is being sent.

NOR's validity and the acceptability is a complicated topic in discussions between vessel owners and charterers. In every case, owners will always issue another NOR or re-tender a NOR to protect the start time.

Clause samples include -

- For the NOR to be considered valid, vessel owners or operators should have obtained all requisite governmental approvals, inspections and clearances, including, but not limited to, those required by the US Customs Service and the Immigration and Naturalisation Service.
- NOR is to be tendered in writing by the vessel's Master to the agent at the discharge port at any time during in normal office hours after the vessel has received free pratique and customs clearance. If the NOR is issued on a Sunday or a public holiday, it shall be treated as a notice at the start of the next working day.
- At the load port a NOR is to be tendered for each parcel that the vessel can load. At the discharge port, the NOR to be tendered, should include the amount of the cargo according to the Bill of Lading.

US port NOR

For the loading or discharge of foreign vessels at US ports, NOR shall not be tendered until all information and/or documentation (ie tank vessel examination) required for importation, exportation or vessel cargo operations has been sent to the terminal and/or appropriate governmental agencies, including but not limited to US Customs and US Coast Guard.

Delays associated with the securing and providing the required information/ documentation shall not count as used laytime or as time on demurrage.

It is not uncommon for charterers or owners to find themselves caught up in delays faced by the vessel complying with financial or credit responsibilities by any party. Such time shall not count as used laytime or as time on demurrage.

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Scrubber retrofits – a case study

At the end of June, TORM's 2008-built MR 'Torm Laura' was retrofitted with an ME Production scrubber system at the Fayard shiprepair and engineering facility at Odense.

The tanker was fitted with a full in-line open loop SOx scrubber servicing the main engine, two auxiliaries and a boiler developing power of up to 13.1 MW.

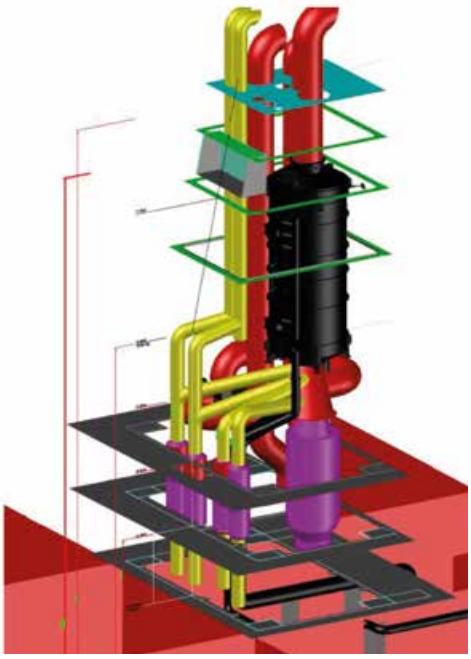
Piping to connect the system was supplied by Integri, while the scrubber's fitting and commissioning were carried out by ME Production and Fayard.

Overall, the power requirements to operate the system is a maximum of 130 kW, TORM explained in a presentation at the shipyard.

Gathering information from various sources, TORM estimated that there will be just over 3,500 scrubbers either fitted or on order by 2020, which represents around 12% of the world's fleet.

Today, some 74% of the scrubber installations are retrofits and 79% of those delivered or on order to 2023 are of the open loop type.

In the tanker sector, of the 3,500 systems fitted or on order, 441 involve crude oil tankers and another 484 product/chemical tankers.



Schematic of the stack fitting

At the presentation, TORM said that it had committed to 34 installations - around half the current fleet. The majority will be delivered ahead of the 1st January, 2020 low sulfur implementation date.

The work will be supported by the joint venture ME Production China (see elsewhere), which will supply 28 out of the 34 scrubber systems.

TORM said that the average cost per system, including installation costs, was below $2 mill. The company explained that this was an attractive proposition, due to the short payback time and a correspondingly high IRRs. Also the current fuel spread prices supported an attractive scrubber business case, the company added.

The company also said that it had looked at LNG and LPG as a fuel, but due to the tankers' trading patterns, these fuels were not deemed applicable

Further installations would depend on a business case assessment, the remaining vessel's life span, fuel consumption of the vessel sailing pattern and investment costs.

Market forecast

TORM also took the opportunity to take a look at the product tanker market going forward, mainly in the light of the forthcoming IMO 2020 legislation.

Overall, the company was bullish, despite geopolitical and macro-economic concerns, giving several reasons to be optimistic.

Taking the second quarter of this year towards the end of June, TORM said that Asian Spring refinery maintenance season had peaked, which will negatively affect East to West trade product flows.

At the time of the presentation, around 90% of the US Gulf's refinery capacity had restarted and around 60% of Europe's capacity had come back on stream. There is an increased flow of gasoline to the US East and West coasts (PADD 1, PADD 5) as stockpiles had fallen below the seasonal levels amid refinery outages - this was researched before the disastrous explosion and fire at the Philadelphia refinery, which necessitated its shutdown.

Global oil demand growth was positive, albeit slower than seen in previous years, while global CPP stockpiles have returned to normal over a five year average, but diesel inventories were said to be at low levels and US gasoline inventories were tight, whereas Asian inventories were relatively high.

Middle East refinery capacity additions of around 3.3 mill barrel per day will potentially increase sailing distances (tonne/miles) and increase diesel supply. The expansion is expected to accelerate in 2020-2021 putting pressure on less competitive European refineries.

There are no new refineries planned in areas where there is a current diesel deficit, TORM's analysts found.

In addition, IMO 2020 will also induce inter and intra-regional product trades, as up to 2 mill barrels of HSFO will move to MGO (diesel) or other low sulfur fuels.

TORM also said it expected that the forthcoming low sulfur cap will lead to a 1.1 mill barrels per day additional diesel demand, corresponding to around 5% incremental growth. The downside was the dependence on refineries to produce a higher amount of VLSFO.

In addition, it is predicted that there will also be a fleet capacity reduction of around 0.5% as vessels go off-hire to be converted. This scenario is likely to emerge during the second half of this year.

In a nutshell, TORM said that the increased flexibility to produce additional diesel in next exporting regions and refinery expansion support long to medium haul trades routes worldwide.

Additional routes should be seen, including shorter distance regional and coastal trades.

As for the fleet, TORM estimated that the product tanker fleet would grow by an average of 3.2% per annum during 2019-2021. This figure excludes any acceleration

in recycling due to the new regulations.

Product tanker newbuilding activity has remained relatively low in the first and second quarter to the end of June.

