

# TANKER Operator

OCTOBER 2007

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## Features:

- Intertanko poses SECA questions
- South Koreans on a roll
- Higher premiums in the offing
- Major engine study
- Owners embracing broadband
- Look after your hull

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7 No 1

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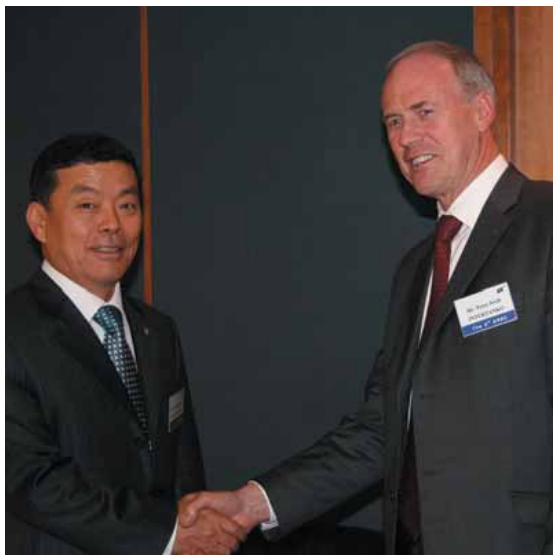


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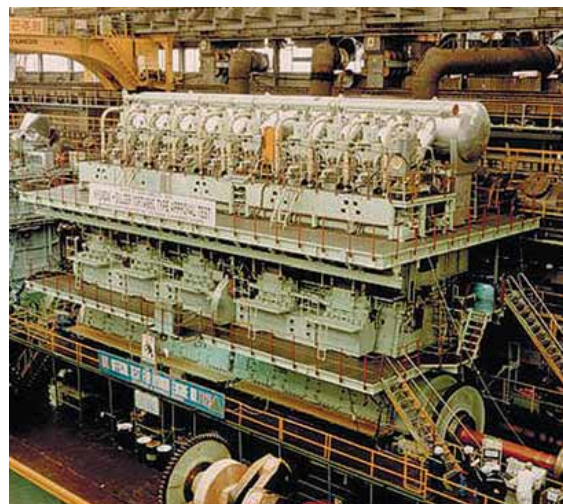
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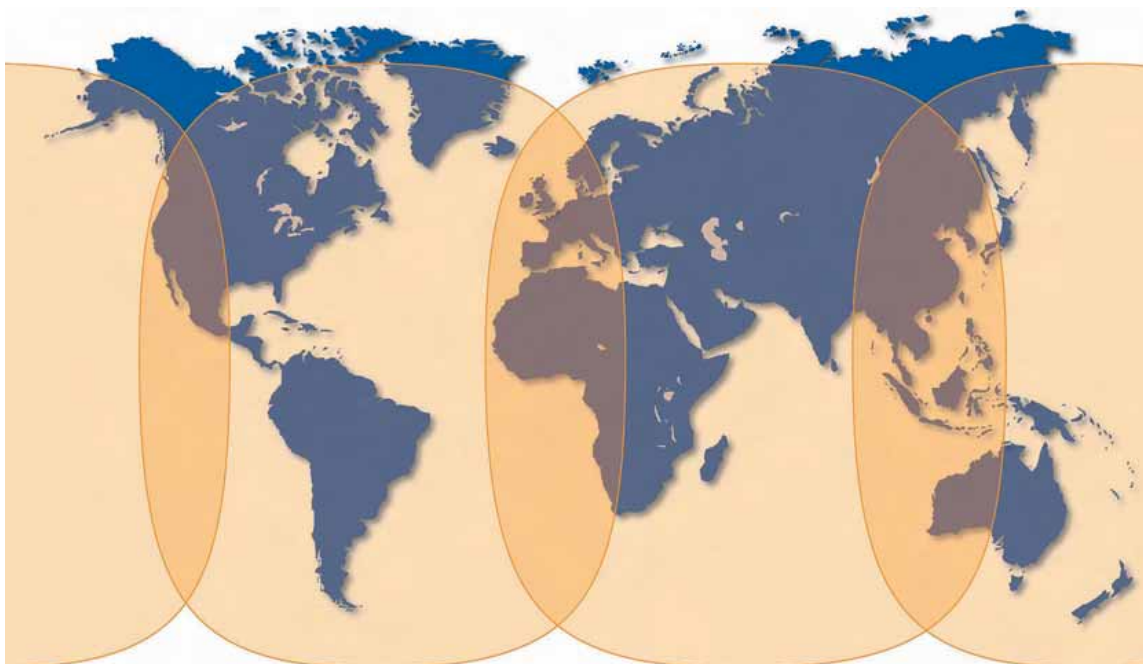
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*Front cover photo - OSG's ULCC TI Africa seen in Dubai Drydocks was coated with International Paint's new foul release application Intersleek 900. IP claims that the new antifouling will reduce the ULCCs environmental footprint, while enhancing the vessel's efficiency. Photo credit - International Paint*

# Close your eyes when transiting the Turkish Straits

## Dardanelles Navigation Issues - Turkish Straits vessel traffic scheme / violations or preferences? A personal viewpoint.

For several years, (since 1995 when I first transited these straits), I was employed on board tankers, which very often loaded crude or product cargoes from the Black Sea to worldwide destinations.

During that period, several times I witnessed violations of the International Collision Regulations (ColRegs) while transiting the straits and it always upset me.

Thus, for some time, I have added to my archive data and photos to help with future training.

My vessel (southbound laden tanker with petroleum products) was in the Nara sector and

approaching the turn at Nara Point, which is well known to all shipping related and experienced persons for the difficult 100 deg turn, as well as for the many incidents that have occurred in the past.

On the approach, for the past 15 minutes I have been watching another vessel steaming at 12.5 kn on the radar screen while I am steaming at 9.8 kn so as to abide by the speed regulations in this particular sector. I believe that this vessel will inevitably reduce speed on the approaches to Nara Point since both the turn itself, as well as the VTS will force her to do so.

However, my notion was totally mistaken. To the contrary, she was steaming at the same speed although another Polsteam bulk carrier was inbound at a



As plotted on radar screen at Nara Point. No 3 target is the overtaking vessel. No 7 target is the Northbound bulk carrier. No 43 is another southbound tanker. The start of the turn is highlighted by the arrow.

very close distance.

The rules clearly state that - Overtaking shall not take place between Yanikoy and Kanlica in the strait of Istanbul and between

Nara and Kilitbahir in the strait of Canakalle.

However, someone could allege that there was not opposite (Northbound) traffic. Well here is the evidence of our case - turning at Nara Point (few minutes later than the time we took the photo in the radar).

At this point I stopped taking more pictures. The real surprising fact lay with the fact that Target No 3 was a Turkish vessel.

Prejudice against other nationality vessel's - perhaps. No matter what the safety of navigation cannot be guaranteed. Should a review of the VTS regime take place at the IMO?

Let the officials decide on this issue.

TO

*Captain On Watch*



A view of the turn. At the end of the Breakwater - there is another buoy extended out into the channel. Target 3 has just crossed our port bow and is performing the turn while two other Northbound vessels are also going through the turn. In total there were four vessels at NARA Point.

