TANKER Operator

AUGUST/SEPTEMBER 2009

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Features:

- Integrated operations system
- Should tankers be armed?
- Going back to basics
- VOC problems addressed
- Monitor oily water discharge
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Contents

TANKEROperator

Vol 8 No 8
Tanker Operator Magazine Ltd
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SUBSCRIPTION
1 year (8 issues)
$220 / €160 / £150
2 years (16 issues)
$330 / €240 / £225
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Printed by FISCHER Poligrafia
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Katowice, Poland

ABC

Front cover photo
Navigation in harsh winter conditions tests both the structural integrity of the vessel and the expertise of the crew. Get either wrong and you will be in desperate trouble. Photo credit –LR/PRISCO.

Seafarer shortage – here to stay?

We all have to join together as an industry to address the seafarer crisis. This was a message that came across loud and clear from industry leaders.

It is imperative that we continue to take positive steps to attract, train and retain the seafarers who will man the ships of the future, the Round Table of international shipping associations (RT) said in a recently published paper.

The group thought that the long term trend in world trade will mean an ongoing increase in the demand for ships, and for well trained crews to man them, despite the current downturn.

In addressing trained seafarers' future requirements, it is important to emphasise that shipping should be considered as a career, which includes attractive opportunities to move to jobs ashore with the appropriate training and experience. This should be borne in mind in the recruitment, education and training of seafarers.

The RT set out ideas on how to achieve these objectives, and the respective roles that different stakeholders, including shipowners, shipmanagers, national and international shipowner associations, governments, unions, ILO and IMO can play.

Many countries have already developed national recruitment campaigns involving all interested parties at a local level, for example, national campaigns such as 'World Careers - the Blue Denmark', 'Take a Fresh Look at the Sea' from the UK (published by Sea Vision UK) and the 'Think Maritime' campaign in Hong Kong, among others.

Recruitment, which is not undertaken at the national level may be geared to servicing the needs of multi-national shipowners and managers, or other elements of the global shipping sector. In some cases, the recruitment requirements of countries supplying relatively large numbers of seafarers for the international sector may require a different approach.

To promote and support national campaigns, the RT proposed the following:

- To conduct a survey of national recruitment campaigns.
- To assist national efforts by exchanging information on experience in organising such campaigns, and sharing the resources used in those campaigns.
- To encourage similar campaigns in more countries.

The ISF will co-ordinate the survey and set up a mechanism for the exchange of information on experience.

The RT and its members said that the following initiatives were already underway, or proposed:

- A DVD has been recently produced by ISF (and sponsored by IMO) entitled 'Careers in International Shipping', which is being distributed to all those interested in using it for seafarer recruitment through national shipowner associations.
- Standard presentations will be developed for use by those promoting careers at sea.
- Material produced for use in national campaigns will be shared, particularly for the benefit of campaigns in countries that have fewer resources to produce their own material.
- A 'library' of images and video material that could be of potential value in promoting careers in shipping will be compiled.
- Social networking websites will be used as a means to reach out to potential recruits internationally.
- Questionnaires and other quantitative and qualitative research involving the future requirements of the various domestic and international shipping sectors.

Shipping's image

Criminalisation of seafarers for accidental pollution and the fair treatment of seafarers are two areas which need to be addressed to eradicate as far as possible potential reasons for negative perceptions and to promote messages for the positive social and economic benefits of shipping in general, and of employment potential in particular.

Education and training

Those who are attracted to the seafaring profession should be given a choice of routes to obtain the necessary qualifications, with an appropriate mixture of time in training establishments and time at sea (in accordance with the STCW requirements).

The industry should work with governments to ensure that the appropriate training places are available and that the quality of training and the curriculae meet the required standards on a consistent basis.

It is important that the industry gives both financial and practical support to meeting these needs. In order to motivate further development of industry initiatives, it is proposed that a survey is conducted of current commitments to education and training establishments by shipowners and industry associations, the RT said.

In order to meet future requirements for trained seafarers, all shipowners should be encouraged to commit to providing sufficient berths for cadets to complete their sea time.

The paper then went on the discuss accommodation and facilities, in line with the Maritime Labour Convention 2006; restriction on seafarer movements; plus the burden of too much paperwork on board ship.

In a recession when jobs are scarce, this might just work. However, we as an industry need to act fast to secure those thinking of a career at sea, before the good times return and other careers take precedent. TO

A more technologically advanced tug was needed in North Puget Sound. Check out Crowley's *Response*.

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The bears have it

The second quarter of this year certainly proved that unfortunately, the tanker sector prophets of doom were correct in their forecasts of a falling market.

Outlining what happened during the period to the end of 2Q09, Teekay, with a little help from the energy agencies and leading shipbroker Clarkson, said that average oil demand fell by 700,000 barrels per day to 83 mill barrels per day, which was down 3.5% (3 mill barrels per day) on the same period last year.

Global oil supply fell by 300,000 barrels per day in 2Q09, led by OPEC cutbacks and a decline in North Sea production on the back of the start of the summer oilfield maintenance season.

At its 28th May meeting, OPEC chose to leave current production levels unchanged, having previously agreed 4.2 mill barrels per day cuts since last September. However, in June, some members increased production spurred on by higher oil prices, but overall, OPEC's production declined by 500,000 barrels per day.

As for spot markets rates expressed in US dollars per day for VLCCs, this averaged only $24,000 per day in 2Q09, the lowest level seen since in a second quarter since 2002. In the previous quarter the average spot market rate was a more healthy $49,000 per day.

Turning to Suezmaxes, this sector performed marginally better averaging $25,000 as against $43,000 per day in 1Q09. The removal of some VLCCs for storage in the Atlantic helped tighten vessel supply in West Africa.

LR2s and MRs rates fell away badly in 2Q09.

Aframaxes fell to an average of $14,000 from $24,000 per day in the first quarter. This was partly due to a 200,000 barrels per day decline in US crude imports as oil inventories rose to a 19 year high and the start of the North Sea maintenance season. In addition, a weak VLCC market, coupled with heavy refinery maintenance programmes in Asia led to a steep decline in Pacific Aframax earnings.

In the Aframax LR2 sector, rates fell away to average $9,000 from $23,000 per day seen in 1Q09. This was due to a continuing weak product demand and an increase in the size of the fleet, despite the removal of some vessels for storage purposes.

Last, MRs also suffered a heavy fall from $13,000 in the first quarter to just $5,000 per day. Falling demand for refined products, high global fuel inventories and an influx of newbuildings were to blame.

Looking at the total tanker fleet, this had grown by 18.2 mill dwt (4.5%) since the beginning of the year, compared with 7.2 mill dwt (1.9%) growth in the first half of 2008. Newbuilding deliveries totalled 26.3 mill dwt in 1H09, compared with 14.8 mill in the first half of 2008 and 36.3 mill dwt for the whole of last year.

Removals from the fleet during 1H09 totalled 8.1 mill dwt, compared with 7.9 mill dwt during the same period last year. Ordering came almost to a standstill with just eight vessels of 300,000 dwt reported in 2Q09.

The dearth of orders plus the acceleration in the number of deliveries, helped shrink the orderbook by 29.4 mill dwt since the beginning of the year. At the end of June, it stood at 35% of the existing fleet, versus 43% at the beginning of January.

What next?

Teekay said the timing and strength of any economic recovery is the single largest variable in the tanker sector. Many agencies forecast an upturn next year. For example, the IMF said global GDP growth for 2010 would run at 2.5%, compared with a 1.3% contraction this year. In its latest Medium Oil Term market Report, the IEA forecast a 1.1 mill barrels per day growth in global oil demand next year, based on a global recovery and various government economic stimulus packages.

Canal transits

Both the Panama and Suez Canals have come under scrutiny recently. US consultancy McQuilling Services has analysed the likely effect that expansion projects will have on the tanker sector.

As has been well documented, the Panama Canal is going through an ambitious expansion scheme, whereby vessels of up to 170,000 dwt will be able to transit by 2014. Owners thinking of using the canal, which dramatically reduces steaming distances, will have to take into consideration the transit tolls.

These are calculated on a scheme known as the Panama Canal Universal Measurement System net tonnage (PC/UMS) and following its expansion, the tolls are expected to rise by 3.5% per annum for the next 20 years.

An Aframax travelling at 14 knots would save around $460,000 on a voyage from Puerto La Cruz to Los Angeles. A Suezmax on the same voyage would save $617,000, in addition to the around 36 days reduction in the voyage time (see table).

McQuilling explained that although there is at least four years until the opening of the new locks, the consultancy derived the PC/UMS values for the tankers on the basis of a correlation of the PC/UMS to the gross tonnage of each type.

Round trip Puerto la Cruz/Los Angeles ($000)

Type	Bunkers (Cape)	Bunkers (Canal)	Canal toll	Canal cost	Savings
Aframax	1,227	435	331	763	461
Suezmax	1,689	602	470	1,069	617

**Bunkers calculated at $400 per tonne, at 14 knots and four port days included.*

Already US east coast ports are ramping up their efforts to receive deeper draft vessels on the back of charterers' desire to take advantage of the economies of scale by using larger vessels. It might be assumed that the value of the Panamax will diminish from 2014 onwards and so will overall tonne/mile demand, as more and more vessels use the Canal, rather than the longer Cape Horn route.

The relative attractiveness of various crudes may change substantially for certain refiners, especially those located on the US west coast as larger tankers will be able to transit the Canal. McQuilling forecast that the opening of the Canal to larger vessels will forever change the face of marine transport.

As for the Suez Canal, the Suez Canal Authority is planning to deepen the draft of vessels transiting the Canal to 66 ft, from the current 62ft. Further expansion plans being discussed could see vessels of up to 72 ft go through, which would allow 99% of today's tankers to transit fully loaded.

This would reduce the attraction of using the Sumed pipeline, which allows fully loaded VLCCs to discharge at Ain Sukhna to the south of Suez before transiting the Canal part-loaded and topping up again at Sidi Kerir, located in the Mediterranean.

However, as freight rates remain depressed, today the high Canal dues make up a large percentage of the voyage costs. Furthermore, the piracy situation has to be taken into consideration, which has already adversely affected insurance premiums, as the potential for tonne/mile savings by using the Suez Canal may not be realised.

Thus far this year, the Canal has witnessed a 70% fall in VLCC transits from last year as owners and operators avoid the piracy hotspots and cut costs, such as higher insurance premiums. To access the Canal, tankers have to go through the Gulf of Aden and the narrow Bab El Mandeb where pirates are active. Tankers' slow speed and low freeboard tend to make them easy targets.

McQuilling looked at the case of a loaded coated Panamax (LR1) lifting 65,000 tonnes of clean product from Jamnagar to Rotterdam and compared the Suez Canal route with the trip via the Cape of Good Hope.

Canal costs were calculated using a net tonnage of 39,766 (a typical size LR1). Under normal Worldscale voyage terms and at a rate of WS100, the charterer's freight costs amounted to just under $2 mill via Suez (a round trip Canal transit cost of $425,161 was included). For the Cape route, the cost equated to $2.55 mill, a saving of 28%. Furthermore, the Canal would save 9,356 miles, about 24 days steaming and about $375,000 in bunker costs at $390 per tonne.

However, the factors already mentioned considerably lessen the attractiveness of a Canal transit today versus the Cape route, despite the obvious savings, both in time and money. TO

Innovative Dutch shortsea shipping initiative

An interesting project is underway in the Netherlands to investigate the possibility of new manning assignments for shortsea shipping.

Called Shore Support, the project is aimed at looking at the safety consequences of flexible manning levels by introducing dual-certificated maritime officers (MAROFs) on vessels of up to 3,000 gt having a maximum engine power range of 3,000 kW.

Although the research doesn't embrace tankers, as their manning levels are strictly defined by legislation, their inclusion has not been ruled out in the future, project co-ordinator Izabella van Tuijl told *TANKEROperator*. She sits in the office of Holland Marine Equipment (HME), which is overseeing the project.

There are around 30 interested parties involved in the project, ranging from shipowners, equipment suppliers, unions, shipping associations and government bodies. Overall, some 23 vessels are being used in the experiment. An expert committee has been formed, which involves HME, the Dutch Ministry of Transport, Public works and Water Management; the Netherlands Shipping Inspectorate; Nautilus NL (the Dutch officers' union); the Royal Association of Netherland's Shipowners (KVNR) and The Dutch Shipmasters' Association (NVKK).

Basically, the project is aimed at the development of a MAROF who would hold a dual engine and navigation certificate, being trained in both disciplines. This would in turn result in shoreside personnel giving more support to those on board the vessel, hence the project's title.

One of the main reasons for starting such a project is the current lack of seafarers coming through the ranks in Holland and elsewhere, van Tuijl explained. Also the extra workload in the engine room, compared with the workload on the bridge was another very important issue taken into consideration.

Another reason for the project was to enhance communications from ship to shore whereby various equipment suppliers could monitor their equipment's operation on board from ashore, taking some of the burden off the engineering department.

Shore Support kicked off during the second quarter of last year and a report is due to be delivered by the end of 2010. Testing the dual-certificated MAROF was deemed to be one of the most important aspects of the whole project, van Tuijl said, so 12 months was earmarked for MAROF testing on board ship and once completed, another six months would be needed to analyse the results.

In the longer term, van Tuijl said that the idea could be extended across Europe through the IMO. Both the IMO and EU are being kept informed of progress and the Dutch Government sent a letter to the IMO last January outlining the plans. Seminars are also being held and newsletters published on the project's progress. It is being partly funded by the Dutch Government and leading Dutch shipowner/manager Wagenborg.

To make Shore Support a success, the rules and regulations would have to be re-written at EU and IMO level reflecting the change in the crew plan. At present, an engineer usually works for four hours, but a navigator can be at his or her post for 12 hours, within a schedule of six hours on and six off, thus a dual-certificated MAROF could be used to help out on the bridge.

In the Dutch Government's note to the IMO, certain conditions were placed on the acceptance of dual-certificated MAROFs. These included –

- They are specifically listed on the safe manning certificate.
- The vessel is neither a passenger vessel, nor a tanker.
- It is less than 3,000 gt.
- It is engaged in European short sea trading, not exceeding 200 miles from the European coast.
- The engine room is periodically unmanned in compliance with class society rules and certified accordingly.
- The type of fuel used is either MDO, or MGO in accordance with ISO 8217:2005.
- The vessel's propulsion and steering power is to be maintained, or immediately restored in case of a black out.

Other organisational conditions as laid down by the Dutch Government included –

- Information on board describing routine technical procedures and maintenance tasks (user's manual) is easily accessible.
- The onshore help desk provides 24-hour technical assistance.
- The onshore service contract at least provides for preventive maintenance.
- The familiarisation process (reference is made to MSC/Circ 834 'Guidelines for engine room layout, design and arrangement') is carried out as part of the vessel's ISM. In the familiarisation process, special attention is given to the consequences of the specific manning configuration of the vessel.

TO

Shore Support project objectives

- To create job opportunities.
- To reduce on board workload.
- To increase short sea ships' safety levels.
- To improve the competitive position of the shortsea sector.
- To increase awareness for shore support principals.
- To assess the social and legal possibilities of flexible manning requirements.
- To strengthen co-operation between shipowners and marine supliers.

Source: HME

High quality data needed

Anyone involved in the commercial tanker market understands that market behaviour is influenced by psychology, perception and sentiment.

These factors have been responsible for a significant percentage of the market's volatility down the years.

Market observer McQuilling Services also believed that the fundamentals of supply and demand, both short and long term, intereact to influence the market's behaviour substantially. The best way to demonstrate this is by the careful data analysis and presentation.

Unfortunately, McQuilling said, that due to the industry's global scope and relative adolescence in terms of data collection and reporting compared to other commodity markets, the tanker sector does not lend itself to readily available, high quality data.

This results in a wide range of interpretation, especially when trying to analyse near term behaviour, or project future market trends. A particularly difficult task is to understand and measure changes in tanker demand and to project this into the future.

Most pundits have agreed that tanker demand would be challenged during the coming years due to the severe economic downturn and the corresponding reduction in projected world oil consumption (see page 4). At the same time, many 'experts' have said that the emergence of long haul trades would boost tonne/miles, resulting in a net increase in tanker demand in the coming years from 2008.

McQuilling decided to investigate whether such a shift would lead to an increase in tanker demand. The consultancy started with a historical trade VLCC matrix. This matrix was a grouping of actual trade flows, both in tonnes and tonne/miles, from the major loading areas to the major discharge regions. The 2008 data was taken from LMIU Apex.

First, McQuilling recorded tonnes and tonne/miles for each major VLCC trade route. As a result, 40 trade groupings were defined. These were split into trade distances where half were considered as long haul trades and the other 50% short haul trades.

The average long haul distance was 7,554 miles, while the average short haul trade was 3,038 miles. It was found that 15 top trades in terms of cargo moved last year came into the long haul category and 16 of trades in terms of tonne/miles also came into that grouping. Long haul trades accounted for 88% of the total VLCC demand in 2008. It became clear that the progression to long haul trades was indeed, a mature one.

Second, the consultancy identified the trades where incremental volume growth was likely to occur in the future. For example, the South America/Far East and West Africa/Far East trades. Some 17 of these 'growth' trades

Total VLCC cargo shipped in 2008

	Longest 20 trades	Shortest 20 trades
Mill tonnes	680	232
Total cargo	74.6%	25.4%
Average distance (nm)	7,554	3,038

Total VLCC cargo demand in 2008

	Longest 20 trades	Shortest 20 trades
Billion tonne/miles	5,132	704
Total cargo	88%	12%
Average distance (nm)	7,554	3,038

Source: LMIU Apex, McQuilling.

were identified, 13 of which were included in long haul trades and the remaining four in the short haul group.

McQuilling then assumed that these trades would experience a 5% cargo volume growth at the expense of the trades not identified. In total, this 5% increase amounted to 35.5 mill tonnes, or around 700,000 barrels per day, or to put it another way, 3.9% of last year's total VLCC cargo volume.

Since the analysis only covered a trade shift, or volume redistribution, the 35.5 mill tonnes had to be deducted from the non-growth trades to preserve the total cargo transported in 2008. This resulted in the reduction of six long haul and 16 short haul trades.

Following the adjustments to the cargo volume by trade, McQuilling then calculated tonne/mile demand for each trade using the new volumes and added up tonne/miles demand for all 40 trades.

The results proved interesting, the consultancy said. For example, a 5% increase in cargo carried on key growth routes (amounting to 35.5 mill tonnes or 3.9% of the total volume transported on VLCCs last year) only resulted in an increase of 1.2% in total tonne/miles to 5,903 bill from 5,835 bill tonne/miles.

Consistent

McQuilling said that this was consistent with what had been observed for many years, which was that changes to the trade matrix for crude and dirty petroleum products were incremental and relatively small overall, even when specific trade volumes grew or shrank substantially. Therefore, when discussing dirty tanker demand it is important to include all the trades, not just those with promising growth characteristics.

This result's practical application is the observation that a shift towards longer haul trades will not carry the impact that may be expected by just looking at the individual trades involved.

Turning to the clean products trades, this result might not be true as arbitrage trading is a larger fraction of clean products shipping demand. This demand may vary substantially year-on-year based on changes in the relative attractiveness of product prices from various sources worldwide.

In the context of today's market, expectations are that total oil demand will decline by well in excess of 2 mill barrels per day this year from 2008 levels. The July IEA report calls for a recovery in oil demand of only 1.4 mill barrels per day. This is less than half of the demand fall off this year.

Therefore, McQuilling said that it finds it difficult to argue that shifts in the VLCC trade matrix towards longer haul routes will produce net positive VLCC demand growth this year, 2010, or even 2011, compared to 2008 levels. TO

Integrated solution vital in today's market

Before the current recession, operators and owners had became used to certain vessel trading patterns with very few disruptions. Now it is more of a case of how to get the maximum value out of a moribund market.

When regular schedules become disrupted, such as occurring in today's market, how do owners and operators deal with the possible reallocation of their assets? How can they visualise their resources and optimise their schedules in a proactive way when faced with a loss of a timecharter, or coa.

One solution is Veson Nautical's Integrated Maritime Operations System (IMOS) where chartering, operations and financial requirements can be seen and analysed using one system. Vessel scheduling assessments can be quickly undertaken using financial, risk and compliance parameters, especially when route planning is called for to optimise the best allocation of resources.

A major challenge facing the industry is being able to visualise the data received while at the same time taking into account all the commercial possibilities. "We have to do more to be proactive," John Veson said. Data analysis has to be facilitated allowing companies to visualise their next move in a more informed way, he thought.

Risk comes into the equation even more so today when quoting for business by way of how far an owner/operator is exposed when dealing with counterparties. For example, open vessel or cargo positions can be analysed with credit ratings using one system.

Veson thought that now was a good time to invest in an integrated solution, rather than wait for the boom times to return. The company has found that many companies were still using spread sheets to analyse information and might only use a part of an analytical system.

Today perhaps more than ever, the commercial department should invest in a fully integrated solution, which will enable the staff to take a holistic look at the operations to see the trade's complexity, volume and volatility, especially in the current tanker market.

Times have completely changed for an owner's, or operator's commercial department.

"One of the key things is to tailor a product without expensive add-ons," Veson advised. The analytics and solutions can be customised for more strategic implementation decisions.

Veson said that the company was increasingly being asked for advice and that the system was being used more as an overall solution provider. The company has employed personnel with experience in finance and derivatives to help ramp up the trading and risk management elements of the solution.

At present, over 90 concerns use IMOS. The figure is roughly equally split between owners and charterers and about the same between wet and dry interests.

Operational benefits

Veson recently outlined the visual approach to several different commercial aspects, such as optimising vessel route scheduling.

Here within IMOS, a system called 'cargo matching' is claimed to quickly show the optimal solution when cargo scheduling. This allows the shipper to work with the specific vessels and cargoes dedicated to the trade to see the impact of different scheduling scenarios. It is possible to minimise the total transportation cost, time delays, sailing day, etc for each cargo, as well as across the whole fleet.

Another situation can arise with dangerous cargoes whereby companies having multiple tanker types in their fleet can deal with specific requirements and modify their processes as needed. The system is also designed to cope with a chemical carrier owner, or operator lifting multiple cargoes on a single voyage.

Chemical and products tankers also often load and discharge at multiple ports and terminals. Many parcels are shipped in one vessel often for different customers, destinations, or at different freight rates. By using IMOS' visual approach, both the shore staff and seafarers will be able to stay on top of operations anywhere in the world, Veson claimed.

Different time zones will throw up different problems, making it difficult to get a complete picture of business activities, therefore delaying action on critical decisions, such as problems, or time-critical market opportunities.

For example, a different approach maybe needed in the Caribbean to that of the Mediterranean, or low sulphur fuel ECA regions. Departments need to seamlessly transfer the commercial management, as the vessels move from one area to another and be able to monitor operational performance.