Vessels value has also increased. LR2 and MR values have gone up by 15% and 8%, respectively this year, compared to 2018.

ME Production China

Late last year, TORM established a joint venture with scrubber manufacturer ME Production and Guangzhou Shipyard International (GSI), which is part of the China State Shipbuilding Corporation group.

The new company, ME Production China, now manufactures and installs scrubbers in China both for newbuildings and for retrofits. TORM has a 27.5% stake in the joint venture.

"Our long-standing relationships with GSI and ME Production helped to facilitate this unique joint venture at a time when demand for scrubbers is expected to increase significantly. This strategic move provides us with a substantial economic interest in a venture that has the potential to be a large-scale international scrubber manufacturer. It will also result in TORM obtaining attractive prices for the scrubber investments that already have a short payback time," said TORM Executive Director, Jacob Meldgaard at the time of the announcement.

TORM has ordered a number of scrubbers with ME Production China (see main article) and will look to order more.

The CAPEX for the confirmed scrubber orders is on average estimated to be below $2 mill per scrubber, including installation costs.

Based on the current market expectations for the future price spread between high and low sulfur fuel, TORM said it expected the installation of scrubbers to be an environmentally and commercially positive business case with a short payback time.

By securing production slots at the joint venture's Chinese factory, TORM has virtually guaranteed the delivery of the systems.

Fayard

Fayard is based at Munkebo, located on Odense Fjord just outside the Danish city of Odense.

The shiprepair yard and engineering complex is the result of the relocation of Fredericia Shipyard in 2010. Fredericia Shipyard was founded in 1916 by the Andersen family who still control the yard today.

It sits on the former site of Odense Steel, famous for building AP Moller Maersk's early large containerships, ULCCs and VLCCs. APM owned the shipyard before closing it in around 2012.

Fayard has taken over the giant building dock, now used as a drydock, which is 415 m long and 90 m wide. It can be reduced to 315 m in length by a moveable caisson.

In addition, the complex has three other drydocks, two of which can handle at least Panamax size vessels, plus alongside repair and general cargo quays, workshops and warehousing.

Today, the facility handles around 120-130 vessels per year, including Baltic trading vessels, such as ferries, tankers, etc, due to its prime position near the Great Belt.

As well as 'haircut and shave' type repairs, Fayard is able to undertake conversion and retrofit work, such as scrubber and ballast water treatment system installations.

Owners managers can bring their own repair and maintenance team on site, while Fayard will also sub-contract in expertise as needed. TO

Three KPIs to stay ahead of the competition

There are a number of different Key Performance Indicators (KPIs) that are vital for the long-term success of a company.*

Organisations, such as BIMCO, release new ones on a regular basis but do people really have the time to sit down, collate all the data available and conduct further analysis to figure out how well their fleets are performing?

Fortunately, there are solutions available to ease this process, doing all the calculations automatically based on reliable data.

However, due to the large amount of data available, some companies are uncertain what they should be measuring and how they can use these powerful tools.

Software provider, Hanseaticsoft offered the following tips for shipping companies on three KPIs they should always keep an eye on:

Fuel efficiency

First, recent years has seen increasing fuel prices, depressed market conditions and environmental issues, such as air emissions. These have brought a new perspective to ships' fuel consumption, as well as their speed.

It is no longer just about increasing fuel efficiency overall but also about how companies can increase efficiency while keeping emissions low. To reach this goal, different key figures need to be monitored closely and appropriate measures initiated if the need for action has been identified.

What is the difference between the consumption calculated and the actual figure? What is the design speed of the vessel and how does it compare to the average speed that has been logged or captured by GPS data – also in comparison to the speed ordered by the charterer?

Might it be worth slow steaming for certain parts of a journey or even re-routing? Should the charterer be contacted, so that the ordered speed can be adjusted to achieve increased overall performance?

Keeping an eye on key data, such as the different types of fuel, the ships' speed or the weather conditions will help companies gain valuable insights into the efficiency of their fleet and help them to optimise vessels in the long term.

Second, maintenance costs vary between 10 and 25% of total operating costs in most industries. The efficiency of maintenance tasks is an important factor, as typically more than half the cost is down to labour. Furthermore, improving maintenance efficiency has a positive impact on reliability—so companies can cut costs without risking performance.

However, efficient maintenance is not the norm. Often, companies approach maintenance re-actively, meaning that jobs are scheduled when they become necessary. But instead of waiting for parts to fail, resulting in replacement costs, the preventative maintenance of parts can result in a massive cost saving.

By closely monitoring KPIs and looking at previous costs, a benchmark can be established to schedule jobs before it is too late.

Job distribution

Another factor that prevents efficiency is an uneven job distribution. Some months can see huge job peaks where the amount of work simply can't be done with the resources (manpower, time, spare parts) available – leading to many rescheduled jobs, while in other months, barely any jobs are undertaken.

Using automated reports to evaluate the distribution of tasks enables companies to easily identify peaks and lows so they can distribute them evenly.

Are companies always aware of how many jobs have been done in the month? How many have been rescheduled, approved or are overdue? Each of these could point to a potential problem.

Monitoring whether the number of jobs completed matches the number planned might be one of the best methods of identifying ways to increase overall efficiency and drive down costs.

Having this information available together in one place gives companies a critical insight into the performance and the efficiency of their maintenance tasks.

Third, ships only make money when they are sailing, carrying goods or being chartered by a third party.

But what if a vessel is idle or not available?

All the information is available in real time

Being off hire, a vessel costs a company money rather than earning it, so this is one of the main KPIs that companies should always monitor.

As a benchmark, anything above 97% availability can be rated as a good performance. When a company's vessels are falling below this, it's time to take a closer look to find out how availability can be increased. It might be worth considering increasing crew numbers or optimising maintenance processes.

Possibilities

These core management KPIs are only a fraction of the possibilities, and each metric may go under another name in different companies. Ultimately, this simple list of management KPIs will provide an excellent basis for identifying how to reduce costs and improve efficiency in any shipping company, the company claimed.

In addition, Hanseaticsoft recently launched a new app for its Cloud Fleet Manager - CFM Go - to access relevant data about a fleet from a mobile phone.

Using CFM Go, customers can have all the information from the Cloud Fleet Manager Portal, including internal company news, upcoming crew changes, current off-hires, disturbances, claims, bunkers, etc.

The major benefit for shipping companies using this software is that all their information can be managed and accessed in real time.