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# To bunker, or not to bunker - that is the question

**C**onfusion reigns over EU North Sea/English Channel SECA - who cares or who dares? Who wins and who loses? asks Intertanko.

One month into the enforcement of the North Sea and English Channel SECA by the EU but not by the IMO, one might have thought that things would be settling down into some sort of routine. Far from it. The actuality is about complexity and confusion.

According to the EU Sulphur Directive, the North Sea and English Channel became a SECA on 11th August this year - more

## Intertanko has thrown up more questions than answers to the problem with charterers and SECAs.

Second - If the charterer will not provide lsfo, then is the owner liable, will the EU enforce a penalty on a non-EU flag ship between those dates, and what could that penalty be?

First - The obligations of owner and charterer are set out in the charterparty. The time charterparty obliges the time charterer to "supply fuels of such specs and grades to permit the vessel, at all times, to comply with the maximum sulphur

Thus either the vessel stops outside the SECA until the time charterer complies with charterparty terms; or the vessel deviates and bunkers lsfo for its own account, aiming to reclaim from the time charterer later. Ironically, if a vessel has to deviate to bunker, this would probably mean more air pollution generated than that saved by changing to lsfo; or the vessel does not bunker lsfo and steams in the SECA with non-compliant

Brussels has advised that the directive is binding law all over the EU; that all authorities have the obligation to control compliance; that while some member states may be more active in enforcement than others, the obligation to comply is there for all ships; that there will be no difference in dealing with EU or non-EU flags. Does this mean warnings for the ship and its owner? Fines? Detentions? Arrests?

The EU's jurisdiction over non-EU flags in international waters may be challengeable, but this will be of little comfort to an owner with a decision to make right now.

Notwithstanding the possibility that EU jurisdiction may be challengeable and although Port State Control action to date is low, it is probably prudent for an owner to comply with the EU Directive during the period between 11th August and 22nd November. The actual cost of compliance is the cost differential between lsfo and hsfo, plus the cost in time and money of the bunkering call, including deviation if any.

At the heart of the problem here is unilateral legislation at variance with international legislation. If the EU dates for this SECA had matched the IMO dates, it is unlikely that the time charterer would have refused to comply. The lsfo would probably have been arranged and paid for by the time charterer.

What this unilateral legislation does is to put the shipowner right in the firing line. This situation highlights the difficult choices that have to be made - there are more questions than answers. It becomes a case of who cares or who dares? And ultimately who wins and who loses?

“ At the heart of the problem here is unilateral legislation at variance with international legislation.

If the EU dates for this SECA had matched the IMO dates, it is unlikely that the time charterer would have refused to comply. - Intertanko. ”

than three months before the area becomes a SECA according to the IMO's international regulation, due on 22nd November. But there are still no official guidelines from any EU member state or from Brussels about how the EU will enforce this directive between 11th August and 22nd November.

Take an owner's vessel relet on time charter and ordered to Northwest Europe. The owner requests the time charterer to supply low sulphur fuel oil (lsfo) for steaming inside the North Sea/English Channel SECA. The time charterer advises that it does not plan to supply lsfo.

This brings up two questions. First - Is the charterer obliged to provide lsfo so that the ship can satisfy regional regulations?

content requirements of any emission control zone when the vessel is ordered to trade within this zone". However there is no obligation on any supplier outside the EU to provide fuel which complies with the EU directive, and a ship arriving in the EU may not be able to find lsfo when/where it requires it in order to enter the SECA with compliant fuel. A detour from the direct route may be necessary.

So the time charterer refuses to provide lsfo to the ship, arguing that only a handful of vessels have been inspected since 11th August by Port State Control for compliance with regional lsfo regulations, and that entering the SECA without lsfo is a low risk for the vessel to take. The owner argues that he will not take any risk.

fuel. If the ship is caught and penalised, who is liable and who would pay for those costs?

Second- Liability? What will happen is uncertain. It is more a case of what might happen? Article 4a of the EU Directive says that EU 'Member States shall take all necessary measures to ensure that marine fuels are not used in the areas of their territorial seas, exclusive economic zones and pollution control zones falling within the SECAs if the sulphur content of those fuels exceeds 1.5% by mass. This shall apply to all vessels of all flags, including vessels whose journey begins outside the Community.' So is the owner liable? Who is 'using' the non-compliant fuel? The owner or the time charterer?

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



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**~ Ron Rubright • Chief Engineer of the *Response***

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## What on earth is happening in Norway?

**From being quietly confident of gaining a restructured tax system, Norwegian shipping companies could be pushing the exit button by the end of the first week of October.**

"The government is on the verge of ruining Norwegian shipping. Prime Minister Jens Stoltenberg cannot possibly have understood the dramatic consequences that the proposal of the new shipowner tax plan have brought about", said Norwegian Shipowners' Association (NSA) director general Marianne Lie.

"Already stock prices have plummeted for a number of shipowners. Thousands of jobs along the coast can be in danger when shipowners are subjected to changes in the government's policies."

The subject of this outburst is the Norwegian government's recent announcement proposing to cancel the current tonnage taxation system, which was introduced in 1996.

At present, shipowners are not taxed on their operating profits, unless taxable dividends are paid to the shareholders, or if assets are moved out of Norway. This situation was broadly accepted by the shipping community as it was thought the plan was designed to keep the shipping companies from quitting Norway and thus remain competitive as a nation, which largely speaking had worked.

Now dropping a bombshell, the government said it proposes to tax at 28% over a 10-year period the undistributed profits retained in the system and not previously subject to the tax.

This amounts to NOK14 bill, that is NOK21 bill minus one third which will be placed in an environmental fund. The shipowners argue that in effect this is a back tax dating to 1996.

NSA president Trygve Seglem who is also managing director of Knutsen OAS Shipping, has gone on the record as saying that most

of these amounts now liable for tax are locked in ship investments and are not available as cash.

### Weakening equity

The NSA argues that a serious consequence on the new proposals, which will go before the Storting on 6th October, is a weakening of Norwegian shipowner's equity base. The owners would rather opt for the status quo and Seglem implied that the government has not understood the situation.



**NSA's Marianne Lie is fighting her corner against the Stoltenberg government**

Several Norwegian-based shipping companies have sent out comments to the media deploring the move, including BW Offshore, Odfjell and Rieber Shipping, while Skaugen was talking of changing its quoted status and joining with its Danish partners, which could be interpreted as a veiled threat to quit Norway.

Lie is reported to be seeking legal advice on two items of the tax proposal. First, if the proposal were to be regarded as retroactive and as such would it be unconstitutional and second, if the proposal contravenes the preparatory documents, which led up to the existing 1996 tax law.

### Declining fleet

Worryingly for the NSA, the national flag fleet is declining without any help from the government, although the number of Norwegian controlled vessels is actually rising.

At the end of the first quarter of this year, the percentage of

Norwegian controlled ships flying the domestic flag fell to 49.4%, compared with 50.5% recorded at the beginning of the year and 52.9% at the end of the first quarter 2006.

Orders for new vessels under Norwegian control had increased by 22 by the end of April to 378. Since the beginning of 2006, the increase in new orders had reached a massive 78%.

At the beginning of this year, 51,500 seafarers were employed on Norwegian controlled foreign going ships. Out of this total only 13,100 were Norwegians.