Veson's solution is claimed to be an integrated, intelligent system that is able to handle these processes and allow companies to run reports on their own defined operating areas, or routes, enabling them to analyse how their profit and losses vary taking into account many factors.

Using the integrated solution, several departments are able to access the same information at different stages in the process, for example, from planning to commitment, to final billing, or invoicing. By using this system there will be less data duplication, which helps to eliminate time wasting, expensive errors and the inefficient use of company resources.

A recent endorsement for IMOS came from National Shipping Company of Saudi Arabia's (NSCSA) vice president of commercial operations, Michael Hudson-Davies who said; "We are 24/7 in the tanker chartering business and are online at all hours. With Veson's IMOS we can view and discuss calculations with our chartering staff in real time. It greatly enhances the ability to see details – the right information is there and we have the ability to look at the business from anywhere. This allows us to make quicker decisions." TO

Firearms or no firearms? Is it the wrong question?

Following various industry comments on the rights and wrongs of carrying firearms on commercial vessels, not least from INTERTANKO (see *TANKEROperator* news, 10th July), a leading anti-piracy specialist said that a different approach was needed.

Proponents and opponents of arming ships against pirate attack may be asking the wrong questions, warned Michael Murrell, coo of K&M Global Security Solutions, an anti-piracy specialist concern.

K&M has recently extended its logistics support system to key points to enable its security teams to embark and disembark vessels approaching areas presenting high threat levels of pirate attacks.

Complex legal issues surround the presence of firearms on ships, while the effectiveness of non-lethal defence systems has recently been brought into question. Murrell, whose company uses its own specially designed deterrence systems, believed that a different approach is needed to meet the concerns of shipping companies, flag states, P&I Clubs and seafarers' organisations.

Murrell explained: "Pirates don't seem to be too afraid of gunfire. Apart from still unresolved legal issues about firearms having a highly visible armed team on deck gives the pirates a more concentrated target, which, if neutralised, gives the vessel no other options. If you engage the aggressor too early you end up with a firefight rather than ship defence. In fact it can actually invite pirates to attack even more fiercely if they believe that armed protection indicates a high-value cargo worth dying for. And let's face it, the last thing you want on oil, gas, or chemical tanker is a firearm going off."

The goal is to prevent boarding and hijacking of the vessel, not a firefight. If a well-layered defence is put into place, with a proper, visible defensive posture, this goal can be accomplished. Early detection and discernment of the threat is paramount in defence of the vessel. A well-layered defence begins with early detection, and should have zones from the outer perimeter, all the way into the final centre of the Citadel. As a layered defence, each zone should have its own type of defence capability.

Sufficient time needed

One mistake that is often made is that the security team is embarked onto the vessel too late. The security team needs to embark with sufficient time to properly prepare the vessel and crew for the high-risk transit. Hardening of the vessel and proper orientation of the crew takes time. This time is extremely valuable in the preparation of a proper defensive posture and the success of countering attack, therefore ensuring the safety of the crew.

"High powered audio defence systems are a great tool and have a place but, as recent events have shown, they aren't enough on their own and the equipment operators also become targets for the pirate firearms. But just because there are no guns on board it doesn't mean the ship is unarmed," Murrell said.

There are many practical methods of defence already on board merchant vessels. These methods are necessary for a full defence capability and K&M's consultants will train the crew on how to use them properly. These items include fire hoses, monitors, emergency line throwers, fire suppression systems, etc.

The answer, said Murrell, is what he terms 'less than lethal' equipment, a sufficiently large and well-trained team and a calibrated response that provides the element of surprise should an attack take place. Much of the equipment has been designed, or adapted by K&M and is legal in almost all jurisdictions.

"We have a suite of protective devices that won't set off too many alarms when our teams fly out to join a ship. In a sense, they don't actually exist until the equipment is actually on the ship. This equipment will disable pirate skiffs and negate the pirate's ability to continue an attack, when used by an appropriately trained team. Firearms come with an enormous cost burden so our decision to use less than lethal force has a significant impact on the cost of protection, and nobody has to be told how important that is in an industry badly hit by financial crises

"In the long term, piracy can only be resolved through economic, developmental and political means, but it is something we have to learn to deal with, effectively and economically to protect seafarers, their ships, and the industry," he concluded. TO

> "Pirates don't seem to be too afraid of gunfire...having a highly visible armed team on deck gives the pirates a more concentrated target, which, if neutralised, gives the vessel no other options."
>
> **Michael Murrell, coo, K&M Global Security Solutions**

Pirates target tankers

In the first half of 2009 the number of pirate attacks against tankers rose to the highest level recorded in years*.

At least 69 tankers were attacked between January and June according to figures published by the International Maritime Bureau (IMB). This is almost double the average number recorded in the same period between 2004 and 2008 and if trends continue over the coming months, 2009 will turn out to be the worst year for tankers to date.

This year's rise in the number of attacks is part of a growing trend in pirate violence, and the increase was seen in all vessel types, not just tankers. Between 2004 and 2008, an average of 27% of all vessels attacked by pirates, were tankers, ranging from 18% in 2006 to 35% in 2007. In the first half of 2009, the figure was still only 29%, which is well within this range. Tankers have therefore not constituted a greater proportion of targeted vessels this year as it would appear that all vessel types are feeling the effects of increased levels of piracy.

In the last six months, over 200 vessels have been attacked by pirates worldwide. IMB figures indicate that 78 have been boarded, 75 fired upon and 31 hijacked, representing a significant increase from previous years. The majority of incidents have taken place in African waters and in total, the Gulf of Aden and East African shipping lanes accounted for over 60% of worldwide attacks. This constitutes a rise of over 32% per cent from 2008 and outranks all other piracy hotspots by a considerable margin. The trend is almost wholly attributed to the much-documented increase in pirate activity in Somalia.

Here, pirate syndicates continue to gain notoriety and popularity, drawing criticism from domestic conservative groups, while attracting droves of the country's unemployed but able-handed men keen to derive a profit from the lucrative industry. Somali pirates have demonstrated the ability and willingness to attack all vessel types. On at least one occasion they have attacked a warship. A number of tankers were attacked while passing through the Gulf of Aden. Pirates have also demonstrated the capability to board and seize a wide range of vessels, including dhows, research vessels, bulk carriers and even super tankers, such as the high profile VLCC *Sirius Star* - hijacked in November last year.

Elsewhere, reported attacks in the Gulf of Guinea accounted for over 10% of worldwide attacks in the first half of 2009. Most of these took place in Nigerian waters, where many incidents are believed to go unreported. It is thus likely that the region accounts for a much greater proportion of worldwide piracy incidents. Given that local threat groups such as the Movement for the Emancipation for the Niger Delta (MEND) are hotly opposed to the oil and gas industry, affiliated tankers are at an elevated risk of being attacked in the area.

The *modus operandi* of local rebels includes the use of armed men on speedboats, which are harder to track by the authorities and able to manoeuvre quickly on rivers and at sea. Attacks have taken place many miles from the coast, threatening vessels which could otherwise consider themselves to be out of harms way. Attacks are now also taking place far from the Niger Delta, implicating tankers operating in Lagos and even Cameroon waters. Unlike in Somalia, however, Nigerian militants are not intent on seizing and holding vessels. Instead, they are more likely to abduct crewmembers and take them ashore. The main risk is thus not normally posed to tankers themselves, but rather to the seafarers on board.

Regions such as the Malacca Straits (2.2%), Bay of Bengal (3.9%) and South China Sea (8.9%) were all dwarfed in terms of the number of piracy attacks suffered over the first half of 2009. Nonetheless, they still remain areas of concern. However, piracy in southeast Asia rose by 100% between the first and second quarters of 2009 and there are no grounds for complacency for the high volume of tankers travelling through key routes between southeast Asian terminals.

Unless there is imposition of law in the littoral states of the South China Sea, stability in Somalia and incorporation of Niger Delta militants into a peaceful transition process, tankers will continue to face a higher risk of pirate attacks. Until then, heightened vigilance, risk mitigation practises and crew training will remain necessary to lower the level of risk posed to vessels operating in the vicinity of these areas. TO

**This article was written by John Drake, risk consultant at AKE Intelligence, specialists in country risk analysis and risk mitigation. For more information contact intel@akegroup.com or tel: (0) 20 7816 5454.*

Loss prevention - all part of the service

Several initiatives have been put forward to mitigate the increased number of claims.

P&I clubs pride themselves on the service aspect of their operations to gain new members and to retain those already signed up when the renewal season comes around.

Loss prevention is one of the major areas where the clubs excel, being able to analyse claims and give advice accordingly.

The UK P&I Club is no exception. In conjunction with Lloyd's Register (LR), the club has produced a series of booklets in the form of pocket size checklists, the latest of which is the *Marine Fire Safety Pocket Checklist.*

LR and the UK Club analysed deficiencies found by Port State Control (PSC) inspectors in ports worldwide over a three-year period. They have related these to their own observations and developed a reusable checklist to help crew members pre-empt and manage the risk of fire more effectively and not get caught out by PSC inspections.

As well as the threat to life, fires are costly, the club said. Over the past 20 years, fires at sea have cost well over $20 mill per annum. Fire is one of the most expensive sources of cargo liability claims across the shipping industry. As well as some other cargoes, crude oil produced the highest claims.

The other checklists published are *Reducing the Risk of Port State Control Detentions, Marine Pollution Prevention and Life Saving Appliances.*

LR has also developed a one day training course 'A Practical Approach to Port State Control.' The course is claimed to reflect the success of the pocket checklist series and was developed as a result of clients requesting more detailed guidance on best practice for handling PSC inspections effectively.

Layup advice

In another move, against a background of rising claims costs, earlier this year the UK P&I Club issued guidelines about P&I cover for laid-up ships to help them prepare and maintain their vessels - and a comprehensive note on the return of calls.

The club said that it was keen to minimise claims for personal injury, wreck removal, pollution, anti-fouling, environmental contamination and damage to other vessels, underwater cables, beaches and reefs.

Normal P&I cover continues during lay-up, subject to the terms of entry and the rules. As a basic premise, a ship in lay-up should reduce P&I risks, enabling the club to return a portion of its calls to the owners.

A full risk assessment should be undertaken before the vessel is laid up, covering site suitability, crew safety, vessel, machinery and environment.

The guidelines, prepared with BMT Marine & Offshore Surveys, contain extensive checklists relating to the lay-up site; mooring arrangements; security, safety, protection and environment; preservation and maintenance; preparation procedures; and approval and inspection arrangements.

They make the distinction between a 'hot' lay-up, where seafarers, those contractually employed by the owner and obliged to serve on the vessel, are present, and a 'cold' lay-up where they are absent. Risk changes when employees are on board, as contract compensation amounts were now very high, the club said.

A hot lay-up is characterised by a reduced crew, some working machinery and the prospect of quicker, less expensive activation. A cold lay-up is a longer term exercise with all systems shut down with minimum ongoing maintenance to prevent deterioration of hull structure and machinery.

The P&I club managers look to class societies, the Salvage Association and other third party technical advisers for evidence of safe lay-up. Hull underwriters may make the certifications and survey arrangements, which document and approve the technical aspects of lay-up. However, the club managers will retain discretion about what qualifies for a return.

Scopic warning

The American Club has warned of a possible increase in the use of the Scopic clause in salvage cases.

Shipping market turbulence is set to pave the way for increased use of the compensation mechanism designed to reward contracted marine salvage companies for fighting oil pollution.

Greater invocation of the Special Compensation Protection and Indemnity Clause (Scopic) under Lloyd's Open Form (LOF), the world's most commonly used salvage contract, will however increase the financial liabilities of P&I clubs, said Tony Goldsmith, a partner with law firm Hill Dickinson Singapore, writing in the American Club magazine - *Currents*.

Goldsmith's analysis is especially pertinent at a time when salvors have expressed concern at the preference of some underwriters to negotiate deals that avoid using LOF because of the perceived high level of salvage awards. Lloyd's has recently refined the arbitration

> "Given current market lows for the values of many vessels and cargoes, it is now significantly more likely that Scopic would be invoked in cases where salvage is performed on the basis of LOF."
>
> **Tony Goldsmith, partner, Hill Dickinson Singapore,**

section of the form in an effort to ensure it remains an attractive option.

Referring to the reduced value of vessels and their cargoes since mid-2008, Goldsmith said: "This will place a lower cap on salvage awards and make it less likely that an award acceptable to salvors will be obtained on a 'no cure – no pay' basis alone.

"Given current market lows for the values of many vessels and cargoes, it is now significantly more likely that Scopic would be invoked in cases where salvage is performed on the basis of LOF. On the whole, market conditions in both the shipping and commodities markets are not predicted to rise substantially for a number of years to come.

"Market volatility itself could be a sufficient influence for salvors to invoke Scopic. Where there is market volatility, vessel and cargo values at the time of commencing an operation may be much higher than when the vessel and cargo arrive at a place of safety (being the time at which the value of the salved fund is to be assessed)," he said.

Salvors will not want to leave it too late before invoking the special clause, and in a volatile market will be more likely to do so earlier rather than later, Goldsmith added.

Scopic, which was drawn up following such tanker casualties as the *Torrey Canyon* in 1967 and *Amoco Cadiz* in 1976, when the maritime community recognised the need for an incentive to protect the environment from oil pollution, as well as saving property, can only be applied when salvage services are performed under LOF.

With a reduction in values, hull underwriters may show less reluctance in accepting LOF terms, said Goldsmith. Lower demand for shipping might logically reduce the number of casualties, but the large number of vessels lying dormant at crowded anchorages increases the prospects of incidents, and some shipowners facing high running costs might reduce funding for maintenance, crewing and training, thus increasing the likelihood of casualties.

Goldsmith said: "How ultimately this will all play out is not yet known, but if there are more casualties they will, generally speaking, be of lower value than in recent years, which will result in greater potential for Scopic being invoked."

Goldsmith quoted International Salvage Union (ISU) figures showing that from the introduction of Scopic in August 1999 to March 2007, there were 844 LOF cases, with Scopic invoked in 183 of them. Only five went to arbitration, a testament to the Scopic scheme being considerably more user-friendly and cost-effective than the previous regime, he said. Cases are generally resolved faster, avoiding lengthy and costly arbitrations.

More casualties against the background of lower values would inevitably result in P&I clubs facing greater financial liabilities.

On the positive side, Goldsmith said that Scopic is a major benefit to shipowners and their P&I clubs in providing for them to have their interests represented at the site of casualties, together with cargo and hull underwriters, giving them greater knowledge of, and potential influence over, the handling of incidents.

Prescribed medication – a must for safety

The North of England P&I club (North) has reminded its shipowner members to ensure that their seafarers comply fully with any prescribed course of medication while at sea. The advice is given in the latest issue of the club's loss-prevention newsletter *Signal*s.

'We are seeing an increasing number of claims where crewmembers have been seriously ill, or died, as a result of not taking the necessary medication in the frequency and amount required,' said North's head of loss prevention Tony Baker.

While the more widespread use of higher quality pre-employment medicals has decreased the number of claims resulting from pre-existing illnesses, Baker said the process has helped to diagnose illnesses that can be managed on board provided seafarers comply with their prescribed medication.

According to North, non-compliance with medication regimes on board could seriously compromise duties such as watchkeeping and cargo-care, potentially resulting in serious casualties, and can result in life-threatening medical emergencies in the middle of the ocean.

North added that crew members also need to discuss their illnesses, and the medication they need to take, with both the ship operator and master. 'Should any problems occur the owner and master will be better able to identify the cause and seek appropriate emergency medical care,' said Baker.

Abandoned seafarers

Another problem was highlighted by the London P&I Club chairman John Lyras regarding abandoned crew.

Lyras said that he welcomed amendments to legislation proposed by governments, making shipowners liable for the abandonment of crew, following bankruptcy.

As originally proposed, the government initiatives, including compulsory insurance, would effectively transfer the cost of caring for crew from "less responsible owners to those who take their obligations more seriously", Lyras explained. He added that the compulsory insurance would effectively be designed to cover a credit risk – "a type of risk transfer that has always been very difficult to price properly and fairly".

Pointing out that the London Club, together with other members of the International Group (IG), felt it would be inappropriate for clubs to insure and certify cover against uncontrolled obligations incurred prior to abandonment, Lyras said, "It was reassuring to hear from the most recent International Labour Organisation and IMO joint meeting in Geneva that pre-abandonment liabilities to be insured and guaranteed would be limited to those accrued during the final four months of employment. It was more reassuring to learn that the guarantor would be subrogated to the rights of the abandoned crew.

"The IG secretariat had made the very important point, in Geneva, that the absence of any subrogation to the crews' rights of arrest would simply have relieved financiers of their obligations, so encouraging irresponsible lending and increasing the problem of abandonment. I am very grateful to the group's secretariat for its efforts, which appear to have contributed to a decision by governments to introduce a right of subrogation into the relevant convention," he said. TO

Long serving P&I guru Rodney Eccleston retires as managing director of the North of England P&I club in September. Eccleston will hand over the reins to current deputies Paul Jennings and Alan Wilson.

Speaking at a reception in Athens recently, Eccleston said; "When I first joined North 36 years ago, our whole fleet was less than 2 mill gt. However, with the help and long-term support of our Greek members - many of whom have gone on to become directors and chairmen - we have now grown to 100 mill gt and rank among one of the very top clubs in the world. This is a testimony to the strength and support of our Hellenic membership, which continues to grow.'

Greek-owned ships account for around 19 mill gt of North's total entered tonnage. They are primarily serviced by the club's Piraeus office, which has a team of seven full-time staff led by manager Tony Allen.

The picture shows Dynacom's George Procopiou, a former North chairman and current director of the club, with Rodney Ecclestone at the Athens reception.

Criminalisation think tank set up

InterManager, the international trade association for in-house and third party shipmanagers, has created an industry-wide think tank on seafarer criminalisation.

The association has created a Criminalisation Workshop that will bring together experts from all areas of the shipping industry - managers, P&I Clubs, shipowners, maritime unions and regulators - to seek ways to protect the world's seafarers.

Headed up by Brian Martis, director of Monaco-based manager V Ships, the workshop will develop proposals, to be presented to the International Maritime Organisation, that can then be integrated into future maritime legislation to protect the well being of the world's seafarers.

InterManager has been scathing in its criticism of the unfair criminalisation of today's seafarers, especially in the aftermath of the *Hebei Spirit* case.

The VLCC *Hebei Spirit's* master Jasprit Chawla and chief officer Syam Chetan were cleared of blame in April by the South Korean Supreme Court, for the country's worst ever oil spill last December. However, they remain unable to the leave the country pending a lower court decision.

This latest move underlined InterManager's pledge to defend seafarers' rights wherever they are in the world and from whatever nationality.

Guy Morel, InterManager general secretary, said: "We are very concerned because we need to protect our crew. They are 'our people' - our colleagues and also our responsibility. We also want to ensure that new regulations will demonstrate to potential seafarers and youngsters that they can consider this industry for a career without fear of unfair imprisonment."

InterManager, whose members represent a worldwide fleet of some 3,000 vessels and more than 125,000 crew, believes the plight of the *Hebei Spirit* pair has already had a detrimental effect on recruitment at a time when seafarers are in short supply. "How can we encourage young people to take up a career in shipping when they see experienced and innocent crew criminalised in this way," said Morel.

Morel thought that seafarer criminalisation had a detrimental effect on recruitment.

KPIs come a little closer

Meanwhile, InterManager has moved forward with its project to establish industry-wide Key Performance Indicators (KPIs) aimed at shipowners and shipmanagement concerns.

Senior representatives of all industry stakeholder groups were invited to attend a meeting in London in June at which InterManager presented the results of its three-year project to develop relevant KPIs to gain vital industry feedback to develop the standards into measures acceptable for the whole shipping sector.

InterManager, together with its consultant Marintek, has worked, with the help of the Norwegian Research Council, to develop a basis for performance measurement in the shipping industry that would be acceptable to all.

The three-year project delivered a complete proposal for a multi-level system of performance measurement in shipping, including base Performance Indications (PIs), KPIs and top Shipping Performance Indices (SPIs). The results of the study were presented at InterManager's Annual General Meeting in Singapore last November and are now accessible online at www.shipping-kpi.com.

President Roberto Giorgi explained: "We would now like to submit the proposed system to the expert judgement of the various stakeholders of the industry. If deemed acceptable by all stakeholders, the proposed KPIs could form the basis for a common language in the area of shipping performance measurement."

Welcoming further feedback, Morel said: "We are working towards a pan-industry agreement that will enable these KPIs to be adopted as standards for the whole of shipping. We would be pleased to talk to all the people involved in shipping that would like to contribute to the effort."

TO

Going 'back to basics'

Bernhard Schulte Shipmanagement (BSM) has launched what it calls a 'Back to Basics' campaign.

The group admitted that its fleet performance had fallen short of what was expected and the targets set. There are several factors that have caused this situation, or have contributed to it, said Holger Pittelkau, group managing director, oil/chemical tankers.

These are not limited to the on board management. If there is a common thread, then it has to be found in the behaviour of individuals, their beliefs and values and their professional pride, he said writing in *BSM Highlights* magazine.

He gave an example of a shipboard pumpman who has pride in what he does. He will have the pumproom spotlessly clean, no pumps leaking, bilge wells clean, alarms working and the room well lit. Another case is the receptionist who is proud of what he or she does and keeps the area around the switchboard clean, will give a friendly greeting and pay full attention to a person until he or she is attended to.

You can replace the receptionist with a watchman, or the pumpman with the officer on watch as it is their behaviour and their values that make the difference, which will ultimately lead to business excellence, Pittelkau explained.

Values, such as professional pride, mutual respect, or correct behaviour, are interlinked. One is immediately followed by the other and none can exist without the other. Similarly, business excellence goes together with safety excellence, he continued.

With this campaign, BSM said that it intends to address both at the same time to have the maximum impact.

BSM has earmarked a period of 12 months for its 'Back to Basics' campaign. During the year, the company will address the importance of getting the basics right and instil a sense of professional pride in the work undertaken. The message will be put across at pre-joining briefings, ship visits by office staff and seminars.

In addition, especially recruited training superintendents, primarily recruited from within and trained to the company's needs will spend two to three weeks on board ship to evaluate the crew and to provide training where necessary. The main objective of this exercise will be to monitor 'safe behaviour'. During these periods at sea, the superintendents will also perform navigational audits and advise the masters of recommendations for improvement. Training will be given as necessary.

Mandatory course

Safety awareness, risk assessment, risk analysis, as well as team building are included in a 40-hour Safety Officer distant learning course developed in-house by the Maritime Training Centre (MTC) in Cyprus. This will be made mandatory for all officers and the contents are to be used at the MTC for shore-based training. The distant learning courses will also be available on board/ashore shortly as required.

MTC also offers five-day leadership and management courses. These form part of BSM's senior officers' upgrading courses and they will now be included in the junior officers' upgrading courses. Presently, upgrading courses are under preparation at the CSC China and at MTC Mumbai incorporating local training needs. The leadership/management and the safety officers' course contents will be partly, or completely included in all junior officer upgrading courses.