**This article was written by Alexander Buchmann, Hanseaticsoft Managing Director.*

New fuels- safeguarding fuel system operability

The IMO's 0.5% global sulfur cap, which will come into force on January 1, 2020 will arguably have as big an impact on the shipping industry since the move from coal to oil.*

It will transform an already complex marine energy supply chain as new, compliant fuels become commonly used across the market.

It is crucial to understand that there are two distinct operational phases in tackling the global sulfur cap.

One is defining the right compliance solution, which is the first hurdle that shipowners and operators are undertaking now, with procurement and supply chain planning.

Second, they also need to seriously factor in the management and use of these new fuels and the right processes involved for when the fuel actually goes into the engine. Mismanaged, and the impact on a vessel could be catastrophic.

Safe and efficient fuel supply and fuel switching will be more important than ever before to protect the safety of the vessel and crew,and safeguarding critical equipment and machinery.

We're all aware of what the fuel landscape will look like; expanding from its current reliance on two fuel types – Heavy Fuel Oil (HFO) and distillates to a market that will see Ultra Low Sulfur Fuel Oil (ULSFO), and Very Low Sulfur Fuel Oil (VLSFO) added to the mix, in conjunction with LNG, and a gradual move towards cleaner products, such as biofuels, ethanol and methanol, as shipping's de-carbonisation challenge comes more into focus.

Moreover, given that there will be more blended fuel in the market, sources will most likely be more fragmented, and less traceable and transparent, which can lead to contamination, high prices and availability concerns. Last year proved to be a big year for fuel quality issues in shipping; the potential impact of distillate hybrid blends in a post-2020 world could be significant.

For the ship implementation plan (SIP), shipowners and operators can decide either to clean the tanks designated for the compliant fuel or to load compliant fuel on top of the remaining 3.5% HFO. However, the latter comes with certain risks that the owner and operator need to be aware of.

Separate tanks

If the ship is fitted with an exhaust gas cleaning system and has separate tanks for 3.5% HFO and low sulfur fuels, it can benefit from a fuel changeover system to switch between these fuels.

During the changeover process, challenges arise when different fuels are present in the same fuel system. A poorly controlled process typically results in sludging and blockages in pipe runs, filters, separator internals, and fuel injection equipment. All of which can have a serious detrimental effect on the health of the engine.

Combined with other concerns, including compromising fuel stability, viscosity, and issues relating to density, Introduction of new fuels into the system becomes a critical concern for operators and can lead – if not managed properly - to loss of propulsion and power resulting to catastrophic damage to engines.

Fuel supply system specialist Auramarine has launched a 'Get Ready for 2020' initiative, which will see the company provide expert consultancy, comprehensive guidance, forward planning, and on-going support for the safe and efficient supply of fuel once the regulation is enforced in less than six months' time.

Controlling engine inlets fuel viscosity and temperature is crucial regardless of the fuel in use. Within the number of services that are provided for this initiative, the new fully automised version of the FuelSafe fuel changeover system is already available and ready for use.

FuelSafe allows a user to accurately predict the time required to safely switch fuels when entering emission control areas (ECAs). The system is suitable for ships operating on HFO and equipped with scrubbers, as well as for vessels that plan to switch between 0.1% and 0.5% compliant products. In addition, the system can also be used for upgrades and retrofits.

Auramarine Global Lifecycle Services Director Konstantinos Fakiolas

Its installation is seamless, due to the design options that have been created to meet space constraints and can be integrated to ships' data system architecture. The system is fully automated with a real-time temperature and viscosity control and it does not require vessel speed reduction during changeover.

Auramarine recently secured its 15,000th order for the fuel supply and management auxiliary units and most importantly, the company works in close partnership with shipowners and operators to ensure that whichever compliance solution is chosen, fuel management systems are fit for purpose and provide reassurance that the operational integrity of their vessels is maintained.

The challenges in the build-up to 2020 have been exponential. However, there needs to be widespread understanding in the industry that the 2020 challenge does not stop once the compliance solution is chosen.

Owners must now look to the practicalities and intricacies of managing their operations in an increasingly complex marine energy supply chain, of which the fuel supply and switching process is a critical element. Failure to do so could result in significant problems that are on par with a lack of compliance. TO

** This article was written by Konstantinos Fakiolas, Director, Auramarine Global Lifecycle Services.*

Making scrubbers work

Scott Poulter, CEO of Pacific Green Technologies explains how to achieve IMO2020 compliance with scrubbers on time and on budget.

It will transform an already complex marine energy supply chain as new, compliant fuels become commonly used across the market.

The clock is ticking and the arguments for and against the various routes to compliance have been well-rehearsed. The scrubber route is one which many have taken: according to the latest figures from DNV GL, a total of 2,947 ships are currently fitted with scrubbers and this number is expected to grow to close to 4,000 by the end of 2020.

But there are still questions in some fleet managers' minds over open loop versus hybrid and closed loop systems, as well as installation issues.

How quickly can a scrubber be installed? Will vessels using open loop systems be able to trade freely in the future? Mixed messages from certain ports and countries about open loop scrubbers and their alleged, unproven impact on the environment mean that some shipping companies have been left confused, as to whether scrubbers are a long-term compliance solution.

Our message to the confused owner is simple: invest in an open-loop, hybrid ready system and work with a manufacturer with the operational capacity to fulfil large number orders.

Available yard time is often perceived to be the main constraint on prompt scrubber installation. However, the possible limitations are numerous and varied. Buyers also need to ensure that their suppliers have ready access to raw materials, parts and spares, and teams of technical specialists.

With such a broad spread of applications and requirements, strategic partnerships offer a means of meeting client needs quickly and professionally.

Thanks to our innovative technologies and a partnership with Power China, Pacific Green Technologies has the ability to deliver and install scrubber systems on time and on budget. Power China is China's largest power plant equipment manufacturer and we are taking on large orders, including a significant order for Scorpio Tankers (STI).

Plan ahead

Planning an installation is key to success. The first step is to assess the vessel's general arrangement to get a sense of the superstructure, funnel and spaces around them. This layout will determine whether the scrubber can be located on the centre line aft of the funnel, or whether space needs to be developed to the side.

The next step is a visit to the vessel to conduct a full 3D scan of the areas impacted by installation. The installation of a strainer and valves ahead of the seawater pumps, may require some creativity, and possibly take up space occupied by other equipment. The scan will be used to route seawater piping to the scrubber and discharge water from the scrubber to an overboard discharge.