To give an idea of the recent growth pattern in Norwegian shipping, in 2005 the Norwegian maritime cluster employed around 90,000 people and the value creation was put at more than NOK80 bill, over 50% more than in 2002.

Value creation is measured as the sum of the operating profits plus wages. In 2005, the maritime value creation was second only to the oil and gas industry with finance just behind in third place. There is no doubt that with the huge investments going on in fleet acquisitions and replacements, plus strong freight rates, this figures was set to grow considerably.

In the 2006 NSA Annual Report there is a statement saying that 'based on the number of ships and rigs on order, we calculate a need for 10,000-15,000 more employees in Norway in the years to come.'

Will 6th October mark a complete change of Norwegian shipping as we know it today?

Down the years there have also been threats from various UK governments to tax overseas shipowners and employees living in London, mainly the large Greek community.

However, this has come to nothing. Let us hope Jens Stoltenberg and his cabinet colleagues see sense and at least opt for the status quo, otherwise the Norwegians will be... 'rocking all over the world'.

## Veson continues to expand

**Veson Nautical, the US-based maritime software developer that markets chartering, operations and accounting solutions has opened another office.**

Located in Singapore, Veson has appointed Jesse DiIanni, to lead the company's project management team. The company's staff and location expansion are part of its ongoing customer care programme, which includes training, staff and post-implementation initiatives designed to provide enhanced support and services to its customer base.

John Veson, president of Veson Nautical said, "Part of our company's mission is to provide consistent, reliable and immediate response to customer requests, regardless of location or time zone. Clearly our international customers will benefit greatly from round-the-clock support and services we now can offer from the Singapore office.

We are working hard to build a world-class organisation and feel that with Jesse coming on board we've taken another step in reaching that goal," he said.

The new Veson office is located at Raffles Place, Singapore. Directing the office will be Xiaobang Yue, a software developer who has worked at Veson for the past 18 months and Robert Marx, who has been instrumental in training and facilitating many important customer installations.

Singapore will allow the company to provide 24 hr service and work closely with clients in the Asia/Pacific region, including Veson's newest customer, Thoresen Thai Agencies and others such as Rio Tinto, The Australian Wheat Board, ConocoPhillips Singapore, and Tesoro Singapore, among others.

## Milestone agreement reached

**A new framework, in which the littoral states of the Straits of Malacca and Singapore (the Straits) can work together with the international maritime community to enhance navigational safety, security and environmental protection in the Straits, has been formally agreed.**

Dubbed the 'Co-operative Mechanism', this far-reaching initiative was cemented at an international meeting hosted by Singapore, convened by IMO and organised in close co-operation with the Straits' two other littoral states - Indonesia and Malaysia.

The Singapore meeting was a direct outcome of the initiative of the IMO Council to consider the protection of vital shipping lanes such as the Straits of Malacca and Singapore. It was designed to

follow up and build on the outcome of previous meetings on enhancing safety, security and environmental protection in the Straits that were held in Jakarta, Indonesia, in September 2005 and in Kuala Lumpur, Malaysia, in September 2006.

The Co-operative Mechanism will provide a regular platform for dialogue between the littoral states, user states and users of the Straits, as well as a structured framework for co-operation with the international community. It represents the successful establishment, for the first time ever, of the type of co-operative mechanism for the management of international straits envisaged in Article 43 of the United Nations Convention on the Law of the Sea (UNCLOS). It will enable the three littoral states, user states and users of the Straits to exchange views, jointly undertake projects and make voluntary monetary

contributions through the following three components:

- A forum for regular dialogue;
- A committee to co-ordinate and manage specific projects; and
- A fund to receive and manage financial contributions.

The meeting saw a widespread show of support for the projects aimed at enhancing the safety of navigation and environmental protection in the Straits that were first proposed at the Kuala Lumpur meeting.

The projects (on response to incidents involving hazardous and noxious substances (HNS); Class B transponders on small ships; establishing a tide, current and wind measurement system; and replacement and maintenance of aids to navigation and aids to navigation damaged in the tsunami disaster of December 2004) were widely endorsed.

The governments of Australia,

China, Japan, South Korea, the UAE and the US pledged financial and in-kind support. In some cases, work is already underway. China, for example, has been actively pursuing the implementation of the project concerning the replacement of aids to navigation damaged by the 2004 tsunami and, along with the US, has conducted a needs' assessment survey on the response to HNS incidents.

Some 250 delegates representing 38 countries, one UN Specialised Agency, one intergovernmental and 14 maritime-related non-governmental organisations attended the meeting.

The three littoral states are now working toward convening the inaugural meetings of the three components of the Co-operative Mechanism in 2008. These meetings are expected to be held annually.

TO

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# LR opens state-of-the-art training centre

**Lloyd's Register Asia has opened what is claims is Shanghai's most comprehensive foreign-funded maritime training centre.**

This is viewed by the class society as the cornerstone of a Yuan3 mill commitment this year to the development of educational courses and related infrastructure in China.

LR said that its new Maritime Institute (Shanghai) was created to provide a centre of learning from where working surveyors and auditors can share their technical knowledge with China's shipbuilders, owners and maritime students through specifically tailored seminars, lectures and training courses.

John Stansfeld, director, Lloyd's Register Asia said. "China's rapid emergence as a modern maritime power has been spectacular to watch. But it is no

secret the country's shipbuilding industry has technical challenges to surmount before it can become the world leader by 2015, as is its goal. At LR, we believe we have a role to play in that regard."

In 2009, the Lloyd's Register Group will move the headquarters of its marine division from London to Southampton, creating a central Maritime Institute in conjunction with the University of Southampton. The opening of the satellite training centre, in Shanghai, is the first Asian extension of that strategy.

The Shanghai office, which is expected to be the first in a network of such facilities provided by LR Asia in China and North Asia, will have the capacity to seat up to 50 students at each seminar, lecture or training course.

It also will be used to deliver highly interactive specialist courses, in which enrolment is

typically limited to 15 attendees. Many of the lectures and seminars will be presented in Mandarin.

The first two-hour seminar covered the impact of environmental regulatory developments emerging from the July meeting of the IMO's MEPC, including the new rules governing ballast water

management on ships.

The Shanghai-based MTS team, formed in 2005, has offered 12 public courses in Greater China thus far this year, in addition to the 25 exclusive courses they presented to private shipyards and the extensive suite of seminars and lectures they made available on an ad-hoc basis.

TO

## GL Rules Pilot launched

**Which rule affects my fleet? That is the main question for shipowners, managers and shipyards when it comes to international maritime regulations from IMO, ILO and IACS.**

Germanischer Lloyd claims that its new GL Rules Pilot has the answers in the form of an online database, which can give tailor-made information, based on fleet structure and specific information needs.

As regulations change with increasing frequency, shipowners, operators, yards and design offices are finding it increasingly difficult to keep up to date with regulation changes.

The rule overview interface shows entries organised by application date and ship type. The database automatically links rule entries to the shipowner's fleet (GL-classed ships) or planned newbuildings. Also reverse searches are possible. Choosing a rule entry will generate a list of affected ships.

Information tables give a summary of the regulation alteration with references to the source document, instrument, and specific regulation.