In addition, the maritime resource management course only available at MTC Mumbai will be made available to all BSM training centres.

Finally, behaviour-based type safety programmes will be introduced. These are simple yet effective. Essentially, key processes will be identified and data gathered on how well this process is executed. Feedback on safety behaviour will be provided and reinforced. The data will be analysed and the results used to remove any safety obstacles.

However, talking with *TANKEROperator*, Pittelkau explained; "We will not go for a fully fledged 'Behaviour Based Safety Programme'. Instead, we intend to develop something in- house, following the simple process that I had outlined in *BSM Highlights*."

Holger Pittelkau – Pride in the job is essential.

He also explained that the 'Back to Basic' campaign was not only aimed at tankers, although, where limited resources require prioritisation, tankers will have priority due to BSM's exposure in this sector with 300 plus tankers, oil/chemical and LPG/LNGCs under management.

The project had been a bit slow in starting but was now quickly picking up momentum, he said. The aim was to review and assess its effectiveness after 12 months with a view to make it more effective where necessary. It is, however, unlikely that the campaign will just stop there, as it was expected that many of the programme's items will become permanent features.

As at the middle of July, all the training masters had been identified and were undergoing training in various locations. At the time of writing, they were due to meet at one of the MTCs to be trained further on various aspects of the campaign.

What are required are the right tools and trained personnel to deliver the programmes, Pittelkau concluded. TO

Bernhard Schulte Shipmanagement

Athens Caracas Chennai Constanta Douglas Freetown Gdynia Hamburg Hamilton Hong Kong Jakarta Kolkata Limassol Manilla Mumbai

New Delhi Newcastle Novorossiysk Odessa Patna Riga Samara Shanghai Singapore Split St. Petersburg Tallinn Tokyo Victoria Yangon

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Efficient HR management = maximum staff potential

A HR system capable of tracking human resource data and linked to both vessel and office sites can be easily acquired and implemented.

However, looking for a system that also provides efficient crew management capabilities, tracks staff growth in terms of training and skills and works towards crew retention can be a daunting task.

But it doesn't have to be – even the smallest shipping companies with tiny HR departments can now effectively manage their crew's career development with BASSnet HR Manager, the software company claimed.

As vessel capacity grows in size, the number of crew required grows with it. Crew managers are then faced with the complex task of updating, synchronising and tracking all seafarer data. While taking this into consideration, HR departments are still tasked with reducing administration costs, gaining staff loyalty and maximising staff potential. With that in mind, the new software has been designed to include the following:

- Allows all parties involved in HR planning and crew scheduling changes to work on the same data in real time.
- Significantly cuts administration time and costs, and provides a sense of community for manning agents, seafarers, medical centres and training centres.
- Allows for the monitoring of training requirements and knowledge development to ensure that crew have the adequate skills to maintain efficiency and safety at the workplace.
- Provides seafarers career progress visibility, as they can update their own biographical data, see details of their next assignment, as well as access training and career plan information.
- Tracks crew month-end, payroll-related information such as earnings, deductions, allotments etc, and exports this information to a file suitable for import by an accounting system.
- Provides a link to BASSnet's Safety Management system where details of crew involved in safety-related events on board a vessel are filed. This helps management track crew safety records, make informed decisions when selecting seafarers and identify the training needs of the crew involved in the event.

Addressing requirements

When a company experiences crew shortages, recruiting the best talent becomes paramount.

Using a web-based HR system, applicants can easily apply for a vacancy online via a link provided on the company's website. Using this form, applicants can enter their personal details, contact information, licenses and certificates held, courses/training they have attended, sea experience and skill details, as well as uploading their resumes.

The system will then automatically reject applications that do not meet the defined criteria, allowing the short-listed candidates to be maintained for further consideration. Interviews can be arranged based on this list and the 'right' candidate can be hired.

Effective crew planning

Using the planner, a user can effectively plan personnel for a single vessel, a group of vessels, or a whole fleet.

The planner will help find the vacancies that need to be filled and propose person(s) that match the specified criteria and requirements. After selecting and approving the personnel, the user can then follow up with regards to the required documents and track progress until the personnel is on board.

Crew changes become more predictable and efficient – avoiding unpleasant surprises for the existing on board crew, and ensuring that their relievers join on time as planned, Bass claimed.

Reducing competency gaps

The tightening of maritime rules and regulations impacts on seafarers globally. Maintaining high training standards requires seafarers to attend training courses (some mandatory) in order to keep up with industry standards (STCW-95). The planning of these training courses must closely relate to crew development based on his/her skills and knowledge.

A good HR system can assist in determining competency gaps and is the key to ensuring that the crew receives the correct and necessary training they require. Once a crew member's competency gaps are defined using a user-definable competency matrix, they will be taken into account when an evaluation is performed. Based on the gaps detected, a training needs analysis can be carried out and appropriate training can be planned.

Training centres can also log onto the system and provide such information as updates on new courses/training offered, course cost information and training schedules.

"A good HR system can assist in determining competency gaps and is the key to ensuring that the crew receives the correct and necessary training they require."

The travel feature in the software program enables the user to handle all travel booking details for the crew. It also gives travel agents real-time online access to the system to provide quotations and booking alternatives, thereby greatly reducing administrative costs.

The sign on/sign off feature allows the user to select the personnel planned for this function and add them to the travel planner. When selecting personnel for sign-on, the system will intelligently take into account crew activity with the status of 'sick', on a course/training, on vacation, etc, and eliminate them as possible suggestions.

A good HR system is able track every detail of the individual crew's information, such as activity, profile, medical records, travel documents, training courses attended, licenses held, sea experience, employment history and wages. All this information is stored in the personnel module and can be easily accessed by the crew manager and by the crew themselves.

TMSA requirements

In general, the Tanker Management Self Assessment (TMSA) elements standards set by international oil majors (OCIMF) has an impact on HR management, among others. Of the 12 elements that define the TMSA, elements 2 and 3 focus on areas where maximum benefits can be achieved in the recruitment and management of shore-based and ship personnel. This enables tanker companies to identify the right personnel trained and certified in risk assessment areas.

With this in mind, BASS has integrated a crew matrix into its BASSnet suite and HR manager module. The crew matrix aims to solve the problem of identifying and having qualified personnel on board tankers. With this matrix, users are able to:

- Define a set of criteria, which then allows the system to display a combined rank experience of officers qualified to work on board a tanker.
- Display crew who do not meet required qualifications for working on board tankers.
- Generate a report of qualifications of crew currently on board a vessel.

By using the crew matrix, crew managers can rest assured that they have selected the right people for the job and that the stringent TMSA requirement of having qualified officers on board a tanker is fully satisfied.

The simple and easy-to-use Wizard-based payroll process effectively cuts down on the time a master needs to spend on the month-end payroll process. The Wizard guides the user through the entire process step-by-step, reducing the possibilities of commonly made mistakes.

It also has a built-in checking tool that sweeps through the system to scan for missing data that may inhibit the payroll process. Once this check has been carried out, the account period can be closed and the export to the accounting system can take place.

For strategic planning, cost control and quick decision making, shipping companies need a centralised HR system with all the necessary recruiting and crew management tools in place to track crew whereabouts and activities, instead of using the manual headcount method as used by many typical organisations.

Instead of doing away with time-consuming tasks such as measuring crew's competence and training needs, the BASSnet HR Manager system can assist in identifying the gaps and training required, the company claimed. TO

Lubricant use optimisation bears fruit

One of the world's largest tanker fleets saved more than $450,000 in lubricant costs in 2008 by optimising cylinder oil feed rates on 20 vessels, according to an engineering report written by Frontline Management and ExxonMobil Marine Lubricants. The sum is in addition to savings of $150,000 achieved the previous year on 11 tankers.

Frontline reduced cylinder oil usage without compromising cylinder wear using the ExxonMobil Feed Rate Optimization Program. According to the company, the objective of the programme is to reduce a crosshead diesel engine's operating costs by optimising the amount of lubricant used and decreasing the amount of wear-related cylinder maintenance. As the oil feed rate is gradually reduced, vessel personnel, using on board testing kits and ExxonMobil's land-based Signum Oil Analysis laboratory,

Frontline has reduced cylinder oil consumption on 20 tankers claiming substantial annual savings.

measure engine wear by analysing iron and TBN levels in scrapedown oil samples at regular intervals.

This technology, which is used in accordance with recommendations of the engine builders, detects changes in the condition of the cylinders so that vessel engineers can safely reduce the cylinder oil feed rates without increasing wear. Savings come from reduced oil consumption and maintenance improvements, due to enhanced monitoring. This can include potential wear-rate reductions due to fewer piston deposits.

The programme pinpoints an engine's optimum, most cost-effective feed rate, while providing an early warning for many potential mechanical issues.

"By optimising cylinder oil consumption, we're reducing cost and supporting Frontline's strategy of lean vessel operation emphasising safety and quality maintenance," said Petter Lalic, project engineer for Frontline. But there are other significant advantages, he pointed out. "The reduction in consumption will further decrease the environmental impact of producing and transporting lubricants, as well as help to minimise lubricant-related emissions from our vessels."

How it works

The idea of optimising feed rates is a direct result of recent changes in the maritime industry. Engines have been redesigned by their manufacturers for greater efficiency, putting increased stress on the cylinder oil. At

Optimising cylinder oil consumption not only saves Frontline money, it further decreases the environmental impact of producing and transporting lubricants, and helps to minimise lubricant-related vessel emissions.

the same time, environmental regulations have dictated more use of low-sulphur content in heavy fuel oil.

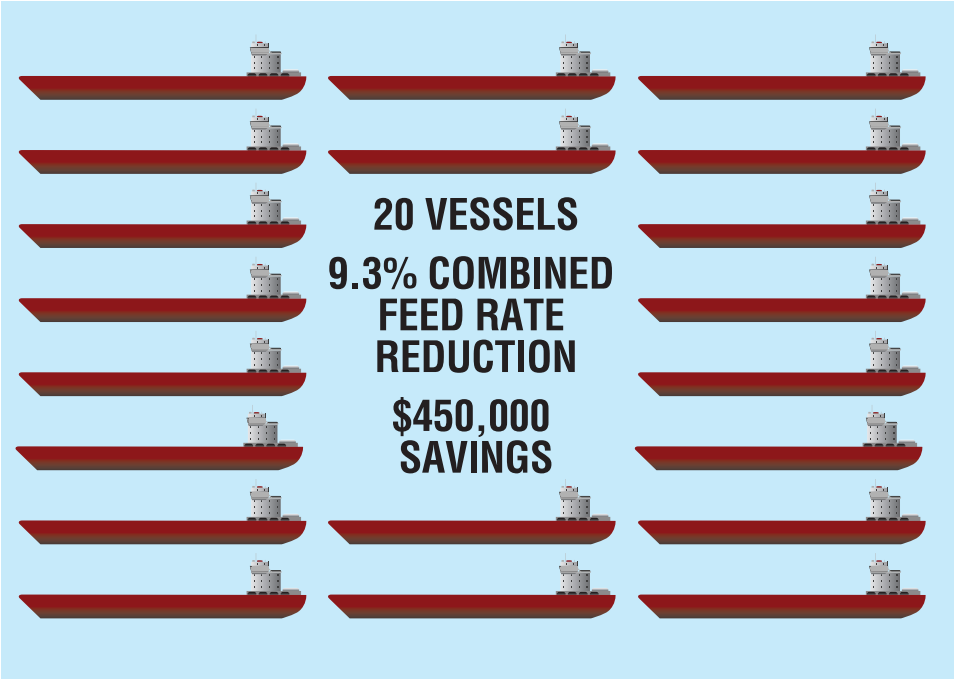
Part of ExxonMobil's solution was to develop a feed rate optimisation programme to help vessel owners safely reduce oil feed rates gradually while monitoring cylinder wear. The technology was designed to capture detailed analytical data on used cylinder oil as a way to evaluate an engine's operating condition as feed rates were reduced.

Vessel personnel are issued with an on board test kit, as well as a portable on board testing unit, Mobilgard Scrapedown Analyzer (MSA), to check for iron. The MSA measures iron in used oil taken from the scavenge drainpipe once or twice per week. Measurements correlate to the condition of the cylinders, enabling vessel engineers to quickly detect substantive changes.

In addition to measuring iron and TBN, which are indicators of corrosive wear, the on board equipment measures water and viscosity. Taken together, the results enable the vessel's chief engineer to monitor wear while the engine is up and running.

Technicians simultaneously conduct comprehensive analysis of scrapedown oil samples at ExxonMobil's Signum Oil Analysis laboratory. This confirms information measured on board and also provides more detailed insights through additional testing.

In addition to providing a base line for reducing feed rates, scrapedown analysis works as a predictive maintenance tool, or early warning system. It typically identifies problems such as leaking stuffing boxes and worn piston rings, and leads to the potential reduction of unexpected engine downtime due to potential cylinder liner casualties.



The combined feed rate reduction for all 20 vessels in the ExxonMobil Feed Rate Optimization Program was 9.3%. Frontline saved more than $450,000 on cylinder oil costs and didn't compromise cylinder wear.

Large fleet

Frontline's strategy involves extensive outsourcing, with crewing and other services provided by a number of independent and competing shipmanagement companies.

In total, Frontline's fleet is composed of 77 vessels, with a further 16 newbuilds. The company has 40 VLCCs, eight OBOs carriers and 29 Suezmaxes. Of these, 20 vessels were selected for participation in the feed rate reduction programme - six VLCCs, seven OBOs and seven Suezmaxes.

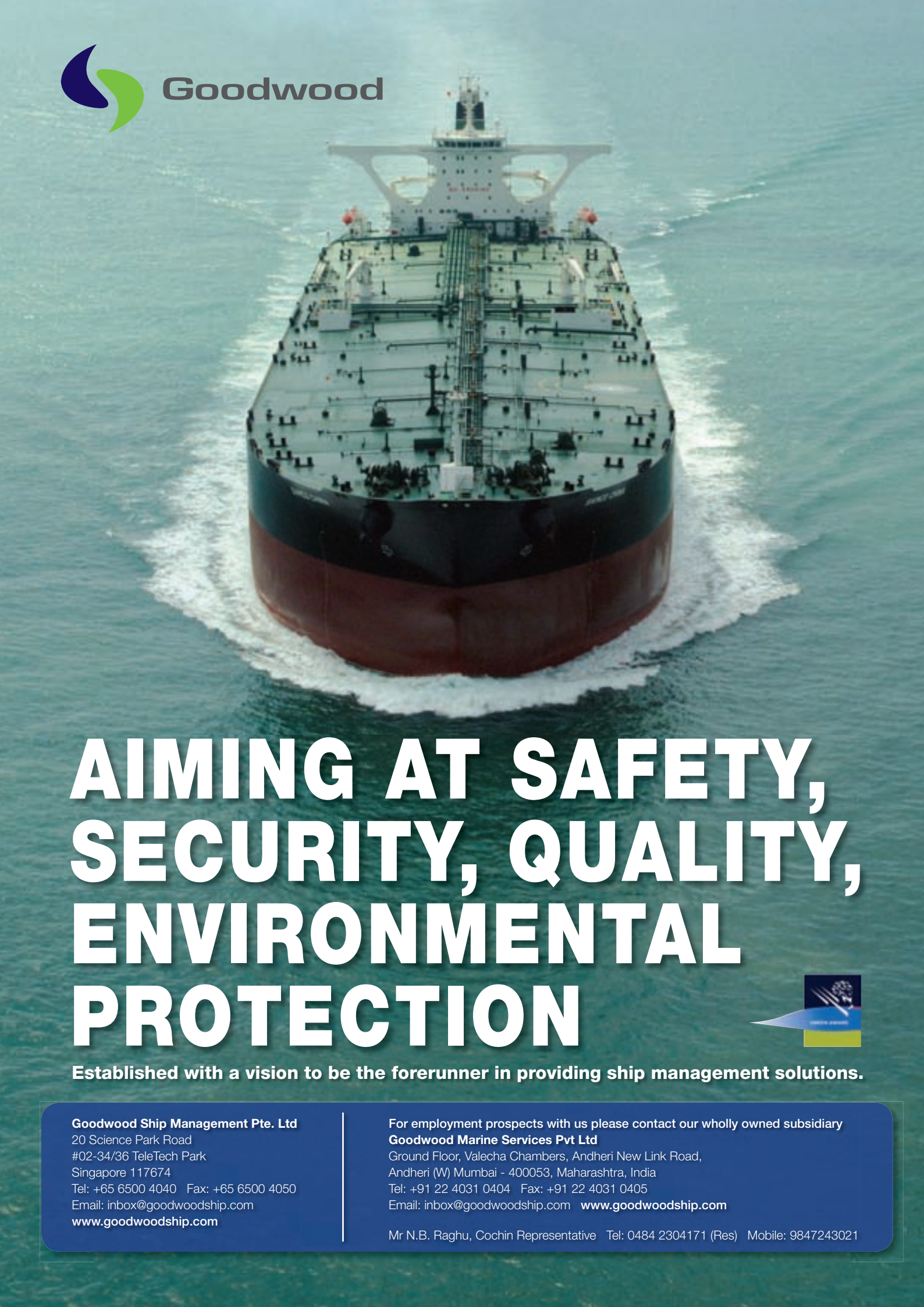
Increasing global environmental concerns, Frontline said, have created a demand for vessels that are able to conform to the stringent environmental standards currently being imposed throughout the world. It emphasises operational safety and quality maintenance on all of its vessels.

Frontline engineers worked closely with ExxonMobil to realise savings. All 20 vessels were lubricated with Mobilgard 570, a key component of the Feed Rate Optimization Program. According to the lubricant supplier, this patented cylinder oil, which was formulated for modern marine engines, utilises consistently high-quality base oils and innovative additive technology to ensure excellent performance.

On board sampling of scrapedown oil was completed weekly and after fuel changes. Additional samples were sent to the Signum Oil Analysis laboratory every three to six months. Profiles of each vessel were established, noting loads, fuel sulphur levels, feed rates and various relationships to iron, TBN and other data. Based on the measurements, ExxonMobil recommended feed rate adjustments for each vessel. The combined feed rate reduction for all 20 vessels was 9.3%. This resulted in annual savings of more than $450,000 in lubricant costs, with additional savings expected from reduced maintenance expenses.

"By using this type of step-out technology to monitor the real-time condition of cylinders, we can help our customers optimise feed rates and reduce the expense of wear-related cylinder maintenance," said Shaara Blome, global marketing manager, ExxonMobil Marine Lubricants. "A welcome bonus is cost savings, and these have proven to be substantial for Frontline." TO

> "By optimising cylinder oil consumption, we're reducing cost and supporting Frontline's strategy of lean vessel operation emphasising safety and quality maintenance."
>
> **Petter Lalic, project engineer, Frontline.**



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Communications provide a competitive edge

The global economic downturn has taught our industry many valuable lessons. To offset a temporary decline in revenues, shipping companies have been forced to carefully scrutinise each expenditure. This scrutiny has helped operators quickly determine which expenses are truly necessary to ensure crew welfare, reduce costs, increase operating efficiency and achieve a business advantage.

After carefully evaluating new technologies and solutions, what have we learned? All of us have learned that advanced satellite communications (satcoms) networks are critical to the efficient operation and long-term financial success of shipping companies.

Shipowners have learned that, even in the robust tanker segment, crew shortages are becoming acute. This means that operators offering broadband communications systems are much better positioned to recruit and retain qualified seafarers.

Shipmanagers have learned that the latest satellite broadband solutions can reduce costs by improving the efficiency of ship operations, resulting in a competitive edge.

Finally, satcoms service providers have learned that operators demand more than fast data transmission and reliable connectivity.

Michiel Meijer

Managers look to broadband to help retain crew and cut costs*.

We must be able to provide integrated multi-platform solutions, a vast geographic presence, local support, creative pricing, and value-added services to control costs.

Satisfied crew is fundamental

In an environment of crew shortages, the balance of negotiating power is slowly transferring from employer to officers. Young, Internet-savvy seafarers expect broadband connectivity wherever they are – to surf the web, stay in touch with family and friends, and participate in social networking sites.

In this highly competitive marketplace, ship managers realise they are at a major disadvantage if they cannot offer seafarers the latest satcoms' solutions. They also understand that reducing crew churn can profoundly reduce expenses associated with crew training – while improving crew morale and productivity.

One of the most effective ways to improve shipboard life is to provide advanced voice, private email, SMS and GSM services that are powerful, economical, easy to use, and available away from the bridge. One example, Stratos' AmosConnect Crew, features a vessel-independent personal mailbox and access to global and local news services.

The leadership of Wallem Shipmanagement, along with dozens of other shipping companies, has benefited from these services for many years. In addition to deploying AmosConnect Crew on more than 100 vessels, Wallem reported that ChatCards, which allow prepaid voice calling and Internet usage without cost to the shipmanager, have been widely used by the company's seafarers.

Remote management

In addition to voice and data for crew communications, new broadband services are helping the operator's onshore experts bring the vessel and the office closer together. For example, MPC Steamship recently deployed FleetBroadband on a vessel, which operates worldwide.

The service enables remote management, which allows headquarters office personnel to help manage the ship's computers, thus eliminating the need for costly vessel visits. It also includes database synchronisation and access to the on board voyage data recorder. In the future, MPC also has the option to use FleetBroadband for engine-performance analysis and emissions monitoring, which has been proven to significantly reduce fuel-cost savings.

Cost containment

Most operators are well aware of the capabilities of the latest communications networks. What's even more critical is the service providers' ability to demonstrate that these systems are affordable and that they can be operated efficiently. The industry's leading distributors have risen to the demand by devising creative pricing schemes that feature equipment-service bundles and flat-rate pricing to lower entry costs.

To address concerns involving efficient use of available bandwidth, monitoring costs and minimising unnecessary usage, the most innovative service providers offer value-added applications that provide cost and traffic control, firewall management, data optimisation, high security options, easy VPN access, messaging services and full IP range.

One example of these strategic services is the online Stratos Dashboard, which provides real-time information on the amount of FleetBroadband traffic used for voice and data, plus the associated costs. This fully automated tool offers high-usage alerts to ensure budgets are not exceeded and it enables customers to manage the consumption per vessel, or groups of vessels.

Recently, when Stolt Tankers' officials announced a decision to deploy a high-speed satcoms network on the 75-ship fleet, the operator mentioned the critical importance of value-added services on its final buying decision.

So, it's easy to conclude that strategic investment in the right communications network is no longer considered a luxury, but rather a tool to ensure efficient business management. That lesson is more important today than ever before. TO

**This article was written by Michiel Meijer, maritime marketing manager for Stratos Global Corp.*

Categorising data - the real problem

In the information age, data is abundant and statistics are everywhere. But why don't they help us make decisions better? Why do we keep blaming the data*?

For years computers have been helping us collect data and draw statistics. But how often do we see a graph and are unable to make a decision because we know that the data capture fails to tell us the whole story about any of the data points?