The electrical distribution cabinets, variable frequency drive (VFD) and programmable logic controller (PLC) cabinets are smaller and can be fitted in proximity to or around existing infrastructure. Routing for power and instrument wiring can be completed with the placement of the cabinets in a preliminary design.

Once a feasibility study outlining the installation solution is complete, the design team meets with the company technical and operations teams to review the solution and system specification. A team takes the feasibility study to the ship and walks the routing for the pipe and duct work to ensure that the solution will fit the vessel.

Once approved, the working drawings are created for the installation of the scrubber and members of the technical and operations teams attend the shipyard throughout installation.

Finally, once all installed, or during sea trials Pacific Green Technology's team provides comprehensive training for the ships' crew in the operation and maintenance of the scrubber.

Despite the complexity, we're confident that our contract time to handover time is one of the shortest in the world.

Pacific Green Technology offers a wide range of emissions control systems for ships of all classes. With more than a decade of designing, planning, manufacturing and implementing scrubbers on vessels, the patented ENVI-Marine is a new generation of scrubbing technology, based on a simple concept. The flue gases are first quenched then cleaned by specialised frothing through pure seawater using a patented TurboHead process before being discharged as harmless salts.

ENVI's TurboHead provides a highly interactive contact between the seawater and the exhaust gas in a turbulent zone containing a high amount of surface area for gas/ liquid absorption. This high energy liquid/gas interaction assures both the residence time and complete interaction required to achieve high efficiency removal of sulfur from the exhaust gas and the extreme turbulent interaction transfers particulate matter from the gas to the scrubber fluid. TO

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Marine monitoring system development powered by innovation

Innovation is driving advanced monitoring and control technologies for environmental and safety compliance in the marine sector, claimed Gérard Baldellou, CMR Group marine business unit manager.

It will transform an already complex marine energy supply chain as new, compliant fuels become commonly used across the market.

The marine diesel power sector continues to face significant challenges, particularly in areas where emissions resulting from combustion inside engines, along with fuel consumption levels need reducing.

Escalating operating costs, tighter margins and pressures in the oil and gas sector signal challenging times for shipowners and fleet operators. Because of this, there's more focus than ever before on achieving savings and operating efficiently wherever possible.

According to a survey of the international shipping industry by a firm of accountants and shipping consultants, vessel operating costs was expected to rise last year by 2.4%. The cost of repairs and maintenance were also forecast to increase by 2%, while expenditure on spares and drydocking were predicted to grow by 1.9% and 1.8%, respectively.

It's clear that the marine sector must strive to cut costs and operate more efficiently and effectively - and the latest in advanced instrumentation and control systems can help here.

New technology is firmly on the wish-list of shipping operators, who are looking to drive-up performance levels, while cutting operating costs in tough trading conditions. Many are turning to sector specialists for added value technologies supported by advanced digital solutions and installation engineering capabilities.

Partnerships

Furthermore, moves by instrumentation and control manufacturers to partner ever closer with engine OEMs are also underway to meet the reliability and lifetime challenges for industrial engine sensors, in efforts to try to minimise final engine delivery cost.

CMR Group's Gérard Baldellou

This approach can typically deliver savings without any compromise around the quality and standard of the final solution. How can this be achieved? As an independent operation, global specialists like CMR Group are focused on the business of providing effective and high-quality precision engineered solutions, built around meeting individual requirements and delivered through partnership strategies.

Working systems and procedures dovetail to reflect this single-minded purpose, and processes are entirely geared to ensuring that work is carried out efficiently, in line with the technical standards required and with close attention to planning and project management.

This focus enables us to work closely with customers and end users to ensure that projects are completed as quickly as possible and that vessel downtimes are reduced to a minimum.

IMO regulations for MARPOL Annex VI Tier III, which is aimed at reducing pollution emissions, have also led to upheavals for diesel engine manufacturers when it comes to control and power management systems. In turn, this has directed CMR to develop a new generation of advanced engine and IAMCS (integrated alarm, monitoring and control system).

Now being designed and built around 'smart' wiring, instrumentation and engineering packages for wider applications in the marine sector and featuring proprietary J-SENSE technology (analogue to digital conversion electronics are embedded within the sensor, allowing for a direct CAN connection to the engine ECU), IAMCS can be directly linked to CAN smart sensors and harnesses, as well as data transfer onshore for predictive analysis, intervention and maintenance.

Owners and operators' value, perhaps more than ever, the availability of their vessels. This means that routine engine maintenance schedules must be optimised and planned very carefully. In achieving this, the need to pay close attention to the details in the project management and planning of system jobs is paramount; it cannot be underestimated - and partner suppliers can often be better placed to provide this.

Understandably, OEMs have priority interests in manufacturing and new product development, sales of new engines and warranty support. External suppliers like CMR can respond to these interests, adding value through wholly focusing on providing a fully responsive engineering service - one that is geared towards meeting the specific timing, location and technical needs of the customer.

In this way, with strong pressures on operating costs and assured vessel availability, sector specialists are responding and adapting to changing market needs, demonstrating their capabilities and system solutions.

CMR Group supplies instrumentation, controls and power management for vessels, engine and industrial applications worldwide.

With core product groups including automation, control panels, displays, sensors, wiring systems, power distribution, signal processing and supervision, the company, based in Marseille, France, is an engineering partner for many leading manufacturers, operators and integrators of capital equipment. TO

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Quiet Revolution

Level measurement plays a vital role in maintaining ship safety and efficiency, yet the specification of tankers tank level gauging equipment is often overshadowed by the focus on investing in ship-wide systems and protecting valuable cargoes.

PSM's Mark Jones looks at the vital role of digital tank gauging and how continuing advances in sensors, the unsung heroes, are raising the bar.

The advent of more sophisticated and larger vessels has introduced new operational risk levels. At the same time the Catch-22 situation introduced by modern technology, while facilitating crew reductions has placed extra pressure on time-constrained individuals tasked with monitoring duties. However, the introduction of digital tank gauging solutions has helped alleviate the situation by removing the need for manual checking.

Modern tank gauging systems are designed to be flexible, capable of handling process control across the full range of shipboard fluid types, from fuel oil and lubricants to ballast water. Intelligent sensors collect real-time data from all on board storage tanks, including anti-rolling tanks and measurement of the ship's draught and trim, as well cargo tanks and water ingress detection.

The sensors and transmitters are networked via an on board system. This uses distributed termination modules to acquire the data collected and relay it to a centralised graphic display unit, which provides content indication and alarm status for all tanks.

A key objective for PSM has been to maximise 'view on deck' opportunities. Repeater displays can be installed to provide function-critical information at additional locations to enable the ships' crew to access information directly.