The GL Rules Pilot grants access to source documents, consolidated regulation texts, and GL-expert interpretations. To reflect the very latest rule changes, the database is updated constantly.

It is accessible via the Internet. With an optional e-mail notification, users are actively informed about any changes applicable to their fleet.

Its development was based on GL's printed booklet 'IMO Pilot'. This print version has been published every year since 1999 and is now an important reference book for naval architects, marine engineers and maritime experts. The basic version of the 'GL Rules Pilot' is free of charge, while the premium version is available for a fee.

The registration page can be found at [www.gl-group.com/RulesPilot](http://www.gl-group.com/RulesPilot).

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GL's members will be able to access rules and regs online.

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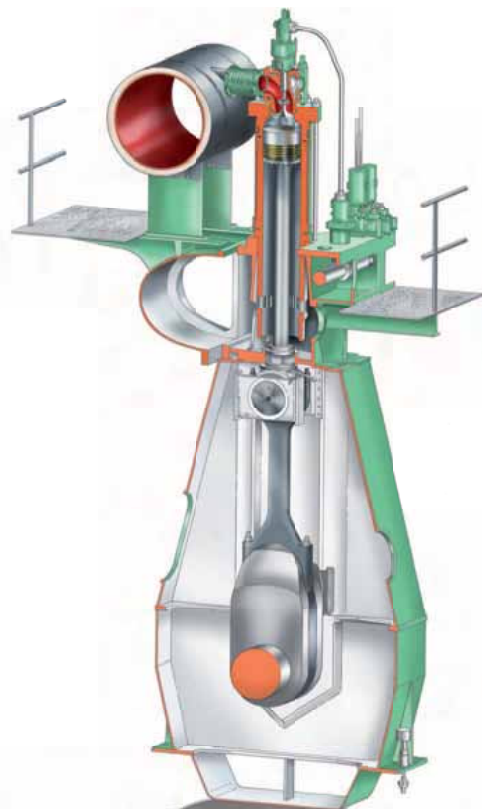
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Furthermore, these smokeless engines have a lower impact on the environment due to the low emissions. Other advantages are the low propeller speed and the low minimum constant speed

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# South Korean builders still top of the pile

We start off the Kormarine exhibition preview with a look at the shipbuilding industry in South Korea, followed by news from the Korean Register then a preview of the exhibition itself.

**B**y August this year, the South Korean shipbuilders had increased their already substantial orderbooks and said that they foresee this situation lasting for several more years.

In September, the Korea Shipbuilders' Association (Koshipa) said that worldwide demand for newbuildings would be sustained at an average of 60 mill gt annually.

In its forecast, Koshipa countered speculation that newbuilding demand would slump following the huge glut of deliveries in the next year or so. South Korean builders have a 35% share of the world newbuilding market, which is currently booming.

In terms of vessels, China leads the way in ship numbers, but South Korean yards are way ahead in terms of deadweight tonnage. Japanese builders are also operating at full capacity but due to yard cutbacks and the rationalisation of the shipbuilding industry, which took place a few years ago, they cannot compete with China or South Korea in volume terms.

Koshipa said that tankers and bulk carriers were expected to dominate the newbuilding contracts until 2015, after which containers and LNGCs would be



**Hyundai is the world's largest builder. But not content with that, it is expanding. Photo credit Thenamaris.**

in greater demand. The association predicted that continued growth in international trade would continue to drive the demand for new tonnage.

For example, crude oil volumes carried by sea are expected to increase at the rate of 3.5% per annum. Local sources said that Koshipa was responding to August's report by the Korea Institute of Industrial Economics, which warned that the newbuilding sector could face a crisis by 2011 when available capacity will exceed demand. The

institute said that it was worried by the massive capacity being added by DSME, Samsung and HHI running parallel with huge Chinese yard expansions.

Koshipa said that \$33.2 billion worth of orders were placed during the first six months of this year, amounting to 364 vessels of all types totalling 11.32 mill cgt. In terms of tonnage this total represented an increase of 51.3% in value compared with the same period last year. During the period, ship prices reached \$2,933 per cgt, an increase of 28.4%.

At the end of June, the nine members of Koshipa had 1,346 vessels worth \$121.6 billion on their books, a rise of 14.3%. In total, all the South Korean yards have about 1,100 tankers of 82 mill dwt out of more than 1,900 vessels of nearly 150 mill dwt on order or under construction.

Of this total, South Korean owners accounted for 134 tankers of 5.8 mill dwt out of 264 vessels of all types amounting to 14.2 mill dwt. South Korean flag tankers totalled 86 of 4.1 mill dwt out of 168 vessels ordered under the domestic flag.

In terms of orders, during the first six months of this year, Hyundai Heavy Industries (HHI) was up 32%, Samsung (SHI) up to 47%, Daewoo (DSME) up to 48% and Hanjin up by 21%.

## Yards investing

To cope with the increasing workload, the major South Korean builders are increasing their capacities. The world's largest builder Hyundai recently announced that it was investing in a 10th dock at Ulsan, which should be ready by January 2009. Combined with extensions to docks No 5 and No 9, the extra building dock would give the yard the capacity to deliver 80 ships annually up from the current 70.

Dock No 10 will be 640 m in

length by 92 m beam. Extensions to No 5 will increase its length to 360 m and No 9 to 460 m. The work on these two docks will be completed by 2008, HHI said. By the middle of this year, HHI said it had a three year backlog with the nine docks fully booked.

HHI is also improving its dry land shipbuilding initiative, which involves building hulls on land and 'skidding' them onto a semi-submersible barge, which then lowers the hulls into the water. This improvement would give HHI the capability of handling 16 vessels on land, up from the eight at present.

Thus far, HHI has built aframax and recently a large LPG carrier and has built 16 vessels using this method with another 30 to come. The latest was a 82,000 cu m capacity LPG carrier for BW Gas.



**The 2004-built Kerlaz seen arriving at Rotterdam. She is a classic example of a Hyundai Mipo 37,000 dwt tanker and is operated by French concern SOCATRA.**

HHI said that this method of shipbuilding cut down on the number of steel blocks needed to just 35 from the 80 required to build a vessel in drydock. This obviously improved the production efficiency and cut down on assembly time. Cargo tanks of up to 1,460 tonnes can

be fitted using this method, HHI claimed.

Announcing results for the first half of this year, HHI said that its operating profit of W117.9 bill (\$126 mill) was a 29.6% increase compared with the same period last year. Turnover was W2.324 trill, more or less same as the first

six months of 2006. In US dollar terms, turnover for the first six months of this year showed year-on-year growth of 4.27%, reaching \$2.5 bill.

However, net profit fell by 20.3% to W114.4 bill compared with W142.3 bill for first-half 2006. HMM said that this down trend was due to a book-value loss, resulting from South Korean currency fluctuations and was not an actual loss.

HMM claimed that its third-quarter results would be even better due to a peak season, continuous large containership buildings deployment, new services for major markets and new emerging markets and business development around the world.

Subsidiary Hyundai Mipo had won orders for 94 vessels worth \$5.3 bill by the beginning of September. This particular builder

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has built up a considerable worldwide reputation for its standard chemical and product tanker designs, primarily the 47,000 dwt and 37,000 dwt types.