The problem with decisions is that people's minds do not balance all the competing influences at any one time. We need to get a balanced view of all the influences to make good decisions. While the need is to integrate the many conflicting goals affecting our decisions, depending on our state of mind and the circumstances, typically, one or other of the goals prevails, to the detriment of a well-rounded and informed decision.

In business we take more time and apply methods to balance goal conflicts and evaluate obstacles. Tough ones like how to assess the market in chartering, or whether to postpone a stern tube repair on a tanker are made with every intention of balancing the conflicting elements and overcoming the obstacles. We could even look at statistics to help make these decisions more balanced. For example, we could use statistical counts of seasonal changes in the charter-market or deterioration rates of stern tube seals.

Amalgamate information

Statistics are used to amalgamate information so as to balance the influences and make decision making easier. However, statistics rarely if ever include enough contextual information and therefore cannot be weighted properly. Take for instance the charter market; it is affected by so many different influences, some of them hugely relevant to the charter levels being faced and some that are normally relevant, but may be insignificant to the current circumstances.

On top of this, statistics are often used to discover cause and effect models rather than verify them. People actually often quote statistics that seem to violate common sense and feel that this is the more educated approach. This works well in physical sciences because we often cannot understand cause and effect at all and begin to piece it together by observing trends. There is rarely any other way to understand the physical world than to gather data and compare it until some pattern emerges.

However, we are not condemned to live with inferior or misleading statistics. In most domains where people are involved, we can ask the people what their considerations are when they work and why they act in a certain way. For example, charter market analysts correlate charter rates to ships utilisation to predict rates and then estimate how closely the two correlate when the better way around is to understand the cause and effect of charter rates and then use the statistics of income rate to utilisation correlation to verify the cause and effect to some degree.

More specifically, we know that rates are dependent on many short and medium term factors, besides supply of ships and demand for transport, such as storage of commodities, charter market rate trajectory, commodity price trajectory, demand trajectory of the commodity, supply trajectory of the commodity, congestion, and many more economic indicators. If we took each charter fixture and weighted these major short and medium term influences as we charter the vessel, we would have more meaningful data to make statistics and better predictions of rates.

Therefore, getting more salient data surrounding the cause and effect of each event is most important when we are observing some type of expectation failure, for example, an observation of a defect reported by an officer on board a ship, could lead to an undesired event.

Examples

1) A non-conformance about failure to follow the right process for a replacement oxygen and gas meter seems different from a non-conformance regarding failure to perform a risk assessment before shutting down a sea water pump and blanking it off. One is about a gas meter and the other about a pump. But they may seem quite similar with respect to perceptions of the importance of safety. Seen from the viewpoint of a seafarer, who has not been informed about some vitally relevant details regarding what has been done in his absence, they are even more similar: a gas meter that behaves differently than expected and a pump that has been blanked off are very different from what he would expect.

2) A crack in the flange of a fuel pipe in the purifier room may seem quite different and also quite similar to a crack in the flange of a pipe feeding the main engine injection pumps. However, if the main engine pipe is part of the fuel pump structure, the cause of the problem can prove to be quite different from damage on a regular pipe fitted by the shipyard.

3) The injury to a crew member due to a fall on a slippery part of the deck may seem to be quite similar but also quite different to the injury of another crew member who recently signed on and was not aware how to use the lathe in the engine room. In the first incident the injury may have resulted and be related to a number of safety precautions that need to be taken while the crew is working on deck, such as cleaning the deck to remove oily residues, wearing safety shoes, painting the deck surface with a special non-slip coating, while the second incident might be related to training issues, lack of experience and absence of written instructions on how to use the lathe.

The right approach to decision making is to understand cause and effect by examining each case 'story' more closely in order to determine the goal and obstacle structure, then, to use the goal obstacles structure to better qualify larger batches of information (statistics) and use these more judiciously to make explanations and predictions. So using common sense to evaluate the factors that could apply to every situation on board where a violation of expectation occurs, seems to be the first useful step you take. The statistical approach can then be applied to a much richer set of cause and effect indicators.

In the information age, access to information and data collection is important. If you are collecting data this is a good thing and the important next step is to get our information management systems to help gather the right cause and effect indicators relevant to each case. However, to do this, the system has to track the work of your staff as they deal with, let's say, a defect or non- conformance and resolve it. If the system does not collect salient points in the processing of daily problems you will never extract any statistics that tell you anything useful about management and improvement.

Right point at the right time

Since there could be many salient points that make an expectation failure, such as a crack in a fuel pipe important, the system has to present the right ones to the user at the right time, otherwise, it will be quicker for the user to write

down comments in a common language that the computer cannot recognise and thus cannot present later in statistical form.

For example, is there a crack or a welding pore, is the pipe under external stress, is the pipe a high pressure pipe with a wall thickness limitation? Is there a maintenance problem common to these pipes? Even more urgently, is there a process that this breakdown affects and should there be a risk assessment at a variety of levels? But how would the system know it's a fuel pipe so as to consider corrosion as of unlikely relevance, how would the system know about the pipe configuration and design limitations so as to ask relevant questions about cause and effect?

All these questions are relevant, if this observed pipe leak is to end up as a statistic, especially if the statistic is meant to assess management quality, something that in the tanker industry is very much a target of Chapter 12 of TMSA, making this abundantly clear.

Herein are the reasons why software often does not help with management decisions that are not straightforward. They are helpful where the decisions are simple, like comparing prices, but they don't help tell us when to stop the ship for an overhaul. To do so, the system has to understand (this means have a model within its data structure) of everything important about the enterprise and everything about what the user is doing (for example in this case reporting a defect).

In the gas meter example above, how would the system know that gas meters can cause death if they are incorrectly operated? And why would it consider asking the user if the gas meters procured operate in a way that a new user can expect? Why this is not a question normally asked when buying new binoculars or chipping hammers? And when reporting the ballast pump isolation process, how would the system know that the blanking off process requires some consideration of coinciding factors, so that someone does not inadvertently flood the engine room?

The system could, of course, ask you all the questions it knows, regardless of context, but will this help the management process or delay it? Would senior management, like masters and engineers, who are responsible for resolving problems, tolerate answering irrelevant questions?

A failure to apply the correct change management process to a gas meter could be categorised under Change Management, which would make sense, or under Gas Meters, or under Tank Entry, or under Safety Equipment, etc. But which one would best help indicate management quality? If the assignment of failure is incorrect, what is the point of making statistical count from this categorisation? Even if it is correct and the non-conformance is assigned under failure to manage change, would this carry the same weight and should it be considered on a par with buying binoculars and chipping hammers, without going through a change management procedure?

It is not difficult to enrich incoming information with the right contextual and salient indices, if the process is well designed and is performed in steps. Most importantly, in performing the process, the enterprise benefits anyway. So the answer to better decisions is qualifying incoming information as a by product of daily work.

In the information age, having solved the information collection problem, we now need to solve the information categorisation problem. Never was this more relevant than today when the obstacle of access to information is behind us. TO

**This article was written by Ulysses Systems.*

Russian Register up to speed on environmental issues

Maritime Register of Russia's (RS) philosophy determines the priorities of RS' personnel, that is - providing high safety standards at sea and environmental protection.

Understanding that every member of the maritime community is responsible to future generations, RS allocates vast resources to undertake scientific research with a focus on enhancing safety standards. "RS assists shipowners using the accumulated experience, scientific potential and high qualification of its personnel. We intend to further contribute to the implementation of high technical standards in ship design, shipbuilding and shipping using our unique experience in providing safety", said RS director general Nikolay Reshetov.

Experience, gained in more than 95 years of activity, has resulted in the register carrying out services for the most modern oil tankers, a significant number of which are now built for operation in ice conditions.

For example, the specific focus on safe operations in harsh ice conditions enabled RS to perform design appraisal and in-service survey of the unique Varandey system components designed for large tanker offshore oil loading and shipments in the Polar region. The project included the construction of a fixed offshore ice-resistant offloading terminal (FOIROT) plus a series of three Arctic shuttle tankers, equipped with bow loading systems and designed for independent ice operations.

Shuttle tankers

New ship designs are mainly connected with the transportation of raw materials in the Arctic region. With regard to this, another significant project in which RS participated was the construction of two double-acting shuttle tankers of 70,000 dwt for year-round operation in the Arctic climate. The structural features of the recently delivered lead ship *Mikhail Ulyanov* are based on the double-acting concept: application of AZIPOD azimuth thrusters and the equal ice strengthening of the stern and bow.

The tankers are equipped with modified Arctic bow loading systems that negate the possibility of pollution during cargo operations. They are to be used for oil transportation from the Prirazlomnoye oil field in the Barents Sea. In accordance with RS requirements for structural integrity of ice strengthening, they have been assigned one of the highest ice categories – Arc6. Construction of the second tanker - *Kirill Lavrov* - was recently started.

The data obtained during the project's appraisal and development has shown that the equipment design coupled with the correct choice of materials were essential for providing operational safety in low temperature conditions. To assist shipbuilders and shipowners in creating a safe Arctic fleet, RS has developed a set of additional requirements for Polar vessels. The requirements concern icing protection (ANTI-ICE, effective since 1st October, 2008) plus structural, equipment and system optimisation for long-term navigation in low temperature conditions (WINTERIZATION, effective this year 2009).

Ballast water

RS also places high emphasis on environmental safety having introduced additional distinguishing marks in the class notation for 'greener' ships – ECO and ECO-S. In 2005, RS held the VIII International Seminar on Marine Environment Safety Management. Ballast water management (BWM) was one of the main issues of the forum as proper BWM is one of the key factors in the protection of the World's oceans. In 2009, after consideration and approval of a number of ballast water treatment systems by IMO's MEPC, the technical obstacles were removed opening the way to the ratification and application of the IMO Ballast Water Management Convention requirements.

These requirements have been incorporated in the RS regulatory documents since 2003 and RS has vast experience in BWM plans consideration with regard to the distinctive features of each particular vessel.

In preparation for the Convention's entry into force and in order to define recommendations for shipowners, representatives of maritime administrations and port authorities, RS collates information on the approved manufacturers, on research institutions, which are capable of approving the systems' conformity with the convention's standards, as well as on the equipment suppliers, for collecting and analysing ballast water samples.

RS will advise shipowners of the latest requirements for ship design and during equipment retrofitting, crew training, co-ordination of port services and facilities. Particular attention is being paid to the Baltic Sea and the Caspian Sea, as special commissions have been established to protect their ecosystems, and the regions are currently under the regulation of international conventions.

"In the terms of the global financial crisis the international maritime community continues to move forward in enhancing the existing maritime and environmental safety standards and implementing the new ones. The pattern of the approach is determined not only by the development of modern technologies, accumulated experience of implementing the decisions taken and the growing demands in sea passenger and cargo transportation, but also in the first instance by the urge to minimise vessel accident rate and ensuring the proper image of the maritime industry", emphasised Reshetov.

RS has called for all members of the maritime industry to co-operate and conducts seminars and conferences involving representatives of shipowners, shipbuilding, shiprepair yards and industrial enterprises.

This year, RS will organise the XII International Seminar *Safety and Marine Environment protection: Prospects We Face,* the second in a series of *Quality Shipping: XXI Century Standard* seminars. The coming event should be an excellent platform to discuss the means to achieve the safety goals. TO

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PRISCO expands fleet, opts for 'Winterisation'

On 29th of June, Primorsk Shipping Corp (PRISCO) took delivery of the *Zaliv Aniva* from Hyundai Heavy Industries, the last of a series of six Aframax newbuildings.

Both this vessel and her immediate predecessor were fitted with bow loading systems, allowing them to load at offshore terminals.

Two other vessels in this series – *Zaliv Baikal* and *Zaliv Vostok* - have fully coated cargo tanks enabling them to load light oil products, as well as crude.

All vessels of the series have been built with double hulls and were classed ice class 1C according to DNV. They are 244 m in length and 42 m beam and are of 103,000 dwt.

As at the beginning of July, PRISCO operated 19 tankers with total deadweight 1,781,647 tonnes. According to company's fleet renewal programme, seven newbuildings were delivered this year totalling 569,000 dwt. At the same time three tankers of 15 years of age were sold. Therefore, today's average age of the PRISCO fleet is two years, the company said.

Following privatisation, PRISCO embarked upon an intensive fleet modernisation and renewal programme resulting in considerable growth in deadweight tonnage terms, which is set to continue to 2011. The company ordered several ships of different classes and deadweight capacity. When all the new vessels are delivered the total deadweight of the fleet will be over 2 mill tonnes.

In 2008, an LNGC of 145,000 cu m capacity was ordered by a consortium involving MOL, K-Line and PRISCO at Mitsui Engineering and Shipbuilding. Upon delivery, she will load LNG from the Sakhalin II project.

As well as the six Aframaxes, seven MRs of 51,000 dwt each will be built for PRISCO at STX shipyard. In September 2007, PRISCO signed a contract to build two Suezmaxes of 166,000 dwt each, which will be delivered in 2010.

Russian tanker concern's fleet renewal programme continues unabated.

All the tankers in the MR series will be classed with Lloyd's Register's notation Winterisation D (-25).

PRISCO also carries out the commercial management, including the charter functions. Basically, the company builds new and then concludes charter contracts. Today, the most important activity for the company is the participation in the various Sakhalin projects, the company said.

The company is providing tankers, as well as services for the support of offshore oil-production platforms through specialist, ice-strengthened supply vessels.

Winterisation

The first of the seven 51,000 dwt IMO II type product tankers – *Prisco Alexandra* – floated out of STX Jinhae shipyard earlier this year, was also the first to be built to a new class notation from Lloyd's Register.

LR's Winterisation rules have resulted in a new 'Winterisation' notation that extends the coverage of the current standards beyond basic hull structures to include the products and equipment that are deemed essential for safe and reliable operations in extreme temperatures.

PRISCO helped LR by advising on the forming of the new rules, making available the Russian shipping company's experience and knowledge gained over 35 years of operating in ice conditions.

According to Konstantin Globenko, director of PRISCO's technical department, having a more comprehensive set of rules helps to streamline the process of establishing whether a vessel is technically equipped to trade in temperatures down to – 25 deg C. This helps other bodies, such as charterers, oil companies, insurance organisations and port authorities, decide on the suitability of the vessel for a certain voyage.

"We believe that being the first to build to this class notation is only the first step. Eventually, all oil companies, charterers, flag and port authorities and terminal operators working in Arctic waters will realise the importance of the proper winterisation of vessels," said Globenko, writing in LR's *Ice Focus* supplement.

"This co-operation between class and owner – between theoretical and practical people – has promoted the development of a very practical tool that is useful to all parties and safer for those at sea," Globenko continued.

The 'Winterisation D(-25)' notation covers everything from the coatings used in the ballast tanks and the sealing materials for valves to the location of water heaters, store rooms and steam lines.

LR's Asia country manager Luis Benito said; "It is our business to support the construction of the vessel. So it is also important to recognise the contribution of STX Shipbuilding, whose employees were innovative and responsive enough to adapt to the new requirements for the construction of these ships."

Five of the class are expected to be delivered this year with the final two coming in 2010.

During the first six months of this year, the two Aframaxes, *Sakhalin Island* and *Governor Farkhutdinov*, on long term charter to Sakhalin Energy, shipped more than 2 mill tones of crude oil from Prigorodne.

In total, the pair completed 23 loadings at the Sakhalin II facility. Their bow loading systems and the necessary ice reinforcements allows the vessels to operate in the Sea of Okhotsk year round, the company said.

History

PRISCO can trace its origins back to 1967 when a specialist oil transportation company was needed to feed the new oil terminal at Nakhodka on the back of the rapidly

increasing oil shipments, according to the company website.

On 1st October, 1969 the oil tanker division of the Far Eastern Shipping Company (FESCO) was transferred to the oil tanker fleet department, based in Nakhodka. FESCO's deputy director for icebreaking fleet and Arctic operations - Nikolay Nemchinov - became the head of the new organisation.

Around 43 tankers with a total deadweight of 314,900 tonnes were moved across from FESCO to the new department. These were mostly of moderate carrying capacity of between 1,500 dwt and 17,000 dwt.

Two years later, the department was transformed into an independent shipping company. Thus, Primorsk Shipping Corporation was born on 1st January, 1972.

The company's fleet had risen to 46 vessels aggregating 350,900 dwt. Most of them were tankers of *Kazbek* and *Baskunchak* types. Coastal navigation made up 75% of PRISCO's cargo transportation, while export cargoes and overseas charterers' cargoes comprised only about 25% of the total volume.

In the first five years of the company's existence the new 25,000 dwt tankers of *Internatsional* class were added to its fleet. In addition, the automated reinforced ice-class 17,000 dwt vessels of the *Samotlor* series, increased the company's potential significantly.

Twelve double-hull vessels of that type were built for PRISCO at Rauma-Repola Shipyard, Finland from 1975 to 1978. A short while later, five *Ventspils*-type tankers of 6,200 dwt each were added to the fleet. Thus, by the end of 1980s, the company's fleet consisted of 54 tankers with a total deadweight of 499,400 tonnes.

In addition to oil and petroleum products, PRISCO began transporting vegetable oil, adipose, molasses and chemical cargoes. The company developed new international trading routes. As a result, the volume of export cargoes increased, especially in the Asian-Pacific region. However, for the most part, of cargoes shipped were for the Northern territories of Russia.

The company's crews' experience in northern latitude shipping operations became of great importance, not only for the Far Eastern shipping routes, but also for the Northern route and Antarctica. Executing the Russian government's orders to supply Soviet Antarctic stations with fuel oil, the ice-strengthened tankers *BAM, Beryozovo* and *Urengoi* made regular deliveries to the South Pole from 1987 to 1989.

On 24th September, 1992, PRISCO became the Russian shipping industry's first public corporation.

Significant changes in Russia's economic life led to a fundamental rebuild of the company's activities. A protracted economical crisis resulted in considerable coastal trading reductions and destroyed the previous employed centralised approach to export /import deliveries. As a result, PRISCO had to search for new markets, to establish direct contacts with foreign charterers and to conclude long-term contracts independently.

To be competitive in the global market, the company needed vessels satisfying all the international safety and service quality requirements. By the time of its privatisation, PRISCO owned a fleet of 38 tankers, having a deadweight of between 3,000 and 40,000 tonnes with half of the vessels approaching a critical age. Therefore, fleet modernisation and improving the quality and safety of transportation became the principal strategy behind the company's development.

Registering its ships under a flag of convenience, the company was successful at getting loans for acquiring new tankers. Four 28,800 dwt tankers became the first vessels built for the company with the help of the new loans. From 1995 to 1998, five more vessels of various carrying capacities were put into service. In total, 15 new vessels were added to the company's fleet in a period of 14 years.

As the company was reorganised into a public corporation, its name was changed to the PRISCO Corporation.

PRISCO's shore facilities were also being constantly modernised and reorganised. Besides shipping operations, their activities include training sea-going personnel, recruiting staff for foreign shipping companies, ship's agency service, banking, insurance and hospitality service, as well as printing, automobile and medical care interests. TO

Zaliv America **was the first of the six Aframaxes to be delivered.**

NEVA 2009 – the gateway to the Russian maritime industry

This year's NEVA 2009 will be the 10th international shipping, shipbuilding, ports and offshore energy exhibition to be held at St Petersburg aimed at showcasing Russia's shipping and offshore industries.

Following the success of NEVA 2007, the organisers have said that this year's event is set to be the largest and most successful conference and exhibition in the event's 20 year history.

The bedrock of this confidence, and the reason why NEVA 2009 (to be held 22nd to 25th September in St Petersburg) has already drawn such high levels of domestic and international support, is Russia's long term commitment – supported by a clearly defined strategy and financing – to the further development of its transport system, maritime and offshore industries.

The role that the biennial NEVA exhibition and conference plays in cementing the international ties that are essential to Russia's maritime and energy ambition cannot be underestimated.

For example, at NEVA 2007 Secretary General of the Community of European Shipyards Associations (CESA) Reinhard Luken made a keynote presentation, which was followed by an undertaking from both CESA and the Russian shipbuilding industries to ensure closer co-operation between the two groups.

Once again the event will bring the entire Russian maritime spectrum together under one roof for four days. A key element in this success is the traditional support that NEVA enjoys from key maritime institutions including the Maritime Collegium of the Government of Russia, Ministry of Industry & Trade, Association of Sea Ports, Union of Russian Shipowners, Union of Oil and Gas Equipment Producers, the United Shipbuilding Corporation, Maritime Council of the Government of St. Petersburg.

This year, for the first time, NEVA will take place 'Under the patronage of the Ministry of

Transport of the Russian Federation.' This is an endorsement from the Kremlin and recognises that NEVA is 'now the largest international transport exhibition in Russia.'

The international list of confirmed exhibitors includes ABB, ABS, MAN, Caterpillar, MacGregor and Rolls-Royce Marine. These names are joined by a number of first time exhibitors such as Samson Ropes and Italian dredging company Italdraghe.

There will also be two Chinese pavilions at this years event – a national one and a regional one from Guangzhou. There will also be a Romanian national pavilion for the first time. which will stand alongside national pavilions from Norway, Finland, Denmark, France, Germany and Poland.

General director of Dolphin Exhibitions, Roderick Keay, who has organised NEVA since its inception in 1989, reports that over 85% of available exhibition space was reserved by January "….and this takes into account the additional space available in 2009."

In parallel with the exhibition, a conference programme has been put together. Day one (22nd September) takes the Arctic and Antarctic as its theme and will address legislative, commercial and technical aspects of operations here. This day is scheduled to culminate in the US Coast Guard (USCG) Amver Awards Ceremony.

Day two has been designated the day of 'Shipbuilding, marine technologies and offshore support operations' and is organised jointly with the Krylov Institute. This will include a focus on 'Russian shipyards as European shipbuilders and their co-operation with Far East shipyards' and special sessions highlighting the rapid development of the offshore support sector in Russia.

Day three has been themed 'Ports Day', which will look at infrastructure development, as well as technologies. It will also see a seminar programme organised by the St Petersburg Institute for Shipbuilding (CNiiTS) around the subject of international co-operation in shipbuilding. Procurement of on board equipment is likely to be a central feature.

Day four will see another NEVA and Russia first - The World Congress on Maritime Training. This event will be co-ordinated by the Admiral Makarov State Maritime Academy.

Russia's maritime industry is currently seeking international partners to help it realise its ambitious goal of a state-of-the art shipbuilding sector capable of delivering some 1,400 vessels of various types through to 2020, as well as massive upgrade of its port infrastructure.

The Russian government is squarely behind the drive to develop Russia's maritime infrastructure. At a cabinet meeting in March hosted by long-time supporter of NEVA - the Krylov Shipbuilding Research Institute - Russian Prime Minister Vladimir Putin detailed the government's plans for the commercial development of the national shipbuilding industry.