Supplied pre-configured to suit individual applications, the on board system also outputs to other shipboard systems, such as the vessel management system or loading computers, enabling the wider integration and automation of ship systems.

Rolling with the punches

ATEX certified and marine approved, digital tank gauging systems are now an increasing requirement for shipping organisations, as well as to ensure regulatory compliance, providing additional drivers for refit programmes.

For shipbuilders, staying competitive and

adapting to changing market conditions means ensuring a quick turnround in the shipyard for refits and fast-tracking newbuilds. Minimising downtime for vessels in service by shortening the time in drydock is also essential for fleet owners.

Easily integrated at a component level, the latest digital tang gauging systems offer a cost-effective route for repair and replacement. Increased compatibility and interchangeability also provide a solution where existing systems are found to be inoperable or where obsolescence occurs due to component suppliers exiting the market.

For newbuild contracts and major upgrade projects, pre-configuration by the supplier of all operational parameters means also that whole systems can be supplied and installed in a minimum of time without the need for costly local engineering expertise, an advantage for shipbuilders.

Unlike traditional analogue systems, which require a signal cable and barrier to be fitted for each sensor with multiple converters, digital systems like PSM's require only a single multi-drop power and communications cable, eliminating the need for multiple barriers and A/D converters, which can reduce installation time and materials cost by up to 60%.

Configurable remote tank level display.

Automated ships are still some way off, meanwhile manufacturers and suppliers continue to support the digitalisation process in the move towards 'smart' ships, which can assist the shipowners to maintain profitability and improve efficiency and safety.

For PSM this means applying the latest thinking and technology to deliver on innovation. Equally key is simplicity of design for easier use, cost-effective installation and reliability.

Currently in final development and testing with a view to launching later this year is a completely new type of transmitter and display package that represents a significant advance, making digital measurement even more accessible.

The new VPM intelligent tank gauging package is based on the next generation intelligent transmitter, which may be configured prior to delivery with all parameters specific to the intended application.

Installers can connect the system and set to work immediately while retaining the ability to finetune settings on the spot using a laptop computer. No specialist knowledge or test equipment is required.

Equally important, given the multiple pressures on ships' engineers, should replacement at sea be required, the smart technology behind the new system allows the crew to drop the new transmitter into place and instruct it what to do in minutes.

The VPM system is scalable from a dedicated compact integral display panel mount unit for smaller vessels to larger PC based solutions with multiple repeater stations for larger ships.

The next generation sensors can also be integrated with more comprehensive systems, such as Scanjet ITAMA total tank management system for larger-scale or more complex vessels.

Often a lesser consideration in the context of ship architecture, smarter sensors hold the key to reducing lifetime vessel costs, while building in more flexibility and control and ensuring legal compliance on safety.

TO

A measured approach to managing climate change

The issue of managing climate change is, more than ever before, posing a threat to the global shipping industry.*

The target has been set by the (IMO for a 50% reduction in greenhouse gases (GHG) emissions by 2050 against 2008 baseline measurements. This will require a 40% reduction in shipping emissions by 2040.

Mid-term measures aimed at fostering innovation and starting the deployment of alternative fuels will need to be adopted by 2030.

Meantime, the first hurdle for the shipping industry is to meet the call for early measures to reduce emissions by 2023, as defined in the GHG Strategy. The IMO hopes to reach this goal by developing short-term measures, such as removing market barriers, improving operational energy efficiency and developing technologies for zero-carbon fuels.

This means utilising every tool at our disposal to reduce fuel consumption, limit emissions and enhance operational efficiency. Protective hull coatings are one solution available to every vessel owner now, with proven ability to improve operational efficiency.

We have seen a wave of innovation in ship design, construction and alteration in recent years to help the industry meet the IMO's 0.5% sulfur emissions requirements from 2020. Importantly, the industry has proven it can adapt to significant change.

This should provide some optimism for owners, operators and managers in finding solutions for the next major regulatory hurdle. In doing so, it is worth remembering that the IMO has set a deliberately ambitious goal for reducing GHG emissions by 2050. This target ought to be welcomed as it fosters an environment of innovation and collaboration.

A coatings inspection

That said, as it stands currently, there are no commercially viable, widely available and sustainable long-term fuelling solutions currently available to comfortably meet or exceed the 50% emissions reduction requirements. So, it is now up to the maritime and related industries to come up with the solutions.

This will cost money, and will require every shipowner, operator and manager, not to mention the energy industry, to act now. It is incumbent upon them to begin making measurable improvements by 2023. Slow steaming, although not without its own problems, is increasingly being lauded as the most sensible interim measure for reducing fuel emissions across every vessel segment.

Pragmatic solution

Following the 2008 financial collapse, many owners and operators used slow steaming as a means for dealing with lower market demand, reducing fuel requirements and enhancing operational efficiencies. The cumulative result was a significant drop in overall GHG emissions from shipping.

According to a recent report by research consultancy CE Delft, the 12% reduction in at-sea average speed during this time led to an average reduction of 27% in daily fuel consumption.

The same report, 'Regulating speed: a short-term measure to reduce maritime GHG emissions' claimed that further speed reductions of 20-30% would put shipping emissions on a declining path, thus contributing to reaching the goals of the global Paris Agreement, if mandated across all vessel classes and sizes.

Vessel efficiency can be enhanced significantly with the application of protective hull coatings designed to improve hull performance. The smallest micro-fouling is caused by slime and can result in an increased fuel consumption of between 1-2%, as the vessel uses more fuel to counter drag caused by biofouling. Macro-fouling - seaweed, barnacles, oysters and mussels - could increase fuel consumption by as much as 40%.

These improvements all count toward significant overall savings. Specifically designed to deliver effective protection for up to 60 months, Hempel's newest coating Globic 7000 – to give an example - incorporates an optimum biocide mix to guard against both hard and soft fouling.

This delivers an improved performance against slime and algae so is suitable for wide operational conditions, including slow steaming and long idle periods. This coating delivers 4.5% fuel savings over a 60-month docking interval, compared to a market average antifouling.

Shipmanagers must be able to carefully monitor and control fuelling requirements, energy consumption and performance of each vessel in order to operate more efficiently, and to evidence the steps taken to reduce emissions. This requires tangible evidence of how a vessel operates against set criterion or key performance indicators (KPI's) and baseline measurements for the vessel, which can be compared over time.

At Hempel, our SHAPE system provides important data and verification which informs our discussions with customers and the products that we recommend.