**Large block method**

SHI, the world's second largest shipbuilder, is investing in a new

floating dock primarily for the construction of LNGCs and is to introduce what it calls the Giga Block method of shipbuilding. This involves moving huge pre-assembled blocks by floating cranes into a building dock.

The maximum size of each block is 5,600 tonnes, with a

length of 70-100 m. Using the traditional shipbuilding method around 100 blocks are incorporated in a new large ship. Using the Giga method will reduce this to just three or four, Samsung claimed.

By using the large block method, construction time could

be reduced to just 22 days. Once introduced, Samsung expects multiple launchings from its No 3 dock to increase to 11 per year from the current 10. Around 30 ships per year are floated out of the dock.

SHI's Giga blocks will be built at Ningbo in China from next year. Another block assembly plant is to be built at Geojeodo, South Gyeongsang Province.

**Dock lengthening**

DSME plans to lengthen its second drydock to 570 m from its present 350 m by the end of 2009. This will give the builder the opportunity to construct 10 more large vessels per year.

Daewoo is also the world's largest builder of LNGCs and recently unveiled the sealed LNGC (SLNGC), designed to operate without the need to accommodate boil-off gases. The shipyard has applied for 10 patents both home and abroad.

DSME claimed that the new design could reduce gas ship operating costs by \$1 mill per year by saving around 3,000 tonnes of LNG.

Steam, gas turbines, diesel-electric plants and dual fuel type engines all rely on boil-off gas. These types of prime movers would no longer be necessary as a standard 2-stroke diesel engine could be installed, DSME claimed.

As for Hanjin, this company is planning a second shipbuilding complex in the Philippines and is also planning to add another dock at Subic measuring 480 m x 135 m.

Hanjin said that space was running out at Subic Bay Freeport and so it was looking to build a second yard in Misamis Oriental, Mindanao. The planned \$1 bill investment was due to start later this year.

The builder also said that it planned to build 40-50 ships per year, focusing on larger vessels, such as VLCCs and FPSOs to make maximum use of its 370 m x 100 m drydock.

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# South Koreans aiming at higher value products

According to the shipbuilders, this year they have rolled up their collective sleeves to develop 'composite high value-added products,' a level beyond 'simple high value-added products', according to an article appearing on the shipbuilders' website.

**T**he momentum for this effort stems from their desire to dominate markets that can return higher profits. For example, HHI plans to further develop LNGFSOs (floating storage and offloading) and deepsea FPSOs (floating production, storage and offloading), products that have evolved to the next stage from the previous LNGC and FSO designs.

HHI explained that with construction of land-based LNG storage/offloading facilities becoming more difficult, large scale demand for marine LNG terminals (LNGFSO) is expected in the future and the need for deepsea FPSOs is also gradually increasing to produce gas from water depths exceeding 1,000 m.

DSME has also declared its advance into the composite high value-added product market and launched related technology development. President Nam Sang-Tae reportedly said, "DSME will transcend the horizon of simple LNG carriers and advance into the market of composite-concept high value-added products like LNGFSRU (floating storage and regasification unit)."

SHI, which has raised its ratio of high value-added products to almost 80%, plans to develop FDPSO (floating drilling, processing, storage and offloading), a drilling function-added to LNGFSRUs and FPSOs, ahead of other shipbuilders.

Samsung is also involved in the high-tech end of the market, such as Arctic ice-class oil tankers, drillships, and so on. The builder

has developed its own patented technology for LNGC cargo containment systems and also plans to promote the development of LNGCs capable of sailing in Arctic areas.

Despite the historic high order volume secured in 2006 and thus far this year, South Korean shipbuilders have focused on sharpening competitiveness in the price sector. This is because they will have to overcome negative factors, such as oil and raw material price instability, including steel, and foreign exchange rate appreciation.

For example, HHI's president

Choi Kil-Seon announced that the building group will respond quickly to market changes stressing, "To secure competitiveness in the price sector, we have to improve our operating rate, sales scale, profit rate, work implementation methods, ratio of indirect expenses, etc."

Meanwhile, SHI's president Kim Jing-Wan noted, "Pessimism rather than optimism is prevailing in both the external and internal management environments for this year." He added, "We must secure No 1 competitiveness to survive in an economic

depression period." SHI said it plans to develop ship types that minimise fuel consumption and also identify and apply ideas to increase sailing efficiency and raise the dock turnover rate.

At the same time, DSME president Nam Sang-Tae said, "The operating profit target for this year cannot be reached, unless accompanied by cost reduction and thorough risk management." He emphasised, "To recover cost leadership, we must make expense-reduction and temperate expenditures a habit."

Mutual co-operation between shipyards and ships' equipment manufacturers and suppliers is very important, not only for enhancement of the South Korean shipbuilding industry's competitiveness in general, but also for establishment of a win-win system between large enterprises and small and medium-sized enterprises (SMEs) from the perspective of balanced development for the national economy.

In order to attain this goal, the industry has established the Large Enterprise-SME Co-operation Council.

Manpower development, the core of the shipbuilding industry's competitiveness, is emerging as a very important task. In 2007, South Korean shipbuilders are expected to concentrate on fostering technical and skilled manpower, not only through their own manpower cultivation programmes, but also from the perspective of the industry's overall requirements. The major programmes are:



**Korean shipbuilders are trying to move away from importing European manufactured high tech equipment. Seen here are the world's largest gas combustion units manufactured by Saacke. They were shipped from Bremerhaven to South Korea to be fitted on a Q-Max LNGC building at Samsung for delivery next year.**

- Re-education of field tech manpower
- Cultivation of marine plant tech manpower
- Cultivation of production design tech manpower
- Support for field training in test operation of ships

In 2007, South Korean shipbuilders plan to further develop technology, the original source of competitiveness, while pursuing activities to prevent the overseas leakage of their shipbuilding technologies.

The ship-type orders recently secured by the shipbuilders are more diverse, higher-quality products. In the past, the domestic shipbuilding industry experienced added risk burdens due to the independent development of ships' equipment and materials between respective shipbuilders and their suppliers. Therefore, there is a need for common development of

equipment and materials through collective dialogue between builders and suppliers.

With this in mind, South Korean shipbuilders agreed to cooperate in promoting common tasks, such as LNG cargo containment system development project (selected in 2004); ballast water treatment technology development project (selected in 2004); joint industry-academia research institute project to build a foundation for research of high value-added ships' basic functions; ice tanker foundation establishment project to secure original technologies for ice class ships (selected in 2006) and expansion of the shipbuilding industry B2B network business.

To solidify its top shipbuilding and marine industry nation status and also to continue to maintain industrial competitiveness, South Korea needs to promote the concept of value-added in its

products, as well as the advancement of related industries.

For this, Koshipa said that it planned to allocate R&D funds to accelerate and stimulate common technology development, while preparing a financial foundation to ensure sustained growth of the present high value-added product groups and creation of future new demand.

The demand for ice class and ice resistant vessels to operate in Arctic regions is increasing. Therefore, a project was designed to understand and analyse related technology trends through an advanced patent search in major product groups and to prepare a PM (Patent Map) for a systematic and efficient response.