He said the 2009 state budget allowed for $90 mill for ordering new ships and that $290 mill had been budgeted to support hi-tech shipbuilding research programmes. He also unveiled a state programme for the development of commercial shipbuilding and offshore technology for 2009 – 2016. This programme guarantees a state contribution of $4 bill over the seven years, $123 mill of which has been allocated for 2009.

During the meeting, he also announced that Gazprom and Rosneft plan to order about 300 Russian-built vessels through to 2030. Work has already begun on a new $1 bill shipyard near the port of Primorsk on the Baltic. Also underway is a major upgrade of the Severnaya Verf yard in St Petersburg which has received financing of $550 mill from Russia's Vnesheconombank and engaged South Korea's Daewoo on a consultancy basis.

Northern European and Baltic countries will also be making a particularly strong showing at NEVA 2009. "There will be a substantial Dutch presence and the mayor of Rotterdam plans to attend again," said Keay. Poland and Estonia will also be present alongside Germany – the single largest national pavilion – as well as the traditionally high Scandinavian showing. Beyond European borders there will not only be stands from China, but also the US.

TO

Russian tanker owners' newbuilding plans will come under scrutiny in St Petersburg. Photo credit LR/PRISCO.

Tank cleaning - a miracle?

Due to the variety of chemical and oil products transported at sea, tank cleaning is essential on chemical and product tankers*.

The products that need to be cleaned vary widely in their properties and characteristics. The industry and their customers have continuously increasing quality requirements. This results in high standards regarding the cleanliness of tanks. At the same time the shipowners are reporting a decrease in the knowhow of their crews.

Tank cleaning has to be performed mostly under considerable time pressure and takes place in a highly regulated and controlled environment. In addition, it is generally recognised that tank cleaning is one of the most hazardous operations carried out on board a chemical tanker.

A tank rejection could be the result of insufficient tank cleaning. Often it is necessary that the ship has to return to the next anchorage to re-clean the tanks. Time and money lost could easily range from several tens of thousands of Euro to the complete loss of the charter party. Not yet considered are the intangible costs, such as impact on the charterers supplier rating up to potential loss of contracts.

Manage the risks

Next to training, procedures and standards, a comprehensive tank cleaning guide is recommended.

Industry vetting schemes from OCIMF and CDI address this issue in their questionnaires. A tank cleaning guide should not just consist of a set of recipes, but also address the underlying background of tank cleaning and the management of related hazards.

The good preparation of the cleaning operation will avoid tank rejections, as well as incidents during the operation. In general the tank cleaning procedure can be determined from the properties of the product to be cleaned, the surrounding conditions, available equipment and last but not least the requirements of the product to be loaded (Next Cargo). In addition, the available tank cleaning hardware and the tank surface conditions have to be evaluated.

The necessity of a comprehensive tank cleaning guide becomes obvious when considering the details of the tank cleaning planning:

1. Physical properties like density, water solubility, boiling point, melting point, viscosity, vapour pressure, flashpoint & flammable range, as well as cargo characteristics, such as polymerisation, reaction with water, reaction with oxygen, reaction with water hardness compounds and smell have to be understood and considered in detail.
2. Surrounding conditions, such as outside temperature, adjacent cargo and ballast temperature have also to be taken into consideration.
3. Assessing the capability of available hardware, such as tank cleaning machines and heating capacities. Consideration of tank internals such as shadow areas and potential adverse effect on the result.
4. Tank surface conditions, such as stainless steel or tank coating and if tank coated, the retention of cargo in the coating has to be considered. The coating compatibility with the cargo, as well as any potential effect of the cleaning operation on the coating has to be evaluated carefully.
5. Required cleanliness standard of the next cargo. At least two major cleanliness standards should be distinguished - Water White Standard and High Purity Standard.
6. The statutory requirements of the cargo. This requires knowledge of the applicable regulations such as MARPOL Annex I or II and the related detailed requirements, such as the IBC Code. The Safety Data Sheet of the cargo and the hazards documented there have to be evaluated.
7. Industry requirements such as FOSFA/ NIOP and EU regulations for banned or acceptable previous cargoes and adjacent cargo compatibility lists addressing the reactivity potential in case of a failure of the tank integrity.

8. During the planning phase the testing and inspection should be kept in mind. A common mistake is too much focus on the tank itself and much too less on the cleaning of the other equipment that was in contact with the cargo, such as pipes and valves.
9. Like in every good plan there should be a consideration of the worst case scenario. An emergency plan has to be developed at this stage.

Regarding the involved safety and financial risks, these considerations have to be carried out properly and thoroughly. Even the most experienced chief mate might require the help of a comprehensive handbook in one or the other case to develop a good tank cleaning plan.

After the execution of the tank cleaning operation, hopefully in accordance with the plan, the verification of the results is another demanding activity. In order to avoid rejection in the next load port by a surveyor, the inspection should be carried out as it would be undertaken by the surveyor thus:

1. Visual inspection of the tank and the related equipment that was in contact with the cargo.
2. Depending on the requirements of the load port and the next cargo to be loaded a wall wash and the test of the wall wash liquid.
3. The test methods like PTT test, UV test, Chloride test etc have to be understood in order to react correctly on undesired results.

> "The good preparation of the cleaning operation will avoid tank rejections, as well as incidents during the operation."

Conclusion

To manage the financial and safety risks involved in tank cleaning it is highly recommended to provide respective guidance in form of a comprehensive tank cleaning guide. This guide is only partly helpful in the management office. It should be available on board readily accessible for all personnel involved in tank cleaning.

This guide should not be just a collection of cleaning recipes. It is equally important to provide information and guidance on the following:

- All cleaning relevant cargo data.
- How to develop a good tank cleaning plan.
- How to evaluate the properties and characteristics of a cargo.
- How to assess statutory and industry requirements of a cargo.
- How to mitigate the safety risks involved in tank cleaning.

Since the requirements and the available knowhow is continuously changing, it should be regularly reviewed and updated as necessary. TO

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Three elements contribute to tanker VOC emissions reduction

Relatively inexpensive design and construction changes have led to Teekay Corporation receiving the *Clean Air Award*, given by Nor-Shipping and Det Norske Veritas at the exhibition held just outside Oslo in June, writes Brian Warshaw.

The citation reads '... in recognition of outstanding efforts to reduce the emission of greenhouse gases', and relates to the design of the *Amundsen Spirit* shuttle tanker currently being built by Samsung Heavy Industries shipyard at Geoje, South Korea. This vessel, and three other similar newbuild shuttle tankers due for delivery in 2010 and 2011, will operate in Norwegian waters.

Teekay is confident that, even with the most volatile North Sea oils, its new shuttle tankers will prevent more than 60% of VOC emissions during loading operations, compared to standard vessels, and will provide total elimination of vapour discharge throughout the voyage.

To achieve this, it is employing the experience gained in sea trials over a period of three years, namely by increasing the pressure at which it operates the vessel's tanks, the fitting of Knutsen OAS Shipping's patented KVOC increased diameter drop lines, and through the installation of a Compact VOC (CVOC) recovery system.

Three design elements will enable Teekay to meet the Norwegian emission regulations. First, as a high proportion of the VOC is generated when oil is loaded into the ship's tanks, Teekay has installed KVOC drop lines. These will reduce the siphonic or under-pressure effect that is experienced as oil enters the ships' tanks, and will reduce the creation of VOC vapour that would otherwise contribute to emissions during loading.

Second, it has strengthened the tanks to a design pressure of 0.7 barg, which will permit an operating pressure of 0.235 barg. This compares to the current industry norm of 2.5 barg, and 0.04 to 0.14 barg respectively, and will save an estimated discharge of 15% to 20% of the VOC emissions. When discharges have to be made, they will be tightly controlled by an improved design of pressure-vacuum valve, which is fast operating, opening and closing within a narrower pressure range than does the standard valve.

Finally, the CVOC recovery system manufactured by the Norwegian company GBA Marine recycles the inert gas and VOC vapour from the top of the cargo tank. As the

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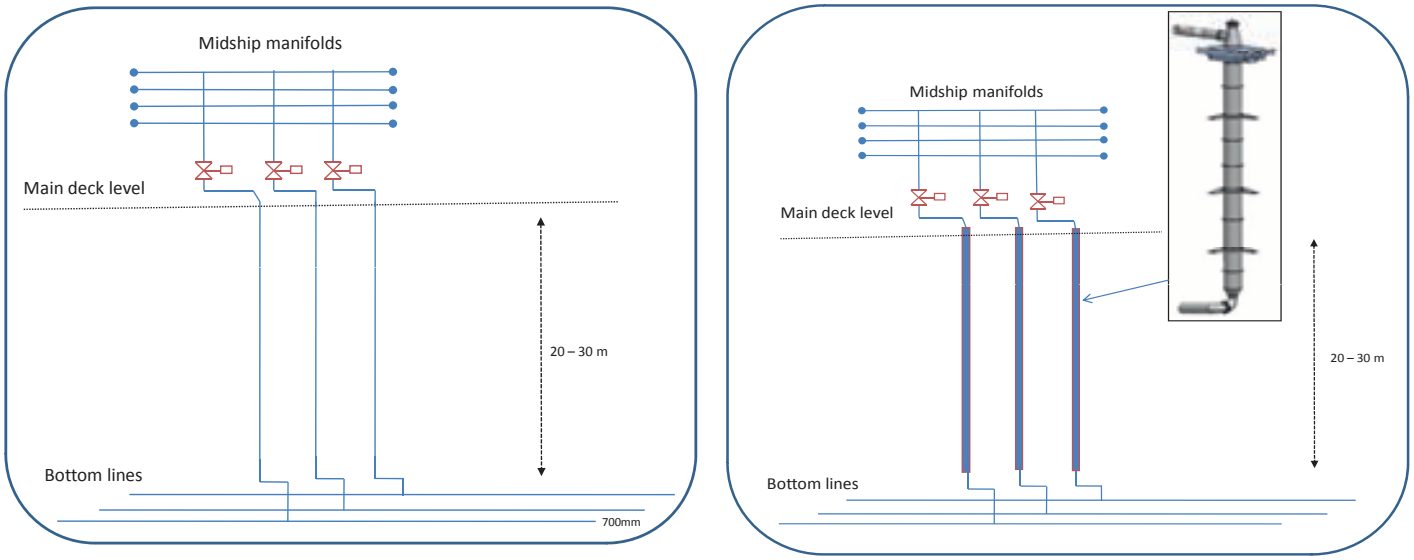


Schematic of KVOC's increased diameter drop lines.

GBA Marine's Swirl Absorber seen fitted on board *Navion Hispania*.

oil flows from the bottom of the tank and through the patented *Swirl Absorber,* it creates a large area of contact into which the VOC is absorbed. By absorbing the vapour back into the oil phase, the pressure in the tank decreases, eliminating the need to discharge VOC to atmosphere during the voyage between the offshore loading facility, and the import terminal.

This is the first time that all three concepts have been assembled on a single tanker, and the development is being undertaken with the support of the VOC Industry Co-operation committee that represents the oil companies operating on the Norwegian continental shelf.

In a statement, Teekay said that based on crude oil priced at $70 per barrel, the retained oil will enable the capital cost to be recovered in about five years. In addition to the environmental benefits, the working conditions for the crew on deck will be improved, and there will not be any VOC vapour to enter the accommodation area through the ventilation system.

KVOC technology

The secret of how the Knutsen OAS Shipping's KVOC technology eliminates volatile organic compound (VOC) vapour formation during crude oil loading has been revealed in a private report undertaken by Det Norske Veritas (DNV).

Essentially it is a large diameter drop line without moving parts or instrumentation, consequently requiring no energy to function, or maintenance throughout the life of the vessel.

DNV found that VOC was generated by flashing throughout the piping system transporting oil from the storage tank to the cargo tank; and evaporation from the oil surface inside the tank. In particular it reported that; 'A significant amount of VOC gas is generated by flashing at the top of a conventional drop line; the vertical pipe with a height of 20-30 m connecting the pipes at deck level and the bottom lines feeding the cargo tanks."

Diameter increased

After looking at, and discarding the idea of a smaller diameter drop line, Per Lothe, project director, settled on the idea of increasing the diameter of the drop pipe. "If one keeps the inlet flow velocity at a rate that doesn't fill the pipe, the pressure will be the same all the time," he explained. "The reduced flow of

KVOC® drop pipe installed on *Sallie Knutsen*

crude oil into the bottom cargo tank feed line does not try to take the gas bubbles with it. There is a gas column in the middle of the down pipe, and liquid around the side. This means there will be a constant static pressure in the drop line balanced by the backpressure from the tanks."

Based on validation studies of the HYSYS simulation computer program developed by Christensen Processing to estimate the volume of VOC that would be generated during the loading of a tanker with conventional drop pipes, DNV concluded that the KVOC system prevented most of the VOC formation being generated in the conventional drop line it replaces. Total VOC formation is not entirely eliminated during the loading process due to flashing at locations outside the ship, and evaporation inside cargo tanks; however, it does have some effect on reducing these emissions.

After running a series of simulation loadings for a typical Suezmax tanker with drop lines at a height of 22 m, and the cargo tanks filled to 98%, DNV said that a saving of between 85 to 130 tonnes when loading a typical one million barrel tanker (160,000 cu m) with Basrah crude oil depending on the Reid Vapour Pressure could be achieved. With crude oil priced at a nominal $50 per barrel, the investment in the KVOC drop pipes would be repaid in 12 to 18 months.

Lothe commented that the technology is suitable for product and LNG loading as well as crude oil. He is particularly pleased at the interest coming from the US for its use on lightering vessels. "The only place that VOC is generated during lightering is the drop line in the ship. The oil is only going up, over the side horizontally, into the ship, and then down again. So the KVOC system will eliminate almost all the VOC generation," he said. "They lose a lot of oil through emissions during this process.'

During the seven years that Knutsen has been developing and testing the KVOC technology, it has installed and operated nine systems on its own vessels, and plans six more by 2011. Three will be on newbuilds, and three are to be retrofitted. Teekay Shipping has ordered four systems for newbuildings being constructed by Samsung Heavy Industries in South Korea. TO

US favours PSM's oily water monitoring system

UK-based shipboard instrumentation manufacturer and supplier PSM Instrumentation has launched two new products – a monitor and logger for oily water and bilge water discharge, plus a digital level, pressure and temperature transmitter.

About a year ago, Danish concern, Clipper Marine Services (see page 38), was fined around $15 mill by the US courts for an illegal discharge of oily water from one of its tankers. However, following negotiations with the US Attorney's Office, the company was offered mitigation to the tune of $10 mill if a state of the art monitoring system was installed.

The company commissioned PSM to find a practical solution to the problem, together with Transas who tracked the data but did not have a monitoring system. The proviso was that the solution would be fully acceptable to the US Coast Guard (USCG).

PSM designed a system that took a different approach to the more obvious choice of padlocking the valves and logging the primary signals. As a result, the company produced and patented – ClearView – which is claimed to be a tamper proof monitor and logger that fully supports the Oil Record Book.

ClearView became the first USCG recommended device to be fitted on board commercial vessels. PSM also claimed that it was the most comprehensive solution to emerge on the market ahead of almost certain regulation.

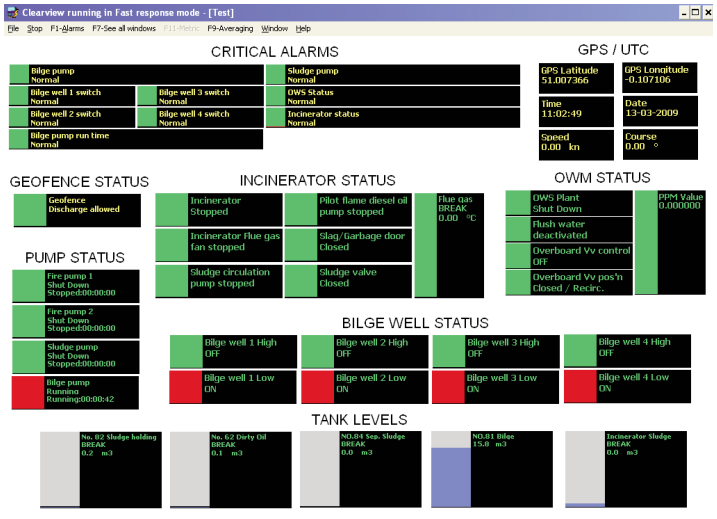
The few products previously available only monitor and log a small number of signals relevant to the proprietary main equipment, such as the separator system, or the PPM monitor, PSM said. The company claimed that its system goes much further by monitoring and comparing a wider range of parameters, such as bilge wells, bilge holding tanks, sludge and sludge separator tanks, dirty oil tanks and the incinerator status and operation.

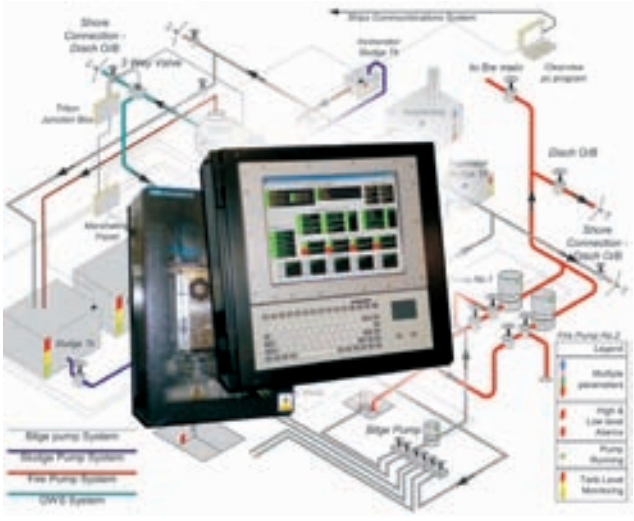
A D+ satellite link forms part of the system meaning all parameters are recorded with a UTC and GPS stamp. ClearView can also automatically ring fence owner/operator selected areas, disabling the discharge valve within territory limits and 'no go' zones.

PSM warned that unless all inter-related functions are prepared and recorded using this method to provide a complete audit trail of oily water/bilge, it will always be possible for those using 'magic pipes' to bypass the system. By continuously collecting and processing data from all elements, a pattern of good practice is inviolately logged, similar to a voyage data recorder (VDR). Data can be held for several years and may be printed out in a fully trended profile for the Oil Record Book.

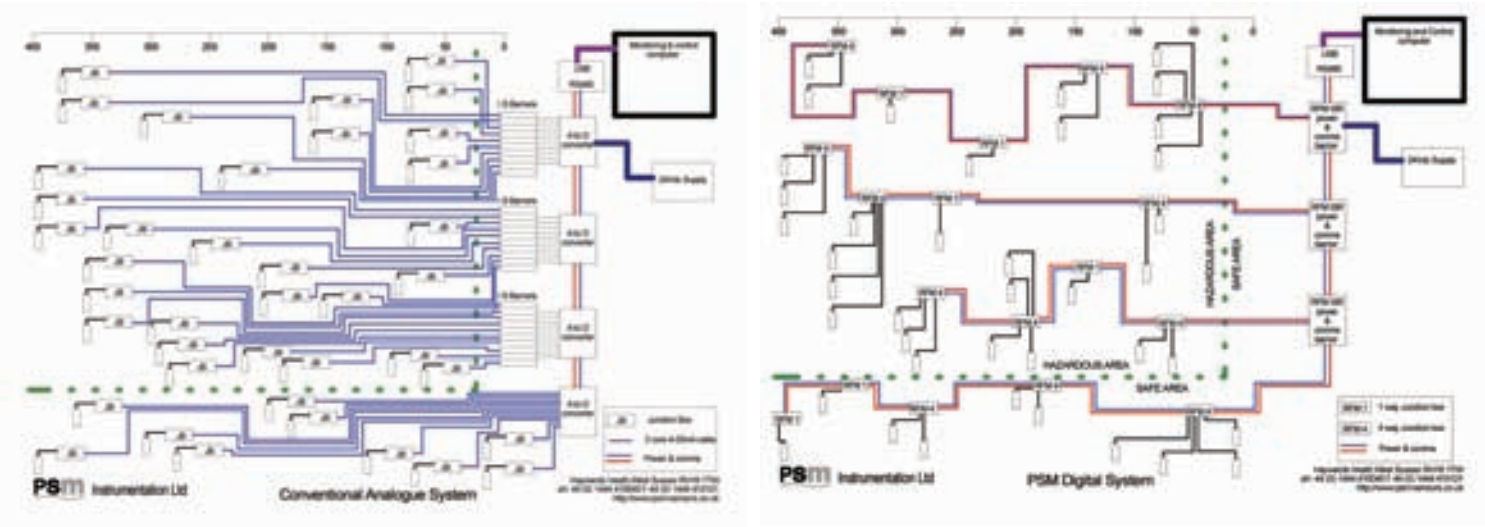
In June this year, the EU followed the USCG's lead by voting to criminalise pollution offences. In another move to control oily waste discharge, 2009 has seen more than 18 countries sign up to the Paris MOU (Port State Control) protocol to emphatically enforce MARPOL pollution regulations through PSC inspections.

Although the Paris MOU's intention is that any logging device fitted is purely there to rigorously police the operation, PSM said that ClearView provides seafarers with a more helpful and supportive watchkeeper, as they have a continuous overview of the entire bilge, separator, incinerator and discharge process. This in turn gives the possibility of alerting the officer on watch on the bridge by using alarm systems and advanced warnings, indicating irregularities, or illogical conditions, as well as equipment or critical failures.





Screenshot of ClearView with schematic.



Analogue tank level gauging versus the digital version.

PSM also claimed that a major selling point was ClearView's ability to automatically transmit information. It can be used as a standalone device, or it can also be set to transmit to a remote location via D+, or GSM for coastal vessels, providing operators real-time warnings of critical alarms, or inappropriate system operation. All routine logs can be transmitted through the vessels' regular satcoms link by which an owner/operator, or PSC inspector, can review all the historical data regarding the system's activity.

Thus far, ClearView has been installed on three of the Danish operator's vessels with another two to come shortly.

Digital intelligence

PSM is also a major supplier of tank level gauging equipment. To cut installation costs and to service the increasing need for accurate and reliable data on board, the company has introduced a digital pressure and temperature transmitter – iCT - to replace the more traditional analogue version.

Through larger volume production methods, quality sensors have become relatively inexpensive. However, the cost of installation cabling and commissioning of a level gauging system, either on a newbuilding, or a retrofit, often exceeds the cost of the actual equipment, the company said.

The new iCT transmitters have an advanced signal processing and communication capacity. PSM claimed that by using digital transmitters, over 80% of the installation costs can be saved, even on smaller vessels. This can easily equate to 15,000 m of cabling in a larger vessel. Another advantage of the digital system is that the sensors can be configured and commissioned from a remote location, such as a laptop.

iCT is ATEX approved and its lower power requirement means that up to 127 transmitters can be protected by a single safety barrier in hazardous conditions, PSM claimed. This equates to another cost saving, as the conventional method requires a safety barrier to be attached to each sensor.