This data intelligence is evidence of the latent efficiency savings to be made, where additional technologies can complement to deliver overall operational cost savings. Importantly, such measuring and monitoring, shipowners can demonstrate how each vessel is reducing its emissions.

This level of detail and analysis will be critical if slow steaming is going to be used as an interim measure for meeting the 2050 target. After all, if we are not measuring and evidencing what we are doing, we cannot prove the improvements made.

**This article was written by Davide Ippolito, Head of Marine Group Product Management, Hempel A/S.*

Making Sense of wash water analysis - Part 1

Analysis of wash water during a tank cleaning operation is undertaken for a number of cargoes with the main objective of decreasing the need for tank entry after a cleaning to perform a wall wash test*.

Tank entry (or any so called confined space entry) is an operation involving serious risks. When safety is concerned, new technologies to lessen this dangerous operation should be embraced. But is this feasible?

The analysis of wash water samples is performed with an UV/VIS spectrophotometer. In short, this device makes scans of wash water in visible and ultraviolet light.

Organic substances absorb light at a specific wave length and thus organic substances can be detected in for instance - water. The wash water scan with the UV/VIS spectrophotometer is compared with existing reference scans of the substance, to determine if the wash cycle is complete or washing needs to be continued. Using this method, could reduce the use of water, resulting in less fuel consumption and prevent over-cleaning, thus also saving time.

There is a relation between a certain substance or molecule and the amount of absorbance at a particular wave length. This is the so called molar extinction coefficient. The beauty of this physical fact is that it can be used to determine substance concentrations. This is why the UV/VIS device is so widely used for the analysis of watery samples in so many industries.

The fact that this substance molar extinction coefficient is a physical constant for each substance, therefore the UV/VIS device is not part of the equation. So each UV/VIS device should give the same result, provided other parameters are the same. Therefore, it is important that procedures for taking and handling of samples, including other parameters that can influence a measurement, such as temperature and soluble medium, should be known.

To correctly compare the wash water UV/VIS scans with the substances' reference scans, it is important these scans are made according to laboratory standard practice. As physics shows, substance UV/VIS reference scans should be able to be exactly reproduced on any UV/VIS spectrophotometer, given all the parameters are known.

This ability to be reproduced is one of the pillars of the scientific method and important to make judgements of observations. The scientific

A UV/VS spectrophotometer

hypothesis is verifiable and can be used as a theory until proven and verified otherwise.

Now here lies the crux of the matter. Trying to duplicate existing market reference UV/VIS scans of certain substances gave different results, hence the scans could not be verified. One of the problems is the fact reference UV/VIS scans exist of substances that are not or very poorly water soluble. Nonetheless reference scans can be found of non-water soluble substances, for instance Octene, up to 200 ppm, while the maximum solubility of the substance Octene is less than 6 ppm at ambient temperature.

When trying to dissolve a substance above this maximum solubility value, it tends to float on water, due to its specific gravity, being lower than water, resulting in a solution with maximum dissolved substance and probably some unknown amount of dispersed or suspended substance.

Cloudy solution

Another problem found was that some substances form a cloudy mixture in water. Measuring a cloudy solution is unreliable, as it will both absorb light and also scatters light, thus turbidity is measured instead of absorbance. This last example of forming turbidity is especially seen in vegetable and mineral oil substances and product mixtures.

We question how these standards are set? The standard should be based on the scientific method, as consensus is just an agreement.

Further questions arise, what is the cleaning standard in relation to wash water analysis and who is setting it:

-Sample preparations and parameters, or better said the analytical protocol?

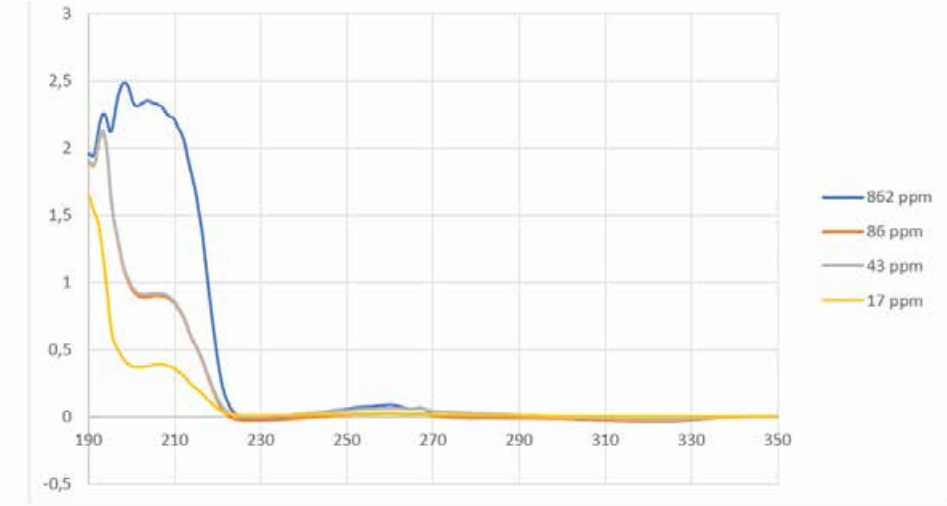
-Up to which concentration measured on the UV/VIS scan of the wash water of a certain substance, the tank cleaning is completed and proven as 'clean', and how does the UV/VIS Scan relate to wall wash analysis results?

-Should standard cleaning procedures and analytical methods per substance, in accordance with the wash water analysis procedure, be available and transparent for the market to follow, given the incentive of creating a safer process for crew and inspections by means of fewer tank entries?

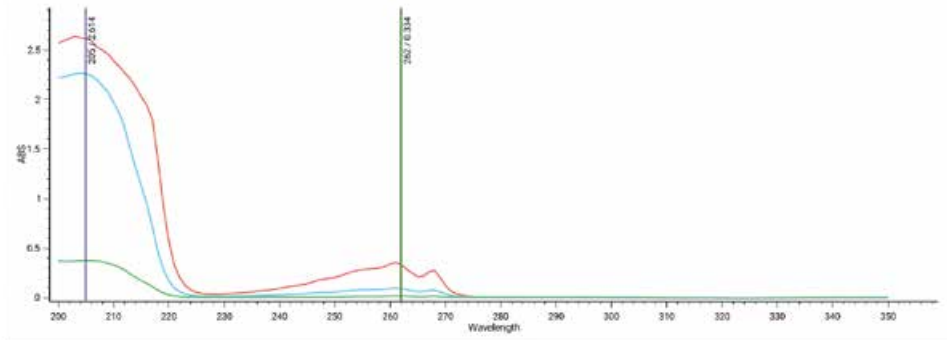
- Which type of tank material/coating qualifies for the applied method? Coatings tend to retain cargo residues, possibly influencing the wash water measurements.