For utilisation in future technology development tasks, the shipbuilders plan to systemise the classification system for major technologies with a view to coping actively with new demands for

ships equipped with ice-resistant functions for the Arctic, which is in the spotlight as a new major energy-supply shipping route.

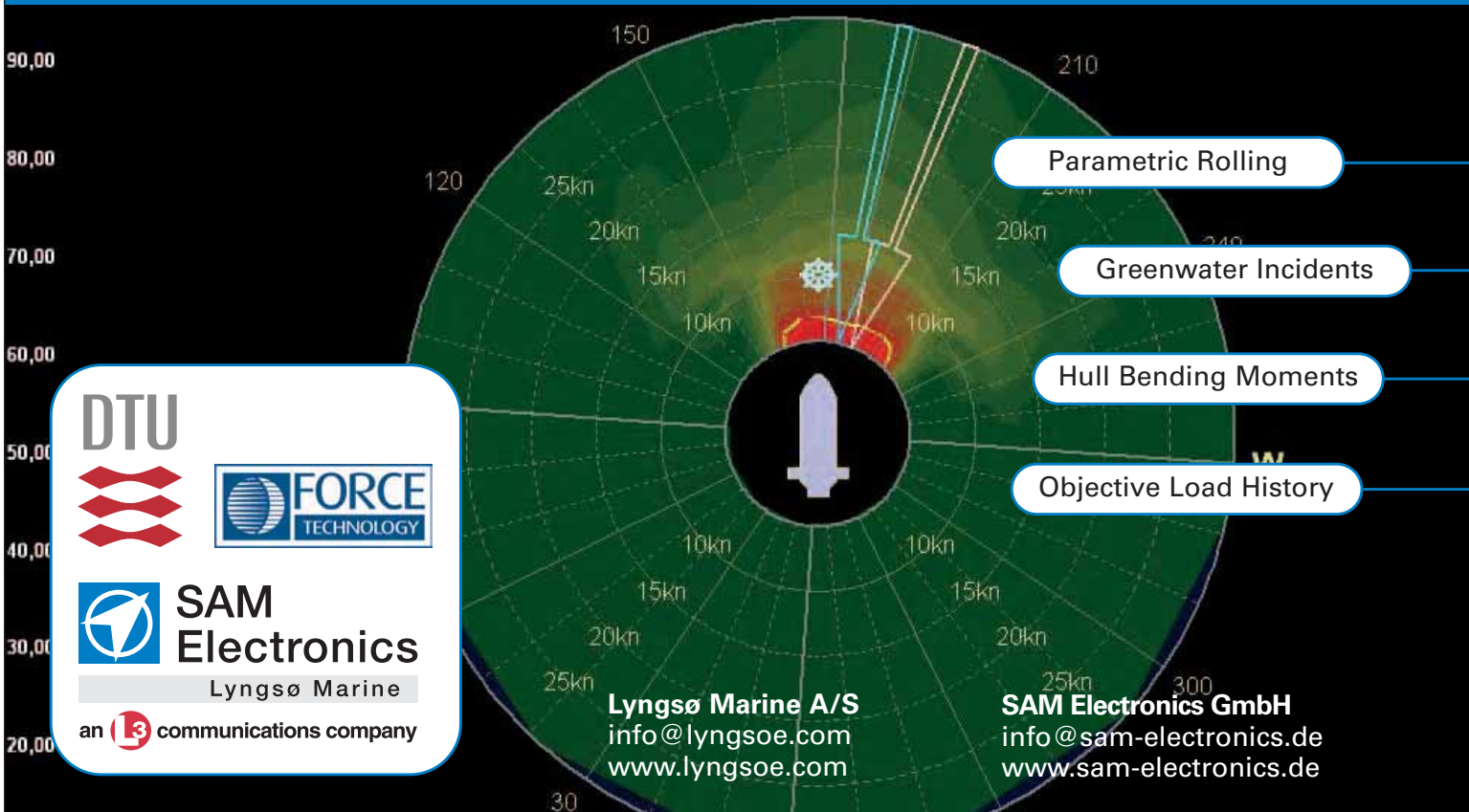
Due to the IMO's MEPC rule regarding mandatory double-hull structure for tankers, the space available for painting work has decreased as enclosed areas are expanded. Subsequently, worker hazards have increased, making it more difficult to secure sufficient space for manual painting work.

Therefore, it has become absolutely necessary to develop automation technology for painting, which currently is primarily manual work. Responding to this, Hyundai, Samsung, Daewoo, Hanjin and STX Shipbuilding are participating in an automation technology development project, which started on 1st July, 2005, lasting to 30th June, 2010, led by Korea Shipbuilding Research Association.

TO

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## Korean Register expands worldwide

**As of 31st May this year, some 2,187 vessels with an aggregated gt of 27.3 mill were classed with KR.**

According to KR's recently elected chairman and ceo, Oh Kong-gyun, the society was underpinning this growth with the opening of three new offices in China and South Africa later this year.

Expansion of KR's overseas network was central to Oh's vision for KR, which included the elimination of all potential substandard ships under its class; extending the KR brand to a broader worldwide audience; and, ultimately, becoming the world's leading classification society.

Oh admitted that while KR's detention record under the USCG and Tokyo MOU is comparable with, or better than, other IACS members, its performance within the Paris MOU region required special attention.

Speaking in London at a

European committee meeting, Oh said that a package of measures would be introduced, including a flying squad of experienced surveyors and a range of pre-inspection services to address this perceived problem.

Following quality concerns from KR members over newbuildings, particularly in light of the emergence of new yards, European committee members welcomed the introduction of KR's new common structural rules (CSR) software.

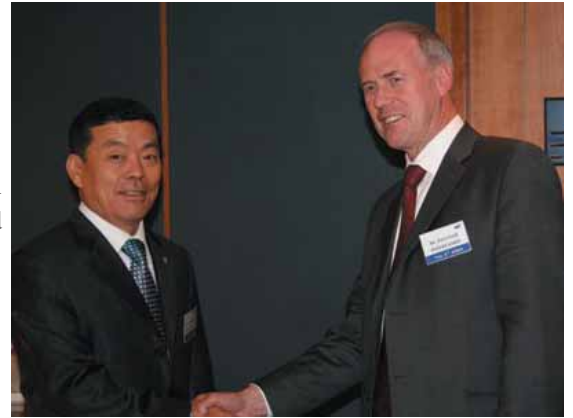
Covering double hull tankers and bulk carriers, this software has been delivered to 17 shipbuilders and designers and has resulted in more robust and safer vessels being constructed under KR rules, Oh claimed.

The committee was also told that KR is developing a software package (Rulecheck) for the European Maritime Safety Agency (EMSA) to give EU port

state control officers a complete list of the rules, regulations and procedures, which need to be applied in their work. The system is scheduled to be delivered by the end of November this year.

A range of other issues were discussed at the meeting, including class-related IMO proceedings, goal based standards (GBS), performance standards for protective coatings, and involvement with the tripartite meetings

The European committee members unanimously re-elected Intertanko's Peter Swift as their chairman and themselves agreed to serve a further three year term. Comprising leading members of



**Oh Kong-gyun welcomes Peter Swift**

the European maritime industry, the KR European committee meets annually to consult on the development of KR services and matters relating to the safety and quality of KR-classed ships.