Other devices, such as radar gauges can be integrated into PSM's communications network using the ATEX approved interface modules. The entire system is addressed and monitored using industry standard MODBUS RTU.

Of particular benefit to owners and operators of oil and products tankers who need to replace existing equipment is that a cargo gauging system can be provided with far less deck components and by using a much more simplified installation process, PSM claimed.

Complimenting the iCT intelligent networks are a wide range of display, data acquisition, alarm and monitoring stations tailored to suit a vessel's needs. The new sensors have achieved marine type approval, as well as ATEX certification for installation in hazardous areas. TO

Origins of ClearView

ClearView was developed due to an agreement made with the US courts to waive part of a near $15 mill fine imposed on a tanker's operator for an illegal discharge.

This was levied following an indictment of Clipper Marine Services and two related companies on 20th March, 2007, due to an attempt by crew members of the tanker *Clipper Trojan* to cover up illegal oily waste discharges.

In a novel arrangement, Clipper pleaded guilty, admitting that it had conspired to defraud the US Coast Guard by maintaining a false Oil Record Book on board the tanker, thus concealing discharges of oil sludge and oil contaminated bilge water overboard between February and June 2006.

However, at the same time, the Danish company agreed to retrofit some of its vessels with state-of-the-art oily water separators and implement a pilot programme involving real time remote monitoring system to track oil waste levels and use oil waste processing equipment on board five of its vessels.

In June, 2008, a US Federal Judge accepted this agreement and Clipper only had to pay a fine of $4.75 mill, of which $1.5 mill went to the National Fish and Wildlife Foundation, which has become the normal practice in environmental cases prosecuted in the District of New Jersey, providing all the conditions in the 'plea agreement' were met.

PSM was retained to develop the monitoring system and retrofit it on all five vessels, as agreed in this rather unusual plea bargaining case. Thus far, three have been fitted with ClearView with other two due soon.

The chief engineer also pleaded guilty to charges of presenting a false document to the USCG and attempting to obstruct a PSC inspection. He also admitted to showing the false Oil Record Book to the inspectors and falsely claimed that the record was accurate.

He received a five month custodial sentence.

Marine fuels - environment, quality and trends

With the formal adoption of the revised Marpol Annex VI regulation addressing SOx and NOx emissions from shipping by the IMO's Maritime Environmental Protection Committee (MEPC 58), 2008 proved to be a historic year*.

The Marpol Annex VI revision process was very challenging, and with first measures entering into force 1 July 2010, the new regulation aims to reduce significantly harmful emissions from shipping. A proposal to include fuel specifications into Marpol Annex VI resulted in a call from IMO for the International Organisation for Standardisation (ISO) to review and provide recommendations concerning the development of a fuel quality standard including specifications related to air quality and ship safety, or that may affect engine performance and crew health.

As sulphur limits will tighten soon, it will undoubtedly influence fuel blending practices, which in turn may affect other fuel oil characteristics as well. It may lead to the use of blend components at a higher concentration, or result in components that were not commonly used for marine fuel oil blending, entering the marine market.

This article looks at the significance of fuel characteristics, which are already part of the international specification, or those believed to be relevant as they are related to air quality, ship safety and crew health or engine operation. It also explores some of the marine fuel quality issues that have emerged over the last few years, and potential concerns related to them.

Introduction

The first emissions control legislation affecting international shipping came in during 2006 and restricts SOx emissions of ships sailing in the Baltic Sea, North Sea and English Channel to 6g/Kwh, which corresponds to a maximum fuel oil sulphur content of 1.5%.

In 2005, the MEPC recognised the need to review MARPOL Annex VI (and the NOx Technical Code). The sub-committee on Bulk Liquids and Gases (BLG) initiated the review with a view to revise the regulations to further reduce vessels' air pollution.

Several global and/or regional measures to reduce emissions were proposed, reviewed and debated at length. But at MEPC 58, the following were formally adopted:

- To reduce the global sulphur cap to 3.5% on 1st January, 2012, with a long-term global target of 0.5% in 2020, subject to a review in 2018 to determine availability of the fuel oil to comply with the legislation.
- To reduce the fuel oil sulphur content of vessels operating in ECAs to 1% on 1st July 2010 and to further reduce it to 0.1% on 1st January 2015.

Regulation 18 of Marpol Annex VI sets out the quality requirements of fuel oil used for combustion purposes delivered to and used on board ships that have to comply with the Annex. Overall, for fuel oils derived by petroleum refining, these requirements are aligned with the general requirements set by the ISO 8217 standard:

- The fuels shall be homogeneous blends of hydrocarbons derived from petroleum refining. This shall not preclude the incorporation of small amounts of additives intended to improve some aspects of performance.
- They shall be free from inorganic acids and from used lubricating oils.
- The fuel should not include any added substance or chemical waste which:
  - jeopardises ships' safety or adversely affects the performance of the machinery; or
  - is harmful to personnel; or
  - contributes overall to additional air pollution.

The BLG sub-committee also discussed the need to include a more detailed fuel oil specification in the amended Marpol Annex VI and recommended to MEPC to approach the ISO to request that it provide recommendations concerning the development of fuel oil quality specifications relevant to air quality, ship safety, crew health and engine performance.

Refining & fuel oil quality

Since the first crude oil was produced, it has taken a long time for the heavier residual fraction to become a component of the fuel oils that provide the energy used by marine engines for propulsion and power generation.

Crude oil refining in early years was a simple atmospheric distillation process with a heavy fuel oil production of approximately 50% of the crude feed. Vacuum distillation was further developed to refine the residue of the atmospheric distillation process to increase the production of distillate products (jet fuel, gasoline, gasoil).

However, to meet the ever-growing demand of distillate products that coincided with a strong reduction in the demand for heavy fuel oil, refineries needed to convert the residual fraction into lighter, also more valuable, fractions. That resulted in more complex refining processes, also called secondary processes, being introduced. These secondary processes can include catalytic cracking and thermal cracking processes

The introduction of more complex refining had a definite impact on the composition and the characteristics of the marine fuels being produced. Whereas complex refining worked well to identify heavy fuel oil grades by their

viscosity, fuel related operational and maintenance problems arose with the general upgrading of refinery operations from atmospheric to complex refining. This resulted in the development of marine fuel specification requirements by the British Standard Organisation (BSO) and CIMAC.

An International Standard -ISO 8217 - has existed since 1987. The stated purpose of this standard is to define the requirements for petroleum fuels for use in marine diesel engines and boilers, prior to appropriate treatment before use. These specifications were revised in 1996 and more recently in 2005 to accommodate changes in marine diesel engine technology, refining processes and environmental developments. Revision of the 2005 standard is currently being undertaken taking due consideration of the IMO request to consider air quality, safety, crew health and engine performance. It is expected to be ready by mid-2010 when the revised Marpol Annex VI enters into force.

The ever increasing consumer demand for light, and more valuable products, has evolved in the need for refining to squeeze a barrel of crude oil the most they can. This reduces the residual stream to the minimum resulting in the heavier, and often higher aromatic species, such as asphaltenes, being present at higher concentrations, which in turn makes the blending of the residual stream into a commercial residual fuel oil more complicated. It should be emphasised that the residual fuel oils marketed today are still 'unprocessed' products. Unlike with automotive fuels, no additives are added when blending marine residual fuel oils to enhance some aspects of performance.

Another factor that will undoubtedly affect the quality of residual fuel oils is the regulatory requirement to reduce shipping's SOx emissions. Today, the share of marine residual fuels with sulphur content below 1.5% m/m (for ECAs) is only a low percentage of all bunker fuel consumed globally. For this reason and as the fuel oil sulphur content of vessels operating in ECAs will further reduce to 1% on 1st July 2010, more low sulphur fuel will have to be made available with blending optimisation being one of the options.

Fuel oil specs/characteristics

Residual fuel oils have been thus far the most cost-efficient source of energy for large diesel engines. The majority of the bunkers supplied to vessels are delivered within specifications. Even when failing some specification, for example viscosity, the fuel can be suitable for consumption, but it may also happen that a fuel which conforms to the current specifications proves to be unfit for an engine and is causing on board handling problems or at worst engine damage.

We will focus on some of those fuel oil characteristics already included in the standard, or considered most relevant for the engine operation, as well as emerging issues affecting marine fuels.

Density, Al and Si

Whereas density is still used to calculate the correct quantity of fuel oil delivered, it is even more important for the on board fuel oil centrifugal cleaning where the principle of operation, or rate of separation of contaminants, is based on Stokes' law, which takes into account the difference in density between the particle(s) and the fuel oil, the size of the particle(s) and the viscosity of the fuel oil.

$$V_g = [d^2 (D_2 - D_1) / 18 \eta] g$$

d: particle diameter
D_2: particle density
D1: density of the fuel oil
η : viscosity of the fuel oil
g: gravitational acceleration

As density and viscosity vary with temperature, the correct separation temperature (98 deg C) is critical to achieve efficient separation. The flow rate of the fuel also contributes to the removal efficiency with a lower throughput being recommended with increasing fuel oil viscosity. It should be mentioned that proper maintenance of the centrifuge is also a contributing factor to the cleaning process.

Cleaning of the fuel is vital to remove impurities that enter in the fuel through the supply chain (water, iron) either are inherent to the fuel oil, such as catalytic fines. Catalytic fines are Al, Si particles originating from the catalyst used in the catalytic cracking process that enter into residual fuel oil with the decant oil blending stream. The current limit for Al and Si in ISO 8217:2005 is set at 80 mg/kg max.

The ability of the vessel to remove catalytic fines depends on the type of purifiers used on board. Modern, computerised equipment is capable of removing more of this material than traditional conventional type centrifuges. However, neither cleaning method is capable of removing all catalytic fines from the fuel. Engine manufacturers have their own recommendations as to what the maximum concentration of these contaminants can be when the fuel is injected into the engine. For Al and Si, a maximum limit of 15 ppm at engine inlet is common, with some recommendations even set as low as a maximum of 7 ppm.

Where it was common practice to put

conventional centrifuges in series operation- purifier followed by clarifier- operating modern computerised centrifuges in parallel configuration with throughput through each at half, enables achieving higher separation efficiencies.

Failing to reduce the catalytic fines or other contaminants to the recommended limits, can result in scuffing and wear of the fuel pump plunger and barrel, piston rings, cylinder liners and pistons.

Important to note here is, that even with optimum operating settings of the centrifuge, very small catalytic fines particles are more difficult to be removed from the fuel oil, and may result in higher amount of catalytic fines going into the engine and lead to increased risk of abrasive wear to the engine parts.

Stability and sediment

Today, fuels are marketed with the total sediment potential (TSP) guarantee of 0.1 m/m % max. TSP denotes the total amount of sediment (organic and inorganic) that can be generated in the fuel under normal storage conditions. It does not indicate whether the fuel is stable or not at a certain moment, nor what the current amount of sediment is in the fuel oil.

The sediment present in a heavy fuel oil at a certain moment is given by the total sediment existent test, but there is no certainty that this figure corresponds to the condition of the bulk of the fuel oil at the same time.

The biggest risk for a fuel to become unstable or to form organic sediment is due to potential coagulation of the asphaltenes molecules. Asphaltenes are polar, highly aromatic molecules kept in colloidal suspension in the fuel matrix. The asphaltene sediment formation is function of time and temperature and an unstable fuel oil will only reach its final sediment formation after a certain storage time.

With fuel oil blending, it is taken into account that the (cracked) asphaltenes present in the residual stream from the thermal cracking unit are sensitive to changes in aromaticity of the fuel matrix (for example, when adding a paraffinic cutterstock) and may agglomerate, flocculate to form sediment/sludge, resulting in the fuel to be unstable. This can be simulated in the total sediment accelerated (TSA) test where the residual fuel oil is subjected to a chemical ageing by adding a paraffinic hydrocarbon, cetane, (hexadecane) at a certain ratio. TSA therefore allows for a better indication of fuel oil stability towards sedimentation.

Fuel oils in which the asphaltenes have coagulated to form sediments and sludge can put the ship and its crew at risk: high amount of organic sediment can cause filter plugging, inefficient centrifugal cleaning but may also result in deposit formation in the fuel pump and injectors and inhibit proper atomisation of the fuel resulting in inferior combustion.

Stability should not be confounded with compatibility. Compatibility is a measure of how stable a substance is when mixed with another substance and thus indicates the tendency to form organic sediment when commingling different fuel oils. To limit the risk of asphaltenic sediment formation due to incompatibility of the different products, it is recommended to segregate different fuels to the largest extent possible. If commingling is unavoidable, it is recommended to check the

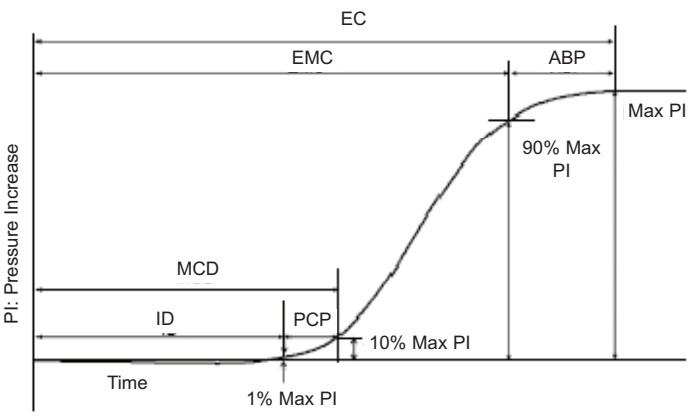


Figure 1: Combustion pressure trace FIA-100 FCA.

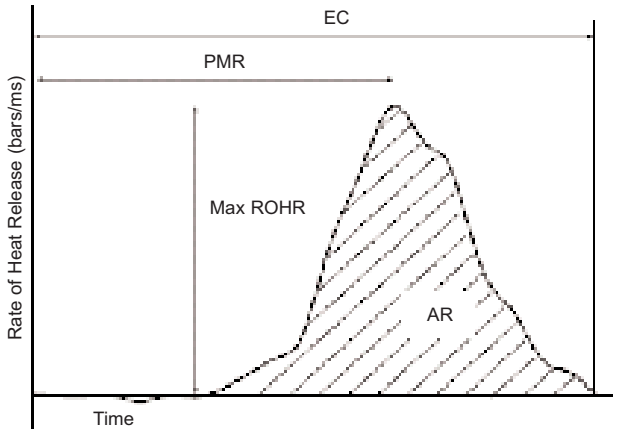


Figure 2: ROHR curve FIA-100 FCA [ref. 1].

compatibility of the respective fuels, or to reduce the mount of one fuel to a minimum before adding the second fuel.

Tighter fuel sulphur requirements will result in increased consumption of LSFO, which is by and large already produced by blending. As vessels may need to have different bunkers on board, switching between different fuels will be more frequent and add on to the risk of compatibility issues.

Ignition and combustion quality

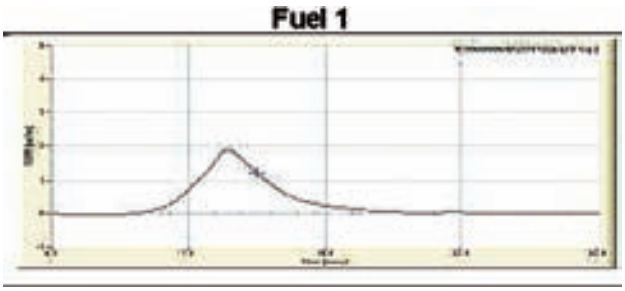
Although the ISO 8217 International Standard and the CIMAC fuel recommendations were developed to guarantee a certain fuel oil quality, ignition and combustion quality have not yet been properly defined, or standardised.

The ignition and combustion quality of a residual fuel oil plays an important role in the overall operational efficiency of a larger diesel engine. Heavy (aromatic) hydrocarbons tend to burn at a slower rate than light hydrocarbons and incomplete combustion may result in injector fouling, increased deposit formation on piston crowns, broken piston rings, liner and piston wear; soot build up on the turbocharger nozzle ring and in the exhaust system; and increased emissions of soot particulates.

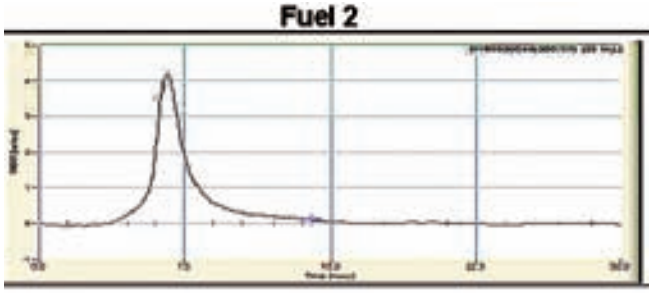
	Fuel 1	Fuel 2
Density 15 °C, kg/m3	**973.5**	**975.5**
Viscosity 50 °C, cSt	**379**	**370**
CCAI	**834**	**837**
Sulphur content, m/m %	**0.62**	**0.99**
IP 541		
ECN, Estimated Cetane number	**15.30**	**25.50**
ID, Ignition Delay	**6.91 ms**	**5.27 ms**
MCD, Main Combustion Delay	**8.06 ms**	**6.26 ms**
EMC, End of Main Combustion	**13.90 ms**	**10.84 ms**
EC, End of Combustion	**20.66 ms**	**17.82 ms**

Table 1: Comparison fuel oil characteristics Fuel 1 and Fuel 2.

For many years, the CCAI (Calculated Carbon Aromaticity Index) and CII (Calculated Ignition Index) were the only empirical tools available to predict, or evaluate the ignition quality of the fuel oil and are calculated values based on the fuel's density and viscosity. Experience has taught us that this does not always correlate with the performance of the fuel in practice. Engine type (medium speed vs slow speed) and design may have different impact on the combustion of a fuel oil. The load profile and condition of the engine also have an important role in the fuel's ignition and combustion process. A fuel oil within ISO 8217 specifications can burn perfectly in one engine, whereas for same engine on another vessel, it may cause problems.



Fuel oil with bad ignition quality and poor combustion characteristics



Fuel oil with acceptable ignition and combustion quality

Figure 4: ROHR curves according IP 541/06 (analysis performed by independent third-party laboratory).

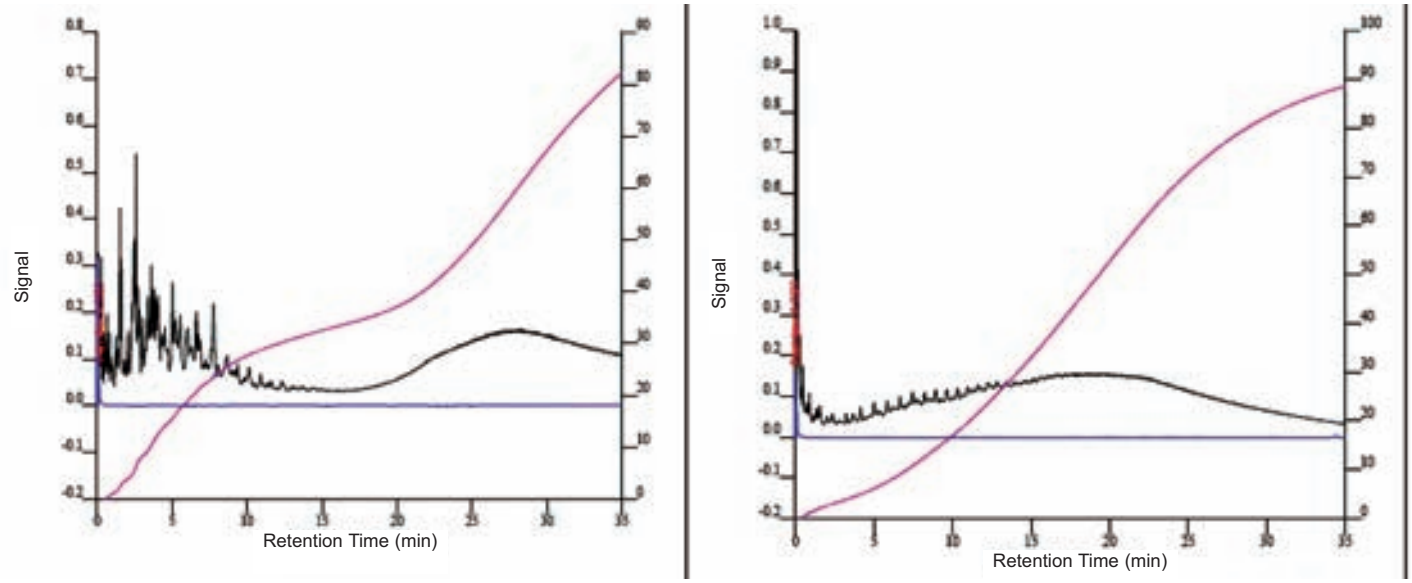


Figure 5: High temperature simulated distillation (in-house analysis).

Some years ago, a Fuel Ignition Anaslyser (FIA) test instrument was developed, based on a constant volume combustion technology, to establish the ignition quality of residual fuel oils based on a measured ignition delay.

According to method IP 541/06, a sample of residual fuel oil is injected into the combustion chamber, which is heated to 500 deg C and pressurised to 45 bar initial pressure using a mechanically activated conventional high-pressure fuel injection pump and a one-hole fuel nozzle.

During injection, the fuel spray self ignites and burns in the constant volume chamber. While in the combustion cycle, the pressure is recorded and the rate of heat release (ROHR) diagram is mathematically derived. The combustion properties of a fuel oil are evaluated by means of the Rate of Heat Release (ROHR) curve and are defined as illustrated in Figure 1 and 2.

A lot of work is currently being undertaken by the ISO 8217 Marine Fuels working group (ISO/TC28/SC4/WG6) and the Cimac Heavy Fuels working group to enhance the characterisation of ignition and combustion quality for residual fuels. This involves evaluation of more extended testing and correlation of obtained IP 541 results with field experience and fuel blend composition.

To illustrate how complicated this issue is, the testing data of two fuel oils both meeting ISO 8217 specifications are compared in Table 1. No operational problems were experienced by the vessels burning these fuel oils. The fuel oils have similar density, viscosity, CCAI but reveal a different combustion profile and blend composition.

Biodiesel

Over the last few years, environmental concerns have resulted in a voluntary or mandatory use of biodiesel in road diesel for passenger cars and heavy duty vehicles. Biodiesel refers to esters derived from vegetable oils (for example, palm oil, soybean oil, rapeseed oil) or animal fats (tallow oil) and is often referred to as FAME (Fatty Acid Methyl Esters).

Different type of biodiesel feedstock results in the biodiesel having different properties with oxidative stability, cold temperature behaviour and risk for growth of microbiological contaminants in the presence of water, being the more challenging ones. All FAME blended into EN 590 automotive diesel has to meet specifications as set by EN 14214.

FAME products are surface active and tend to absorb to surfaces, contributing therefore to the risk of cross contamination in multi-product supply lines.