Wash water analysis can be shrouded in mystery. For instance, as the cleaning standard or consented methodology is missing, interpretation of the UV/VIS scan is done randomly and some scan conclusions are resulting in insufficient cleaning.

Looking at the above, a clear separation should be made in two types of substances (or cargoes) and the use of the UV/VIS Spectrophotometer in wash water analysis.



UV Scan Caretech Spectroscan UV-Vis Cumene in water 10mm cuvet



Sample	ABS(205)	ABS(262)
toluene 520 ppm	2.614	0.334
toluene 100 ppm	2.258	0.091
toluene 10 ppm	0.372	0.014

Tank cleaning toluene in water 10mm cell

1) Water soluble substances/cargoes.
2) Non- or poorly water soluble substances/ cargoes.

For water soluble substances, the analysis of wash water can be used to determine if a tank is clean. This could save time, as over-cleaning is prevented by continuous monitoring of the process, by measuring the wash water with the UV/VIS spectrometer.

As water is the medium and the substance dissolves in water, the tank is clean when the measured substance/cargo is under a certain value. For this purpose, the wash water analysis and the UV/VIS graphs could be an excellent tool, although it is unclear what the certain value of acceptance of each substance is, as explained earlier.

Non-water soluble substances are less or not suitable to determine if a tank is clean with wash water analysis. The determination of the concentration of non-water soluble substances/cargoes is not accurately possible at concentrations higher than the maximum solubility in water.

In most cases, these kind of substances are generally not cleaned with water only, as a circulation wash with cleaning agents is performed. In such cases, the wash water analysis could be of help to lower the use of water prior to the circulation cleaning. During this stage the water can dissolve as much as the maximum solubility of the substance/cargo.

Measuring wash water with an UV/VIS spectrophotometer will show a trend of the UV/ scans of the substance/cargo in the subsequent wash water samples.

When the analysis of this wash water shows no absorbance (a flat line) this pre-wash is complete. In this case the wash water analysis can shorten the cleaning time. It could also save fuel consumption, in case heated wash water is used and thus lowering the carbon footprint.

In conclusion, wash water analysis with an UV/VIS spectrophotometer can be a good tool for shortening water wash phases and thus saving time and energy. For water soluble substances this method could also be used to determine cleanliness of a tank and prevent tank entry to perform a wall wash test.

As questions remain, Marine Care, together with stakeholders, is undertaking further research.

**This is the first of two articles written by Thomas van Os, Research and Development Manager at Marine Care.*

Marine Care

Founded in 1997, Marine Care is a privately owned company, specialising in cleaning solutions for bulkers and tankers.

For many years, the company has supplied the Caretech Spectroscan UV-Vis spectrophotometer to support hundreds of clients in both cleaning and wall wash testing challenges.

When discussions with customers started to develop on wash water testing the company sensed that a general scientific approach and understanding was missing.

With years of field experience, customer input and support for the latest development, the UV-Vis SmartLog, the company has investigated the sense and nonsense, which led to this paper.

TO

Effective tank cleaning while in operation

The success of any tank cleaning operation is generally measured on the ability of a vessel to switch from one cargo grade to another in the shortest possible time, using the minimum volume of tank cleaning chemicals or materials.*

Hidden inside this statement are a considerable number of variables, all of which directly impact on the end result. Many of these variables can be changed during a tank cleaning operation, for example the choice of cleaning chemical, temperature of washing water, number and/or operating mode of the tank cleaning machines and the skill of manipulating these variables is potentially what makes one vessel better than another at tank cleaning.

But perhaps the most important variable, which cannot be altered during tank cleaning operations and arguably has the most impact on the success of all tank cleaning operations, is the vessel itself.

For example, the size and construction of the cargo tanks, the ability of the vessel to maintain the optimum washing water temperature, the ability of the vessel to supply and remove washing water to and from the cargo tanks, to name three of the most significant.

Put simply, the construction and overall maintenance of these 'fixed assets' of the vessel are controlled and certified by the class societies who inspect the vessels from newbuild and throughout operational service. They will also provide the vessels with a class notation, which directly relates to the construction of the vessel and permissible operations.

Put another way, class notation defines the minimum standard that a vessel must achieve in order to operate in a specific field. However, vessels that are equipped above and beyond this minimum standard may also qualify for additional class notations.

Specifically this would indicate to an interested commercial partner, that a vessel with an additional notation may be more suited to perform a particular service, compared to a vessel without the additional notation, even if the class notation of both vessels was the same.

Further, an additional notation is termed ETC, or Effective Tank Cleaning (on board oil products and chemical tankers). The basis of this notation can be read as: 'An improved tank cleaning standard relating to the arrangement of and equipment on board oil product and chemical tankers that may reduce the turnaround time in ports. This notation is an attempt to make it less likely that the cargo will be affected by insufficient cleaning'.

It is interesting that by applying this notation, TECO chemicals and on board supercargoes appear to be actively working towards enhancing both the operational and commercial performance of the vessels. The comments relating to the quality of the next loaded cargo are extremely important for tanker owners and operators, as in all cases, where there is a cargo contamination claim, it is the owners and/or operators of the vessel that will take ultimate responsibility.

Things to do for ensuring effective tank cleaning:

1) General:

(a) The Master & Chief Officer are responsible for the tank cleaning operation. They are responsible of conducting inspections before and during the operation to ensure that all necessary equipment is in good working condition. All stages of the operation must be undertaken in a safe manner, according to each individual chemical's physical and chemical characteristics, such as flammability, corrosiveness, toxicity and reactivity.

(b) Pre-cleaning Meeting : A pre-cleaning conference under the leadership of the Chief Officer will be held prior to any cleaning operations. This conference will involve various crew members appointed by the CO. The purpose of this conference is to discuss and firm up the cleaning plan and that respective crew members are aware of their responsibilities and duties.

2) Meeting agenda:

(a) Which tank to be cleaned.
(b) What type of cargo to be cleaned from.
(c) Major risks involved during the cleaning, such as flammability, corrosiveness, reactivity, chemicals if ingested can be harmful and poisonous, connection/disconnection on cargo manifold.
(d) General use of PPE during cleaning operation.
(e) Cleaning instruction to be followed.
(f) Where to dispose the cleaning water (slop).
(g) Intervals for measurement of explosive/poisonous gas in cargo deck area during tank washing/gas freeing.
(h) Duration of cleaning.