As at 31st August, KR classed 367 tankers of 7,646 mill gt, making up 27.2% of the total fleet. Over the next three years through 2009, another 184 tankers of 3.779 mill gt are due to be classed by KR.

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## A Capital product

### One of the major customers of Hyundai Mipo is Nasdaq quoted concern Capital Product Partners.

As well as taking delivery of a series of 37,000 dwt product tankers, Capital also has a large series of 47,800 dwt MR product tankers on order.

Deliveries of the 11th and 12th in the series *Apostolos* and *Anemos I*, from Hyundai Mipo Dockyard, was recently confirmed, ahead of the anticipated time of delivery, for 20th September and 28th September respectively.

Both are ice strengthened vessels (Ice Class 1A) having carrying capacities of 47,782 dwt and 47,823 dwt, respectively. They are capable of carrying a range of refined oil products, chemicals (including ethanol and

biodiesel feedstock), and crude oil worldwide.

The *Apostolos* and *Anemos I* have been fixed under timecharter terms to Morgan Stanley Capital Group for three years at a base rate of \$20,000 per day, subject to a profit sharing arrangement which allows each party to share, at a 50:50 percentage, additional revenues when spot rates are higher than the base rate. The purchase price for the two vessels of \$56 mill each will be fully funded through a drawdown on the existing revolving credit facility.

The two vessels are the third and fourth out of seven additional MR product tankers that Capital Product Partners had agreed to purchase from Capital Maritime & Trading. The remaining three product tankers will be 51,000 dwt MR chemical/product tanker sister vessels that are scheduled



Capital's 10th MR product tanker *Akeraios* seen arriving in Rotterdam on 27th August.

for delivery in January, June and August 2008, all of which will be under bareboat charters, due to start at the time of delivery.

Meanwhile, the 10th medium range (MR) product tanker, *Akeraios*, from Hyundai Mipo was delivered on 13th July and is identical to its sisters and has also been chartered on the same basis as the other members of the fleet.

Capital Product Partners, a Marshall Islands master limited partnership, specialises in medium-range (MR) product

tankers. Following the deliveries of *Apostolos* and *Anemos I* and the intended acquisition of another – *Attikos*, Capital Product Partners will own 13 product tankers, including 12 Ice Class 1A MR tankers. It also has an agreement to purchase three additional product tankers from Capital Maritime & Trading. All 16 vessels are under medium to long-term charters to BP Shipping, Morgan Stanley, Overseas Shipholding Group and Trafigura Beheer.

TO

## Kormarine - A winner

### The Kormarine shipbuilding and marine equipment show comes at a time of significant investment in the local shipbuilding sector with yards putting up the 'full up' signs for 2011 and quoting 2012 deliveries and beyond.

The exhibition and conference takes place this year between 24th and 27th October at the

BEXCO centre in South Korea's second largest city - Busan.

This is the 15th event in the series and comes under the banner of Marine Week, which includes the Naval and Defence, plus the Sea-Port exhibitions and Kormarine under one roof.

Advertised as a 'three in one' show, Kormarine's organiser claims that the exhibition is the first global exhibition where all of the maritime-related businesses

are covered.

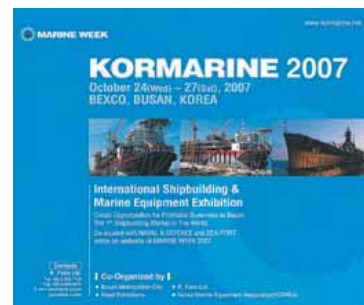
Due to the country's huge shipbuilding industry, which is at an unprecedented level, this year's exhibition is expected to be the biggest ever.

The last Kormarine was held in 2005 about a year or so in to the current shipbuilding boom. In that year, the organiser said that 36,883 visitors passed through the doors, of which some 30,441 registered for Kormarine.

This year, the 19,000 sq m floor space will house around 1,600 booths, an increase of 20% on the 2005 exhibition, playing host to 1,000 companies from 40 countries. Around 40,000 exhibitors are expected with 5,000 coming from overseas.

National pavilions have been booked by Austria, China, Denmark, Finland, Germany, South Korea, Netherlands, Norway, UK plus others.

On 24-25th October, The Korean Society of Marine Engineering (KOSME) will be holding a two-day conference on



the theme of 'Advanced Technology for Marine Engineering'.

This will include such topics as-

- Engine & turbine technology
- Marine machinery & Equipment
- Environmental-friendly technology - energy & pollution
- Electric & electronic systems
- Safety, regulations & laws
- LNG tanker technology
- Automation & control
- Shipbuilding industries
- Recreational sports equipment; and
- Others topics in the marine engineering field.

For further information go to [www.ismt2007.or.kr](http://www.ismt2007.or.kr)

TO



Around 40,000 visitors are expected this year.

# Clubs in for a bumpy ride next year

**O**pinions on the level of increases range from a low of 7.5% to a high of 20%.

Unfortunately, most pundits are forecasting a rise at the higher end.

These prognoses are based on two major factors. First - the turmoil currently being experienced in the financial markets, which mutuals use to invest their members premiums to bolster their reserves, while second is the significant rise in large claims seen during the past few years, which were handled at group level.

Across the 13 clubs,

responsible for around 90% of the world's shipowner members, which make up the International Group (IG), the same dynamics are affecting each one. High, if not top of the list is the increase in high value claims.

For the tanker industry, the main worry is a major disaster, which could have a knock-on effect on corporate liability. Regulatory and safety issues are kicking in and although tanker claims tend to be more serious,

the rest of the shipping industry appears to be mimicking this trend, a leading P&I broker told *TANKEROperator*.

Generally speaking, most of the clubs smaller claims of under \$250,000, are relatively stable year on year. However, it is these larger claims that are giving rise to concern.

Broker Aon's executive director of marine Stephen Hawke said that there doesn't appear to be any pattern with these large claims.

"There is no particular flag, or age, or geographic reason for this, but they are going through the roof," Hawke said.

Some of the reasons are obviously in that the world has become more litigious and with it more organised, there is more concern over the environment, ships and cargoes are becoming more expensive, while repair yards are full impacting on costs. "The world is more expensive," Hawke said.

Higher claims are obviously more difficult for a smaller club to digest. Hawke warned that clubs must expect at least one per year, but said that in the event of

## Trying to put an estimate on February 2008 P&I club increases is obviously difficult at this stage.



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a 12-month period yielding five such claims of up to say \$100 mill, then some clubs would be in trouble.

During the underwriting years of 2004 and 2006 large claims were random, but impacted on results. For example, after the February 2007 renewals, Aon said that higher pool claims already processed for the first nine months of 2006 stood at \$182 mill. This was far higher than the acknowledged bad year of 2004 when \$144 mill of pool claims were registered during the whole of the policy year.

P&I policy years are closed three years down the line to allow for the majority of claims to be processed. In February of this year, the changes in the IG's reinsurance programme led to individual clubs raising their retention to \$7 mill each. A new \$1 bill overspill

layer was also agreed to provide a total of \$3 bill in reinsurance protection.