The use of biodiesel in marine fuels is yet not mandated. Moreover, marine fuels marketed today according to ISO 8217 shall not contain any FAME component as ISO 8217 standard stipulates that marine fuels should contain only hydrocarbons derived from petroleum refining. As some of the multi-product supply pipelines can be used to supply marine fuels as well, the presence of trace concentrations of biodiesel in marine fuels can likely not entirely be excluded.

Also, blending biodiesel in marine fuels at a concentration comparable to automotive diesel, would undoubtedly require a more in depth evaluation to be carried out to assess potential impact of FAME on the storage and handling of the fuel on board a vessel.

Since there is today no accepted test method available to quantify biodiesel in marine fuels, assessment of limit values for biodiesel in marine fuels is yet not viable. However, as the ISO working group (ISO/TC28/SC4/WG6) is currently reviewing the international bunker standard, the issue of biodiesel trace level contamination in marine fuels is being addressed.

Today, the majority of the marine fuels is supplied within specification and consumed without any problems. With increasing demand for lighter distillates and the shipping industry facing tighter sulphur limits to reduce emissions from shipping, there will be changes in some of the quality aspects of marine fuel oils. In most recent years, some fuels, although tested to be within the ISO 8217:2005, failed to be fit for purpose.

The quality of marine fuel oils is definitely not restricted to those properties discussed in this article and as MEPC has requested the ISO working group to review the standard, we will likely see additional fuel oil characteristics and/or are emerging issues being addressed in the fourth edition of ISO 8217. TO

**** This article was taken from a paper written by Chevron's Monique B Vermeire.***

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[1] Fueltech AS, 'FIA-100 FCA-Fuel Combustion Analyzer for heavy fuel, fuel combustion properties and fuel quality'.

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NESTE OIL

Arctic rules needed despite activity slowdown

There are an estimated 90 bill barrels of oil and 1,670 trill cu ft of gas equal to 22% of the world's undiscovered, technically recoverable hydrocarbon resources in the Arctic region alone, according to a UN geological survey dated July 2008.

As research and development in the area progresses, the eight member Arctic Council is pushing for rules and regulations to control vessels trading into the area. The current members are Canada, Denmark (including Greenland and the Faroe Islands), Finland, Iceland, Norway, Russia, Sweden and the US. In the future, it was thought that more countries could join this body.

In May of this year, the eight Arctic Council Ministers signed the Tromsø Declaration. This outlines the guideline for the work in the Arctic Council the next two years.

The Arctic Council previously met at foreign minister level every second year, approving projects and guidelines. Due to the increased activity and interest in the Arctic, the Tromsø meeting decided that the Arctic Council from now on would meet at a political level every 12 months. Denmark recently took over the chairmanship of the Arctic Council from Norway.

As for the details on the recommendations adopted by the Arctic Council, these included:

Search and rescue: As maritime activities in the Arctic increase, there will be increasing need for search and rescue services in the area. The Arctic Council therefore agreed to negotiate an international instrument on co-operation on this issue.

Arctic shipping guidelines: The Council also urged the IMO to ensure adoption of updated and binding guidelines for vessels operating in Arctic ice-covered waters and to support the development of mandatory regulations on safety and environmental protection for Arctic waters as a matter of urgency.

Infrastructure safety: The Council also approved a Russian proposal to 'develop safety systems for economic activity and infrastructure projects in the Arctic'. Norway and Russia will take the lead in this project.

Oil and gas: The Council also revised the guidelines for oil and gas exploration in the Arctic, including procedures and minimum standards.

Task force on short-lived non-CO2 drivers: The task force on non-CO2 drivers of climate change will identify measures to reduce emissions of these substances and recommend immediate actions, at the same time recognising the role of short-lived non-CO2 drivers of climate change, such as black carbon, methane and tropospheric precursors in Arctic climate change.

Ocean management: A project on best practices in ocean management has resulted in advice on principles for ecosystems-based ocean management.

The road to Copenhagen: The Arctic Council also agreed to report to the Conference of the Parties to UN Framework Convention on Climate Change (COP-15) from the project 'Snow, Water, Ice and Permafrost' in the Arctic.

Ice Melting: The Arctic Council decided that it will co-operate with the task force established by the co-chairs of the ice melting conference, which will contribute a report on ice melting to the Copenhagen meeting.

In addition, the Council received final reports with recommendations from several projects on climate change, the International Polar Year, the Arctic marine environment, human health and human development, energy, contaminants and bio-diversity.

Speaking at this year's 5th Arctic Shipping Summit held in Helsinki, organised by Informa Maritime, Dr Olav Orheim of the Norwegian Research Council warned that operators considering making use of Arctic waters should concentrate 50% of their efforts on the strength of the ship and 50% on the competence of the masters and crew.

A survey undertaken four years ago by Fearnleys Consultants and Fearnresearch estimated oil shipments from Murmansk, Indiga, Prirazlomnoye, Varandey and Dickson up to 2012. Due to a slowdown and apparent abandonment of various projects, the total Arctic crude oil volumes forecast has dropped by around 80%.

According to Fearnleys' presentation at this year's Helsinki Arctic Shipping conference, the current status is –

Varandey – The new terminal is in place. However, only 150,000 barrels per day are planned for this year.

Prirazlomnoye – This project has been further delayed. The earlier start up date is now late 2011 with leak production not until 2016.

Dickson – There are currently no plans or projects on the drawing board.

Indiga – The output forecast has been reduced to 240,000 barrels per day - no timescale has been set.

Since 2005, the two most tonnage intensive projects have been called off – Dickson and Indiga – while Varandey (downscaled) and Prirazlomnoye are already covered by newbuilding ice class tankers.

For example, the three Samsung built *Vasily Dinkov* class shuttle tankers are already operating on the Varandey/Murmansk project, while the two St Petersburg-built shuttles are due to enter service in August 2009 and April 2010, respectively between Prirazlomnoye and Murmansk. Thus far, no new tankers have been ordered for the Barents Sea, or neighbouring projects and there are very few, if any, projects due to come on stream in the next five years, Fearnleys stressed.

Several speakers at the Arctic Summit expressed concern about search and rescue

DNV's ice load monitoring project is to be applied to vessels and offshore structures, such as Arctic friendly drillships.

(SAR) in the area. There are an increasing number of storms of up to hurricane force in the Arctic and if a vessel has a problem, it would be almost impossible to reach it through the ice in rough weather. An Arctic regional SAR MOU has been signed by the UK, Denmark (Greenland), Iceland, Norway, Russia, Canada and the US.

Barents 2020

The trouble with navigating in and around the Barents Sea is that the area is not uniform in terms of ice and metocean conditions.

The Barents Sea is broken down into eight sub-areas, one - the Norwegian sector - which includes Murmansk, is generally ice free, but the other seven sub-areas normally see ice each winter.

According to DNV's programme director for cold climate shipping, Morten Mejlaender-Larsen, speaking at the Arctic Shipping Summit in Helsinki, the main challenges involve working in low temperatures, ice, darkness, remote locations and in a vulnerable environment.

He then gave an outline of a two-year project, dubbed Barents 2020, which aimed at establishing a dialogue between Russian and Norwegian experts in order to harmonise industry standards in the Barents Sea.

He started off by explaining that Barents 2020 is a bi-lateral project between Norway and Russia, initiated to identify and agree upon common industry standards for safe operation of oil and gas activities in the Barents Sea.

All activities relating to oil and gas are included, whether they are, or will be located on the Russian, or Norwegian sector. The aim is to ensure that these activities are carried out with an acceptable safety level as seen in the North Sea.

The first stakeholder meeting was held in January 2008. Seven critical HSE topics were identified addressing safety critical issues for operations in the Barents Sea. Each topic will be addressed by working groups consisting of four Russians and four Norwegians. Each group were due to meet in at least three, or four workshops this year.

The expected results are –

- Common and agreed references to recognised international standards, which may be used in the Barents Sea.
- Harmonised comments to standards and practices, which need to be revised due to Barents Sea challenges.
- Concrete proposals for revisions and amendments to key industry standards.
- Suggestions for any amendments to national and international regulations to allow the application of industry standards proposed by the working groups.
- Proposal to IMO/ILO submissions – IMO guideline to be mandatory.
- Based on risk evaluation, identify research and development needs in areas where current knowledge is insufficient.

The challenges for the rules and regulations are that the maritime transportation is based on classification society ice rules and international regulations. However, some Russian regulations were perceived to be strict, while international standards were generally written for worldwide application and would need to be addressed for Arctic challenges.

Barents Sea standards will require site and route specific data on environmental conditions and loads. A major problem was that most of today's industry had little Arctic experience.

Many of the rules and regulations were issued pre ISM, but now the shipowner/manager is responsible for the operations, including seafarer health and safety plus pollution prevention.

To maintain the same risk in increased consequences, the accident/incident probability needs to be reduced. The technical specifications for Barents Sea projects will have to reflect this, Mejlaender-Larsen said.

Ice load conditions

For the past three years, DNV has been developing technological solutions for ice load monitoring (ILM) to enhance safety and regularity for ship operations in a cold climate.

This project culminated last year after the development of a comprehensive decision support tool for transiting ice. This ILM system was tested during the past two winter seasons on board the Norwegian Coast Guard cutter *Svalbard*, which operated extensively in different Arctic ice conditions.

Mejlaender-Larsen explained that it was important to develop and test the system over

Barents 2020's working group topics this year

1) **Recommend the basic list of internationally recognised standards for use in the Barents Sea.**
2) **Recommend standards for design of stationary offshore units against ice loads.**
3) **Recommend standards for risk management of major hazards, such as fires, explosions and blow-outs on offshore drilling, production and storage units.**
4) **Recommend standards for evacuation and rescue of people from ships and offshore units, including standards for rescue equipment.**
5) **Recommend standards for working environment and safety related to human performance and decision making (human factors).**
6) **Recommend safe standards for loading, unloading and the transport of oil by ship to minimise risk of accidental oil spills.**
7) **Recommend standards for operational emissions and discharges to air and water.**

Morten Mejlaender-Larsen, DNV's ice expert.

an extended period of time under different ice conditions, since they are so variable that it was necessary to ensure that the ILM was working under different sets of circumstances.

Real time ice load information includes the use of fibre optic sensors, which are suitable for installation in gas dangerous spaces. These measure the vessel's shear hull strain in ice conditions.

Their relatively small size means that they can easily be installed on girders and stiffeners in all parts of the hull. Mounting the sensors on girders, or stiffeners helps to ensure that the measurements shown are not distorted by local vibrations, caused by deck equipment etc.

Sensors are fastened with adhesives for the optimal stress transfer from the hull surface and they can be incorporated in the vessel's coating regime with an unbroken membrane covering the sensor and the surrounding metal. Fibre optic sensors have a number of advantages over electrical alternatives, especially in harsh environments, he said.

An electro-magnetic ice measuring device also measures the thickness of the ice around the ice belt in way of the vessel's bow. This was developed by the Alfred Wegner Institute in Germany.

This information is analysed and displayed on the vessel's bridge in an ILM screen system. Both the real time values and statistical values are available. A separate window showing the time history and trends of different parameters and the correlation of the different parameters can also be displayed.

These parameters are displayed in real time and can be used for showing the ice thickness and corresponding utilisation factors for the different sensors.

In addition, ice meteorological and satellite data is integrated into electronic charts allowing for optimum route selection.

"Real time ice load information is essential to avoid damages," Mejlaender-Larsen said, writing in DNV's *Arctic Update* magazine. The system is providing simple but essential information to the bridge about acceptable loads, borderline loads, or overloads, which translates into go ahead, caution or reduce speed/stop.

DNV is currently involved in major projects where ILM will be applied, both for vessels and offshore structures, as decision support for ice navigation and management.

This project was led by DNV and supported by the Norwegian Research Council. Other partners included Teekay, Statoil/Hydro, Light Structures, the Norwegian Meteorological Institute, C-Map/Jeppesen and the Norwegian Coast Guard. TO

From Finnish-Swedish rules to Unified Requirements

US class society American Bureau of Shipping (ABS) was the first class society to approve a commercial oil tanker for ice navigation in the Arctic during the mid-1960s.

The vessel in question was the converted *Manhattan*, an Aframax class of vessel, as it would have been called today.

ABS was also the first class society to class an LNGC for which an ice class notation was included. This was the *Methane Polar* built in 1969, which is still trading today as the *SCF Polar.*

The early requirements were prescriptive, based largely on the accepted Finnish-Swedish Ice Class Rules that resulted in the traditional ice class A, B and C ratings. The standards specified a percentage increase in scantlings above normal class requirements, together with structural reinforcement through intermediate framing of the critical areas, particularly in the forward part of the hull.

In 1971, the Finnish-Swedish Ice Class Rules were completely revised, establishing design ice pressures for the corresponding ice ratings together with engineering equations for plating, framing, longitudinals, stringers, decks and bulkheads in the ice belt. Requirements for machinery, shafting, propellers, rudders and steering systems were more directly addressed.

The ice ratings were also expanded and redefined as 1A Super, 1A, 1B and 1C. These revised class rules were adopted by ABS and several other class societies with identical ice classes noted as 1AA, 1A, 1B and 1C.

In 1980, the ABS rule development department began the development of general class rules to establish improved requirements for worldwide operation, ranging from those applicable to the highest class Polar icebreaker to the more modest strengthening required for commercial vessels operating in first year ice.

This project involved a comprehensive review of the ship ice technology available at the time and reference to a database of 33 operating ice class vessels, including the highest class Arctic icebreakers. Reference was also made to the Canadian Arctic Shipping Pollution Prevention Act, the Russian Register rules and the prevailing Finnish-Swedish Ice Class rules.

The resulting ABS rules were the subject to wide ranging reviews by industry and governments, prior to their formal adoption in 1985. These standards, subsequently updated and expanded to reflect improvements in technology and in-service experience, provided the bedrock of the ABS rules for ships navigating in ice covered waters until early 2008.

At that time, ABS issued the 'Guide for Building and Classing Vessels Intended for Navigation in Polar Waters' that incorporates

The start of the modern day ice class approval process.

the results of a multi-year, joint research effort by IACS members into the demands that would be placed on a new generation of large commercial vessels that were expected to be built for the extraction and transportation of the vast energy sources thought to exist in the Arctic region.

These IACS requirements were issued as Unified Requirements (URs) concerning Polar class (URs 1, 2 and 3) that address both structure and machinery with a particular emphasis on propeller and shafting requirements. They apply to vessels contracted for construction on or after 1st March 2008.

The new ABS guide and IACS URs include ice load definitions, as well as specific strength requirements for plating, framing (including web frames and load carrying stringers), plated structures (such as decks and bulkheads) and the hull girder. The guide also includes material requirements for hull appendages, stem and stern frames, as well provisions for local details. Direct calculations and welding are also contained in the new criteria.

Both open and nozzle propellers are addressed, including design ice thickness and a strength index for calculating propeller blade strength. It also defines accelerations imposed upon machinery due to ice impact/ramming so that the integrity of the arrangements for securing essential machinery is maintained.

The new IACS URs and ABS guide are both based upon the lowest Polar class having a general level of oil strengthening roughly comparable to the Baltic 1A class, with the intention that a vessel conforming to the lowest Polar class should automatically have sufficient strength to meet the Baltic requirements.

The highest Polar class is intended to offer a level of capability for a vessel to operate year-round in all Polar regions with due caution on the part of the operator with respect to limiting the vessel's speed in severe conditions, avoiding aggressive manoeuvres, impacts with glancing ice features and other operational risks.

Assuming the same ship configuration (identical hull form and frame spacing and span), experience shows that the highest Polar class (PC 1) should have around 250% greater shell plating thickness and a 700% greater frame strength requirements (shear and section modulus) compared to the lowest Polar class (PC 7). Based on this assumption, seven total ice classes are defined with plate thickness increasing by about 14% increments and the frame strength by around a 32% increment from one class to the next highest.

Each Polar class is defined in terms of its operational service limitation. The definitions are generic, as the vessels in any of the classes may operate safely in a wide range of actual conditions, depending on season and area.

In formulating ice class requirements, the IACS members examined design scenarios, such as ramming, glancing, pressure and estimated ice loads from vessel, ice and operational parameters. Service experience with existing ice strengthened vessels built to previous ice class rules suggests that glancing, ramming and pressure scenarios should be considered in developing strength requirements for Polar classes.

Two sets of equations were adopted in the applicable Polar UR to represent the structural requirements for the bow area to sustain ice loads due to glancing and ramming. The glancing scenario would set the local scantling requirements for the bow area, while the

It is not only the hull that needs to be considered in ice conditions. Photo credit LR/PRISCO.

ramming case would be related to the longitudinal strength requirements. Since it is not practical to define the characteristics of design scenarios for all hull areas, most hull area strength requirements are defined as percentages of the bow area strength. The ice loads caused by a pressure scenario, which is quite difficult to define, are assumed to be encompassed by the defined Polar UR ice loads.

Ice loads for the ramming and glancing scenarios are determined by a set of ship parameters and a set of ice property parameters and an operational parameter – the speed at which the ship impacts the ice. The ship parameters include displacement hull form at point of contact and effective added mass due to the impact. The ice parameters include crushing strength, flexural strength, ice thickness and local ice-edge geometry at the point of contact. The combinations of ice parameters and the vessel speed are chosen to characterise the ice conditions for each Polar class.

All of the structural design requirements are based on the Polar UR load model. This model assumes a load patch of constant intensity in vertical direction, peaked longitudinally. For use in plate, frame and grillage design, the load representation is simplified as a uniform rectangular patch. Within the ice strengthened areas, it is assumed (and required) that stiffeners terminate in a manner that provides full fixity. Intersections with deep members, decks, bulkheads etc, are designed to provide sufficient connectivity to offer the same restraint.

While most traditional ship design rule formulations are based on elastic criteria, the structure requirement for vessels under ice loads uses a plastic design method. Requirements for both the shell plate thickness and frame strength in the Polar UR take into account plastic designs, such that under the design ice load, the shell plate and frame should be within acceptable limits.

For plating, the design loads governing the requirements should correspond to the load when the first plastic strain occurs in the structure. An ultimate strength margin factor was used to determine the limit state level. For framing, the energy method was used to formulate limits. To derive the plastic limit state, several possible energy-absorbing mechanisms were considered, including a pure bending hinge, a combined shear/bending hinge and a shear hinge. Additionally, unlike all other Ice Class rules, the Polar UR gives a requirement for the vessel's overall longitudinal strength to account for the global ice load due to ramming thick ice features.

These new rules unify and clarify ice-strengthening requirements, regardless of the flag or operational area of the vessel, greatly simplifying the operational flexibility of these vessels to trade internationally.

Unresolved issues

IACS has formed a hull panel to address certain issues with the URs. ABS said that it had targeted these issues and included guidance where appropriate in its revised 2008 edition of 'Guidance Notes on Ice Class'.

The main topics include –

- Icebreaker; the highest Polar notation (PC 1) was for year round operation for a commercial vessel in all Polar waters. However, the criteria did not specifically address icebreakers.
- Stern requirements for double acting vessels (DAVs); IACS Polar hull panel considered that requisite scantling for the stern area of a DAV needed further study and clarification.
- Ice loads for hull forms other than icebreaking forms were to be defined.
- Grillage strength for structures under ice loads were to be further assessed.
- Additional inertia loads caused by vessel/ice interactions for those structures not directly contacting ice were to be identified and studied. These structures include for example, the inner skin bulkhead and the containment system of LNGCs.
- Requirements for the arrangement and for the scantling of load distributing stringers were to be addressed.
- Loads on appendages caused by ice were to be defined.

Finnish-Swedish rules

As for the Finnish-Swedish Ice Class rules (FSICR), Finnish Maritime Administration senior maritime inspector, Jorma Kamarainen explained at the 5th Annual Arctic Shipping Summit in April that 1A Super and 1A were needed for year-round navigation in the northern Baltic Sea area, while 1B and 1C were sufficient for year-round navigation in the southern Baltic Sea region.

Vessels sailing to Finnish ports in winter should have adequate engine power, enabling icebreaker assistance, if required, to be rendered in the shortest possible time. The minimum engine power regulations were also a safety issue, he said.

Minimum engine power is defined as a requirement to steam at five knots or over in the following brash ice channels –

1A Super = 1 m and a 0.1 m thick consolidated layer of ice.
1A = 1 m
1B = 0.8 m
1C = 0.6 m

The required minimum engine power can be determined based on formulae for vessel resistance in a brash ice channel and the formula for the engine power.

Due to the IMO developing an Energy Efficiency Design Index (EEDI), there may be limits put on future engine power. Therefore some flexibility may have to be built into the rules for minimum engine power, Kamarainen said.

Obviously, the hull areas of a vessel coming into contact with the ice have to be strengthened against ice loads. However, it is recommended to avoid excessive structure strengthening on economic grounds. A vessel's frames must be stronger than her plates.

Both the Finnish and Swedish Maritime Administrations started to revise chapter 4 and 5 of the ice class rules in 2006 by inquiring of class societies of problems associated with the implementation of the existing rules.

In response to IACS, the administrations are considering amending certain rules this year and next. These will include –

- The vertical extent of the ice belt.
- The influence of vessel size on the ice pressure.
- The requirement for the frames web thickness.
- The stem area definition.

As for the propulsion machinery, these cover open and ducted type propulsors with CP or FP design. The given loads are the expected ice loads for the entire vessel's service life under normal operating conditions.

However, off-design operational conditions are not covered, for example, when a stopped propeller is dragged through the ice.

The regulations also apply with some restrictions to azimuthing and fixed thrusters used for the main propulsion concerning loads resulting from propeller-ice interaction, but ice load formulae for ice impacts on the thruster bodies are not yet available.

The new propulsion regulations were adopted in 2008. In these new rules, ice loads and ice loading cases are given for the design of the propulsion machinery elements. The methodology for fatigue analysis is also explained.

Kamarainen admitted that there was a need to develop regulations for azimuthing propulsors. He also said that there were problems with large tanker hull structures and the rules needed to be developed further.

First year ice

Lloyd's Register (LR) has also been actively involved in the key changes in the future requirements for operating in cold climates, especially machinery requirements for sailing in first year ice.

First year ice forms each year in the St Lawrence area and in the Baltic meaning that vessels transiting these areas require additional ice strengthening. While sailing in these waters, a vessel's propeller is frequently exposed to ice impacts and therefore, a key component of ice class rules is the propeller's protection.

Many initiatives have focused on propeller integrity and the consequences for propulsion system loading when navigating in ice. When estimating the propulsor loadings, as well as making due allowance for the variability in the mechanical properties of the ice in the intended regions of ship operations, it is necessary to consider the propeller's interaction with the ice and in particular, whether this is of a milling, or impact nature.

Of equal importance is the ice's interaction influence on the other shaft line components due to bending and radial forces produced by the ice loads on the propeller.

The major revision of the December 2008 Finnish Swedish Ice Class Rules was the propeller requirements. These now provide an explicit ice load that is applied to the propeller blade and modelled using Finite Element Analysis to accurately predict the response.