Many factors need to be considered in order to achieve the desired tank cleaning result. The most imoprtant factors are:

- Properties of the last three cargoes to be cleaned and to be loaded.
- Cargo in surrounding tanks (temp, Inhibited etc).
- Tank construction (coated, zinc, SS).
- Available cleaning equipments (cleaning machines, etc).
- Selection of the proper cleaning method and cleaning medium.
- Cleaning of all areas/equipment that was in contact with cargo (valves, lines, deck heater, blinds etc).
- Safety aspect.
- Shadow areas.

Cleaning methods using chemicals - Prior to

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use of any chemicals, make sure the tanks and lines are well stripped and drained. A proper pre-cleaning will reduce the amount of chemicals required. Due to the fact that zinc is porous, a prolonged pre-cleaning with lower temperatures is highly advisable prior to introduction of chemicals on such lining a) Spray method b) re-circulation method c) injection method.

Despite following any of the above methods, some important notes are to be followed:

Always understand the effect the chemicals may have on the coating, and in which concentrations it may be used. Futher, the temperatures during the cleaning operation can dramatically affect the final result. Polymerisation, oxidation, gumming or hardening of cargo residues as a result of to high or to low temperatures could easily turn into a costly and time consuming experience.

As a rule of thumb never exceed 10-15 deg C above the cargo melting point, at least until all residues are removed Do NOT underestimate the quantity chemicals required for any operation, nor the time. No chemical can produce miraculous results unless used prudently. Only a proper pre-planning and a subsequent correct operation will yield the required results

We can divide tank cleaning into following steps - planning of cleaning procedures, properties of previous last three cargoes, requirements of cargo to be loaded, time factor, pre-cleaning, final cleaning, gas freeing, mopping, drying, verification of result.

Cleaning for most cargoes carried by sea, ie animal, vegetable, fish oils and fats. These groups of cargoes are separated into three categories: Drying oils are an organic liquid, which readily absorb oxygen from the air and polymerises to form a relatively hard and elastic film.

A polymerisation is a chemical reaction in which a large number of relatively simple molecules combine to form of chain-like macromolecules. The reaction occurs spontaneously, and a warm and dry atmosphere will accelerate the process.

Drying oils are usually natural products, such as linseed, tung, perilla, soyabean, fish and dehydrated castor oils, but are also prepared by a combination of natural oils and their fatty acids with various synthetic resins. The drying ability is due to the presence of unsaturated fatty acids.

Semi-drying oils are generally vegetable, animal or fish origin, such as groundnut oil, sesame oil, cottonseed oil, sunflower seed and herring oil or sardine oils. These oils react similar to the drying oils. The oxidation (polymerisation) occurs in three phases: liquid, gum and solid. Again, high temperatures will accelerate the process.

The formation of cargo residues is often seen below the main deck, stringer deck etc. where the cargo has refrigerated/oxidised during a voyage or discharging operation. The polymerisation process will occur more rapidly the thinner the layer left on the bulkhead/wall.

Non Drying Oils are oils with a low melting point, such as tallow, lard, rape seed, palm oil and coconut oil.

Some rules/advice - When handling the above oils it is vital to closely monitor the cargo during the voyage and the discharge process and to pre-plan the cleaning operation. This will save cleaning time and reduce the amount of cleaning chemicals required

Certain basic rules should be taken into consideration: After loading, all lines should be blown clear of cargo, including connections, drain plugs and valves. If the cargo has a high melting point, and the vessel is sailing in cold waters, re-circulation of the cargo while heating is advisable.

This should be done in good time prior to discharging to ensure pumps running. Frozen cargo clogged to the pumps impeller, can turn to be a very time-consuming and expensive experience

During the voyage it is vital to keep the temperature of the cargo as requested by shippers. Be aware of time required to gain extra temperature prior to discharging (if required)

Examples - Cleaning of IG Soot stains and cleaning of extremely dirty tanks after mineral oils/petroleum products. Practical Cleaning Guideline with Marclean SC, tank cleaning chemicals from TECO.

Usage instructions for NLS Cargo tank cleaning; Prior to the use of any chemicals, make sure the tanks and lines are well stripped and drained. A proper pre-cleaning will reduce the amount of chemicals required. Further, do not overheat, as this may change the characteristic of the cargo and in some cases burn the cargo to the bulkhead. Carefully read the cargo specification.

For vegetable, animals, and fats: Tanks containing drying or semi-drying oils should be flushed or pre-washed or moisten as soon as possible after completion of discharging to prevent formation of hard tenacious residues. The temperature used for pre-cleaning will depend on whether the cargo is drying, semi-drying or non-drying, and the cargoes melting point. Thus an individual cleaning operation should be made for each cargo.

Due to the fact that the zinc is porous, a prolonged pre-cleaning with lower temperatures is highly advisable prior to introduction of chemicals on such lining. Note. All cleaning chemicals have reduced effect with seawater

Marclean SC is very efficient when applied using high pressure.
Re-circulations:

(1) Flush tanks with ambient seawater to remove remaining cargo to slop.
(2) Recycle tanks with increasing temperature for 2-8 hrs, depending cargo and size of tank. This is a very important operation, as it will remove oily-mud and residues in the coating/ steel.
(3) Make a mixture with fresh water and 0, 5 -2 % Marclean SC. Insert the mixture into the tank and commence the re-circulation wash for 2-8 hrs. Increased temperatures will improve the cleaning result. Maximum effect from chemical at 65 deg. Do not overheat, as this may burn the cargo.
(4) Flush tanks with large amount of warm seawater (2-3 hrs) to remove any residues of chemicals.
(5) Flush tanks with freshwater to remove salts, mop and dry.

Spot cleaning after most CPP/ hydrocarbons -

(1) Marclean SC may be sprayed on the bulkhead neat or diluted, to areas where residues remain after tank washing, 'Spot Cleaning'. A heated dilution is found to be very efficient.
(2) Product should be allowed to stand for 10-30 mins prior to re-washing areas. Do not leave the product to dry on bare coating.
(3) Clean areas by flushing manually with high pressure, using fresh water, or by performing a re-circulation. For persistent deposits, agitation by scrubbing will assist the cleaning operation. Heated water will increase the cleaning effect.

**This article was prepared by Gaurav Saini, Head of Global Sales, TECO Chemicals.*

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