This methodology is also the same as currently used in the IACS Polar Ship rules, which brings further harmonisation and transparency to the ice class rules, LR said. Writing in LR's *Ice Focus* supplement, Andrew Smith, LR's global technology leader for engineering systems, who was instrumental in the development of the machinery requirements, said; "The development of the propeller requirements will allow the further advancement of ships designed for ice and allows the propellers and associated machinery to be designed to the latest methodology and ice loads.

"This will enable future ships to navigate in first year ice conditions safely, protecting the crew, ship and environment."

The new requirements come into force in January 2010. However, the Finnish Maritime Administration will accept ships designed to the new standard before this date. LR said that it will be amending its ice class rules this year to align with the new requirements and reflect the changes. TO

PRISCO's new MRs were built to LR's Winterisation notation (see page 28). Photo credit LR/PRISCO.

Ice class expertise called into action

Sovcomflot's (SCF) Captain Igor Pankov, SCF's vice president safety and quality, gave an insight to operational experience, crew training and management of Azipod propelled ice class tankers at the 5th Arctic Summit, organised by Informa Maritime and held in Helsinki in April 2009.

First, he outlined the challenges of operating in the Arctic region where more than 20% of Russian territory (6 mill sq km) is located north of the Polar circle with more than 1 mill people living in the region.

Second, he explained what all the fuss was about. Oil and gas resources in the Russian Arctic and sub-Arctic regions are the world's largest outside OPEC countries and account for 90% of Russian gas reserves and 60% of her oil reserves.

Unlocking the Arctic's potential is a challenge requiring expertise, dedication, commitment and specialist vessels, as well as ice trained crew and shoreside backup teams, he said. Among the challenges are –

- Low ambient temperatures down to -50 - -60 deg C.
- Waters ice covered for at least eight months of the year..
- Ice up to 3 m thick presents a major hazard to navigation.
- Underdeveloped infrastructure.

Russia uses various organisations to provide assistance with safe Arctic navigation and ice management, including the Arctic Hydrographic Office in St Petersburg, which produces aids to navigation, hydrographic surveys, contributes to publishing charts and Arctic pilotage.

In the same city is the Arctic & Antarctic Research Institute, which undertakes ice related research and provides other information, such as ice charts.

The ice operations headquarters (Rosatom) is located in Murmansk. This organisation provides the planning, co-ordination and provision of large icebreakers, including helicopter ice patrols.

Finally, Morsvyasputnik (Moscow) operates the additional safety net of promulgating navigational warnings and relaying other safety information thought its satcoms service.

Some 20% of SCF's 133-vessel fleet is ice class – 16 vessels are assigned ice class 1A or 1A Super, while 11 vessels are ice class 1B or 1C. SCF is also the world's leading operator of ice class shuttle tankers, Pankov claimed.

The first two, the IC class Aframaxes *Viktor Konetsky* and *Yuri Senkevich*, were delivered in 2005 and operate out of Sakhalin 1. The next trio – the IA Super class *Vasily Dinkov, Kapitan Gotsky* and *Timofey Guzhenko* were delivered in 2008-2009 and were built for Varandey offshore loading operations, while the last two – the 1A Super class *Mikhail Ulyanov* and the *Kirill Lavrov* will be delivered in 2009-2010 for transporting crude from Prirazlomnoye.

SCF has signed various agreements with the Russian government institutions involved in ice navigation. One of the first was signed on 7th June 2007 with Rosmorport, which called for the development and provision of port-related services, plus interaction in providing icebreaker assistance.

On 15th May 2008, another agreement was signed with Rosatom whereby icebreaking assistance in Arctic Sea waters, including the Northern Sea Route (NSR) was made available and consultations could be held on the technical management of the icebreaking fleet.

Pankov then outlined the operations at Varandey (see page 53), which by 28th April this year had seen 4 mill tonnes of oil shipped much of it going to the large FSO *Belokamenka* located in Kola Bay near Murmansk, for onward transhipment.

The first vessel to operate from the Varandey offshore ice-resistant terminal (FOIROT) was the 70,000 dwt *Vasily Dinkov* like her sisters fitted with twin 10 MW Azipods, which loaded on 9th June last year, closely followed by the *Kapitan Gotsky* on 31st July 2008. The third in the series, *Timofey Guzhenko,* arrived at Varandey to load her maiden cargo on 23rd April this year.

She and her sisters are dual Russian and ABS classed assigned a 1A Super (LU6) notation with an icebreaking capacity of 1.5 m unassisted at about three knots. At the FOIROT, one icebreaking tug and one icebreaker are employed. These give assistance when needed, including towing, enable the transfer of pilots and loading masters and will deliver support in an emergency, including oil spill response. The tug is made fast to the tanker's stern and is on standby for pulling the tanker off the terminal during loading operations in the summer months. Eight people are employed as emergency oil spill responders – four on the tug and four on the icebreaker.

A sophisticated computer controlled approach and mooring system is used to berth the tankers at the loading terminal and once the loading line is attached, the vessels' positions are constantly monitored. The mooring operation can be completed in 30-50 minutes. In heavy ice, the tankers cast off from the platform and wait for completion of a tide change.

As for ice condition monitoring, annual long term forecasts are used, as are medium terms forecasts giving the forthcoming season and/or month. Current ice conditions are monitored two or three times per week and short predictions are also given. Masters also add their reports using dedicated formats.

The third vessel is acting as a floating laboratory for a project instigated by a partnership involving SCF, ConocoPhillips, ABS and Samsung. She was fitted with fibre optic sensors in the bow and stern shoulders on the ice belts to measure and record ice pressures and loads to compute the hull structure's ice-induced responses at highly loaded locations. A bridge display depicts a colour plot of the pressure distribution over each area. This display is fitted with an alarm to alert the crew of any major impacts.

The system continuously scans all strain gauges. A recording of strain time histories is

triggered when a high impact occurs. The system records –

- Time histories of all strain gauge signals.
- Derived pressure time histories.
- Calculated critical stresses and impact severity for each high impact.
- Navigational data – GPS, location, speed, wind.
- Propulsion data – Rev/min, pod angles, torque, etc.

An on board camera is also available.

The bridge display also includes the severity of the 10 largest impacts and the expected maximum stress.

Pankov explained that this system leads to safer operations in that it shows the operator the structure's margin of safety in encountered ice conditions and also shows the safe speed. It also provides an alarm function. He also said that it also helps to operate the vessels more efficiently by way of showing the optimum speed for better fuel economy in ice and it also leads to less downtime for repairs etc.

He also claimed that the system provided a full understanding of the vessel's performance, including design adequacy and provided data for future design developments (Arctic technology development) and rules development.

Training also formed an important function for the personnel to be employed on the shuttle tankers. For example, the senior officers to be employed on the first two tankers were sent for hands on training on board the Azipod propelled multipurpose vessel *Norilskiy Nickel* between March and May 2007.

ABB (the manufacturer of the Azipod system) held a training course in September 2007. Included was a general course for senior deck and engineer officers, a course for marine high voltage safety for engineers and a detailed large Azipod engineering course. Hands-on bow loading system training for masters and chief officers took place in October and November 2007, on board vessels engaged in the Sakhalin-1 Project.

For relieving seafarers and for those taking over the third vessel, shore-based training was undertaken at the Admiral Makarov Academy in St Petersburg and on board overlap training was held for one to two months.

The extent, scope and facilities used in the training were agreed with the charterers and other interested parties well in advance. Pankov stressed that extensive ice navigation experience is a must for all candidates for the senior deck officer positions.

The world's first ice simulator was introduced at St Petersburg, sponsored by SCF. Future officers start ice training in the academies two or three years before joining SCF vessels. The company is also establishing an *ad hoc* Ice Advisory Service at St Petersburg, where experienced ice captains may be on-call acting as ice pilots and assisting with the provision of training for junior deck officers. SCF is also putting together what it calls an ice captains league.

Pankov concluded by saying that Varandey had proved to be a success and warned that short term profit driven projects in the Arctic would not survive as investments require considerable support resources. Even the largest international companies would require partnerships and/or co-operation agreements, he stressed.

Varandey background

Large scale oil exports from the Varandey offshore terminal, on the Barents Sea coast in Russia's Arctic region, began in the first half of 2008. This followed construction of a new offshore oil export terminal, which has a throughput capacity of up to 12 mill tonnes per annum (240,000 barrels per day). The terminal enables exports from the oil wells operated by Naryanmarneftegaz, a joint venture between Lukoil and ConocoPhillips, located in the Timan-Pechora oil producing province of northern Russia.

Large scale oil exports from the Yuzhno Khylchuyu field in the Nenets Autonomous District of the Timan-Pechora province pass through a new 159 km heated pipeline (530 mm in diameter) to the Varandey oil terminal. Oil then passes through a fixed offshore ice-resistant oil terminal (FOIROT), from where it

Gently does it! A shuttle tanker approaches Varandey.

is loaded onto the specially designed trio of 70,000 dwt icebreaking shuttle tankers, owned and operated by SCF. The oil is then exported to the European and North American markets.

In less than three years, a transport infrastructure was constructed to enable oil to be exported by sea from the Yuzhno Khylchuyu oilfield in Northern Russia. This required close co-operation between Lukoil, ConocoPhillips and SCF in the development of an integrated logistical system for the year-round seaborne transportation of oil.

All components of the transport infrastructure are capable of operation in severe winter temperatures (down to minus 40 deg C). This has necessitated the use of a heated pipeline, a special fixed offshore ice-resistant oil terminal and the use of icebreaker shuttle tankers of sufficient size to enable the desired export levels to be maintained.

Faced with Arctic operating conditions and an extremely sensitive Arctic environment, specialised loading systems were installed on both the export terminal at Varandey and the SCF vessels. These systems were designed to operate within zero spills and incidents.

SCF's Arctic shuttle tankers used to ship oil year-round from Varandey, incorporate the most advanced and unique technical features. These include a capability to break ice up to 1.5 m thick without icebreaker assistance and the ability to operate in temperatures down to minus 40 deg C. The ships have an ice-enhanced hull structure, designed in accordance with LU6 (1A Super) ice-class, under the classification of the RS. The tankers each have two Azipod propulsion units, with a total power output equivalent to 20 MW, a dynamic positioning system for use in ice and a helicopter pad.

This export system makes it possible to transport large quantities of oil to/from Polar regions, using a new Russian transportation corridor that enables exports of oil at a minimum cost. The transport infrastructure preserves the quality of the oil, incorporates multiple environmental safeguards and uses the shortest sea route to European and North American export markets.

The new Varandey oil export facility became fully operational on 9th June 2008 when SCF's *Vasily Dinkov* began her maiden voyage bound for Come by Chance in Canada. *Vasily Dinkov* and *Kapitan Gotsky* made 30 voyages from Varandey last year transporting more than 2 mill tonnes of crude oil.

Sovcomflot invested $450 mill in the construction of the three new 70,000 dwt icebreaking Arctic shuttle tankers. This was in addition to the multi-billion dollar investment by Naryanmarneftegas and its shareholders Lukoil and ConocoPhillips, in the upstream development of the Yuzhno Khylchuyu oilfield in the Timan-Pechora oil basin and the transport infrastructure at Port Varandey, on the Barents Sea coast.

Prirazlomnoye background

Located in the Barents Sea off Northern Russia, Prirazlomnoye is an offshore oil field. In 2005, Gazprom, SCF and Sevmorneftegaz agreed to co-operate to provide the transportation to enable seaborne exports from Prirazlomnoye to start in 2011.

SCF subsequently concluded two 25 year timecharters with Sevmorneftegaz. This provides for the transportation oil from the Prirazlomnoye offshore field to the transhipment point in Murmansk, or directly to oil refineries in Northern Europe. It is anticipated that the maximum annual volume of oil shipments will amount to 6.5 mill tonnes.

To serve Prirazlomnoye, SCF ordered two 70,000 dwt double acting Arctic shuttle tankers from the Admiralty Shipyard in Russia - *Mikhail Ulyanov* and *Kirill Lavrov.* The vessels are due for delivery in 2009/10.. It is also the first time a Russian yard has incorporated ABB's Azipod propulsion system.

Each vessel will be equipped with two 8.5 MW Azipod units enabling them to operate at 3 knots in first year ice of up to 1.2 m thick.

The vessels have a length overall of 259 m, a moulded breadth of 34 m and a draft of 14 m. They are being built to dual classification standards (RS and Lloyd's Register, including the notation LU6 1A Super ice class).

Sakhalin II background

Sakhalin II is the world's largest integrated oil and gas project and is being constructed from new in Sakhalin Island, located in the sub-Arctic region of Russia's Far East.

The project is backed by Gazprom, Shell, Mitsui and Mitsubishi and incorporates Russia's first LNG plant and associated export facilities.

In 2004, a Japanese-Russian consortium was established by NYK and SCF to ship LNG from the Prigorodnoye terminal, near Yuzhno-Sakhalinsk in Russia, to Japan, South Korea and Baja California (Mexico).

Orders were placed with Mitsubishi Heavy Industries for two ice class LNGCs fitted with four Moss-type spherical tanks, providing a total cargo capacity of 145,000 cu m. The vessels, *Grand Elena* and *Grand Aniva* were delivered in October 2007 and January 2008 respectively and they began exporting LNG from Sakhalin II in 2009. They are each engaged on 20 year timecharters.

The vessels are the most technologically advanced within the SCF fleet and are among only a few vessels of a similar specification and capability in the world.

Principal Particulars - *Timofey Guzhenko*

RS class – KM* ARC6 (2) AUT1 Oil Tanker ESP
ABS class - +A1(E), "Oil Carrier", Ice Class 1AA, SH, SHCM, +AMS, +ACCU, VEC, SPM, NIBS, ESP, TCM

Built	**Samsung Heavy Industries**
Delivered	**24th February, 2009**
Owned/Operated	**Sovcomflot Group**
Managed	**Unicom Management Services**
Deadweight	**70,000 t**
Loa	**257 m**
Beam	**34 m**
Depth	**21 m**
Dft	**14 m**
Tank Capacities	
Cargo	**85,300 cu m**
Water ballast	**37,460 cu m**
Propulsion	**2 x ABB Azipods**
Output	**2 x 10 MW**
Speed (in open water)	**16 knots**

Timofey Guzhenko **is the last of a trio of Arctic shuttle tankers and has been fitted with a unique ice load monitoring system.**

Each vessel is of 123,000 gt, 36,900 nrt and 71,200 dwt. Their LOA is 288 m, moulded breadth 49 m, depth 26.8 m and their draught is 11.5 m. They are each powered by a steam turbine generating 23,600 kW, enabling a service speed of 19.5 knots to be maintained. LNG 'boil-off-gas' will be used as a primary fuel source.

They are classified ice class 1C and can operate in broken ice of up to 40 cm thick. The bridge of each vessel is fully enclosed, making navigation easier for their crews in conditions where outdoor temperatures of minus 25 deg C are experienced. Their cargo tanks have been constructed using several aluminium layers, insulated with polyurethane.

Meanwhile, an air bubbling system has been fitted to the side water ballast tanks and forward ballast tank of each ship. This facilitates safe ballasting operations in severe cold weather conditions.

A special paint, specifically developed for ships operating in sea ice, has been applied to the outside shell surface of each vessel, from one metre below the light ballast waterline to the scantling draft. This is designed to meet the challenges of operating in extreme low temperature conditions, to resist severe ice abrasion on the vessels' hulls and to help avoid ice adhesion.

Timofey Guzhenko background

The third Varandey shuttle, *Timofey Guzhenko*, is a Panamax icebreaking Arctic shuttle tanker, owned and operated by SCF. She entered service in February 2009 and operates on timecharter to Naryanmarneftegas, a Lukoil-ConocoPhillips joint venture concern.

Using many technologically advanced design features, like her two sisters she provides a year-round crude oil shuttle tanker service from Varandey, within the Arctic Circle, to Murmansk.

Timofey Guzhenko was the last in a series of three vessels of the same class to be delivered to SCF, by Samsung. She was named after a former Merchant Navy Minister of the USSR who was also one of Sovcomflot's founders, and in 1977 led the first ever surface ship expedition to reach the North Pole, on board the icebreaker *Arctica*.

Her home port is St Petersburg and she is registered with the Russian International Shipping Register. Technical and commercial management is provided by Unicom Management Services, a member of the SCF group, based in Limassol.

Timofey Guzhenko is an advanced design crude oil Arctic shuttle tanker of 70,000 dwt, classified to Ice Class 1A Super (Russian ARC6). Her length overall is 257 m, moulded breadth 34 m, depth 21 m and loaded draft is 14 m. Two Azipod propulsion units deliver a total power output equivalent to 20 MW. This gives a service speed of 16 knots in open water.

Her ice-strengthened double hull enables ice of up to 1.5 m thick to be broken, at a speed of two knots. As a double acting tanker, she has a particularly effective ice-breaking capacity - whether moving ahead or astern.

This design reduces manoeuvring time and improves the safety of the vessel in ice. Her hull is covered with a special hardened coating, which meets the challenges of operating at extreme low temperatures while avoiding severe ice abrasion and adhesion.

Timofey Guzhenko has a unique ice load monitoring system installed to facilitate her safe operation and to collect and measure data on ice loads in the area of the vessels' operations as part of a pioneering international research project performed by SCF together with ABS, ConocoPhillips and Samsung.

Other features were incorporated to help the vessel operate in sub-zero temperatures down to minus 40 deg C. These include a fully-enclosed navigating bridge and winterisation systems that allow her anchors, cargo bow loading, sea-chests, lifeboat and upper deck to function in sub-zero conditions. She also has a steam heating system, to enable safe ballasting in frozen waters and is equipped with a helicopter pad. Meanwhile, her 28 crew members benefit from special thermal insulation to their cabins.

Timofey Guzhenko meets all the relevant international requirements for safe navigation and for the protection of the marine environment. She was built in compliance with the requirements of the RS and ABS. TO

Ice navigation enhanced

Rutter's sigma S6 Ice Navigator is a result of nearly 20 years of research and development aimed at detecting ice, icebergs and small targets.

Down the years the technology has been refined resulting in the current sigma S6 radar Ice Navigator product, explained Sten Warnfeldt, Rutter Technologies' European area manager at Informa's Helsinki Arctic summit.

The sigma S6 Ice Navigator is currently being used in many demanding ice environments, such as the North Atlantic, Alaska, Beaufort Sea, Baltic and Sakhalin Island, he said.

It is used in VTS centres for ice detection, on oil platforms for ice and iceberg detection, as well as on board vessels for assistance in ice navigation.

The Navigator can connect to most conventional marine radars to provide a low cost means to augment their ability to detect ice. The system is easily installed and usually connects to the main navigational X-band radar.

The Ice Navigator uses the full dynamic range (12-bit) of the radar to produce a high quality image. The image produced shows up to 256 video intensity levels (colour shades) for finer ice definition.

In high clutter conditions, such as in ice, this 2-, or 4-bit video produces a radar image that is too bright and as a result, the gain is reduced, which subsequently removes much of the important ice video.

The system does not manipulate the radar image like some conventional radars. Pixel manipulation or echo stretching is a method used on board to highlight radar echoes against the open water background.

When this method is used in high clutter conditions, such as ice navigation, all the echoes become enlarged and the radar screen becomes flooded with echoes. Again the operator will reduce the gain, which subsequently removes much of the important ice data.

In 2006, Rutter Technologies delivered sigma S6 Ice Navigator systems to UK based BP Shipping.

DNV has approved Transas' ice navigation simulator.

Transas sets the standard

Transas has become the first manufacturer to receive a statement of compliance for its ice navigation simulator, according to a new standard.

NTPRO 5000 Bridge Operation Simulator with class notation 'Integrated Simulator System, NAUT AW (SIM), DYNPOS – AUT (SIM), HSC, Tug, Ice' was found to comply with Class A Standard for Certification of Maritime Simulators No 2 of 14th October 2007 as certified by DNV.

Transas is the first manufacturer to obtain the DNV seal of approval for the Ice navigation module of its navigational simulator according to the new standard.

Safe cold-climate shipping operations entail more than just ice-strengthened and winterised ships. Relevant crew training for the conditions is one of the largest accident risk reducers in the sector.

According to the DNV report, the setting of high standards in bridge resource management and the selection and training of crew can reduce the risk of accidents involving collision, grounding, fire and explosion by 44%.

Much of the work was carried out within the MS GOF project (Maritime Safety in the Gulf of Finland) in close co-operation with the Makarov State Maritime Academy, including increasing ice model accuracy and trials in an ice test-basin. The simulator was tested by Academy experts, experienced ice captains (including captains of icebreakers) and pilots who currently operate in the Arctic. New vessel models were developed, including Arctic shuttle tankers equipped with Azipod thrusters.

In addition to the ice navigation training, the statement of compliance indicated that NTPRO 5000 was an integrated simulator system and is intended for training for the following types of vessels:

- Vessels equipped with an Integrated Bridge System (IBS): bridge design, instrumentation, location of equipment as well as automatic grounding avoidance system and information on the manoeuvring characteristics of the ship.
- Vessels fitted out with dynamic positioning systems with an independent joystick system back up and a position reference back up.
- High speed craft.
- Tugs.

The new standards have been introduced to ensure that simulators provide an appropriate level of physical and behavioural realism in accordance with recognised training and assessment objectives.

Commenting on the certification, Capt Aksel Nordholm, DNV SeaSkill™ surveyor, stressed that Transas strength was in people: "All that Transas achieved in simulation is due to its highly professional and enthusiastic staff". TO

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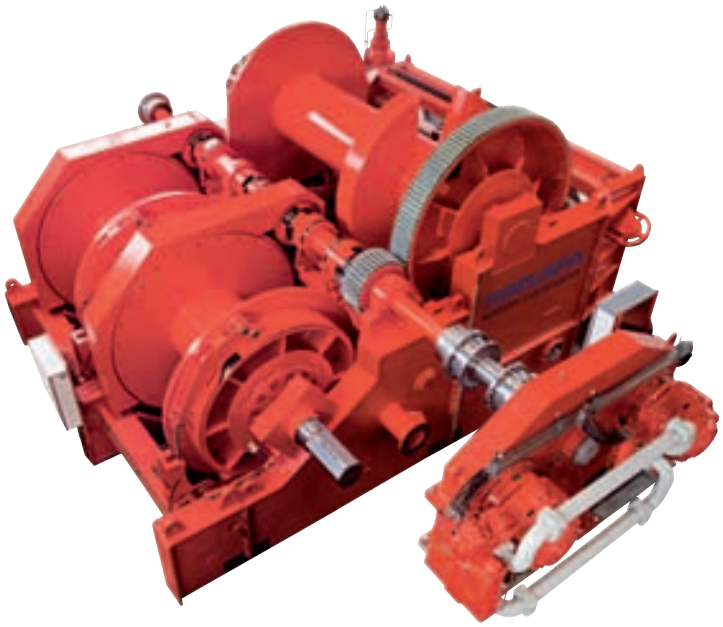

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