Hawke thought that the current era of day-to-day stable claims would continue, while the value of larger claims would keep climbing. "Clubs will have to adapt," he said. He thought that the way ratings were being adjusted was an allotment to the larger claims.

The trick for an owner, operator or charterer is to try to anticipate which clubs perform worse than others. However, there were not many wholesale movements at the last renewal (20th February 2007) as by and large membership of a club is more of a personal choice as companies become attached to a certain club for the long term.

Hawke said that the fixed premium market was still primarily aimed at the smaller

## Restructured cover

**From 20th February 2007, the individual club retention was increased from \$6 mill to \$7 mill and the Group general excess of loss reinsurance contract was also restructured.**

The adjusted lower pool now provides cover for \$23 mill in excess of the individual club retention of \$7 mill and the upper pool (reinsured by Hydra) now provides cover for \$20 mill excess \$30 mill. The previous four layer general excess reinsurance programme

(3 x \$500 mill with unlimited reinstatements and 1 x \$500 mill with one reinstatement) was restructured into a three layer programme (2 x \$500 mill and 1 x \$1,000 mill with unlimited reinstatements) on top of which the group also arranged a collective overspill protection layer (\$1,000 mill with one reinstatement).

The Hydra co-insurance (25%) in the first general excess layer, oil pollution and chartered entries reinsurance structures remained unchanged save for adjustment of the individual club retention. ■

ship market. "Their dynamics are more affected by the reinsurance market," he explained.

Currently the insurance market has a lot of underwriting capacity resulting in the supply/demand ratio being good. However, several factors could impact on the future, not least the UK Financial Services Authority (FSA) and the European Union.

### EU dispensation

As for the threat from Brussels, the group has a dispensation to 2010. Hawke explained that the quasi-cartel situation will not change unless somebody objects. "If the P&I fundamentals change, then the exemption might change", he said. They are regulated under Brussels' Solvency II regulation.

When claims rise clubs must go out and demand more money from their membership instead of just trading through the bad times, as part of the Solvency agreement.

Hawke did not think that consolidation among the P&I clubs was on the cards as illustrated by the break-off of talks about a possible Swedish Club/Skuld merger. Other rumours have also been 'doing the

rounds.'


He also advised an owner, operator or charterer with around a dozen or more vessels to split the entries between two or more clubs, thus "spreading the risk."

Almost every group member has tankers on their books. Claims are handled regionally and different claims handlers will handle the different ship types, thus building up specialist expertise.

Aon also offers consultancy services, such as risk assessment. Some owners, operators and charterers like to deal direct with a club, but would still seek advice on planning and other P&I matters. The broking house also offers third party evaluation services.


For example, events model testing, 'road' testing and benchmarking can be undertaken for a wide variety of businesses, mainly for publicly listed concerns.

For P&I matters, Aon will look at the probabilities, retention, deductibles and other likely scenarios. For example, during bad claims years, the broker will advise a company to be at 'Level X' thus avoiding affecting its share price if applicable. **TO**



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# Charterers wary of increased liabilities

**The obligations and exposure of charterers of ocean going ships have grown in volume and complexity in recent years. Legal and regulatory changes, the stances taken up by port authorities and the precedents set by court decisions have effectively meant an increase in charterers' legal liabilities across a wide spectrum of marine incidents.**

Once incidents occur, all connected parties may be drawn in. This very much includes traditional charterers with ship operating backgrounds and slot, space, voyage and timecharterers.

A hardening regulatory environment effectively underpins claims inflation. The latter stems partly from greater aggregations of value carried on ever larger ships and increasing commodity prices.

All this indicates that a charterer needs increasingly to consider standard P&I cover for the same risks as are usually insured by an owner. He may need to widen the scope of cover for direct liabilities if he agrees to take on contractual risks that would not fall to him as a matter of law. He will also need cover for liability where he indemnifies the owner for such risks.

This is reflected in the growing number of enquiries to the UK Club alone from charterers seeking advice on the nature and extent of their exposure and looking for cover to match it. This needs to be tailored to meet individual situations. Typically, common components are integrated hull and other covers, pure liability protection for non-operational charters and pollution liability without sub-limit.

A charterer's direct liability to third parties can arise in contract or in tort. He will be liable directly to the owner of damaged or lost cargo as the carrier under his own bill of lading or, in some jurisdictions, if he is considered the carrier under an owner's bill of lading. Some cargo service contracts may be

more onerous than the usual standard terms of Hague-Visby.

Any third party who suffers injury or property damage may claim liability as a result of the charterers' negligence during loading or discharging. Some charterparty contracts shift this liability from owner to charterer. In certain US states and other jurisdictions, a charterer can incur direct and even strict liability for pollution caused by the chartered ship. OPA '90 provides that, 'any person owning, operating or demise chartering the vessel', may be liable.

Individual US states have enacted legislation potentially targeting a timecharterer as a 'transporter of oil,' 'person having control over oil,' or 'person taking responsibility.' Alaska and other states impose strict liability for pollution on cargo interests. As a carrier, a charterer can be fined. The US Automated Manifest System Regulations hold the controller of the vessel liable.

## Owners indemnification

A charterer is obliged to indemnify the owner for third party liability arising from breaches of the charterparty or other activities. Breaching a safe port or berth warranty could result in P&I liabilities from cargo loss or damage, personal injury, pollution or wreck removal.

The charterer remains liable for cargo damage and bad stowage, and for death and injury, pollution and wreck removal. Liability will rarely extend to the owner's crew but the charterer may have to indemnify the owner in respect of stevedores and others. Owners require indemnities for property

damage or personal injury arising from dangerous cargo, even if not properly declared by the shipper.

Charterers supplying bunkers will usually have to indemnify the



**The UK P&I Club's loss prevention guru Karl Lumbers.**

owner if they are off-specification, or if the ship does not meet maximum sulphur content requirements in an emission control zone. Pollution may also be his responsibility - for example, in an unsafe port situation.

## Hull damage

The standard P&I cover provided to shipowners excludes cover for damage to the entered ship. However, a charterer may become liable for such damage, perhaps caused by stevedore actions, poor stowage, the cargo itself, not obtaining a safe port or berth; or for damage to ship's engines from 'off-spec' bunkers. General Average and salvage contribution costs in respect of loss or damage to the ship may be recoverable from the charterer.

■ The UK P&I Club, which leads the field in marine protection & indemnity insurance with around 20% of oceangoing tonnage, has experienced

significant growth in fixed premium business, about two thirds of it from timecharterers. Consequently, the Club has published a guide to charterers' liability cover, available in newsletter or online format on [www.ukpandi.com](http://www.ukpandi.com). The key risks are categorised as direct liability to third parties, indemnification of owners and hull damage.

Meanwhile, confusion and ambiguity about what should be entered in ships' oil record books (ORB) had been noted by the UK Club's ship inspectors in their regular visits to entered vessels. Over the years, they felt that oil book record keeping had not been well understood by ships' officers and MARPOL inspectors.

In recent months, however, the IMO has tightened up its guidance in relation to machinery space operations, prompting the UK Club to issue a technical bulletin, summarising members' concerns and suggesting a standard format for ORB entries. The aim is to avoid fines from Port State Control authorities and others for incorrect record keeping.

The areas of most concern relate to oil sludge and other residues retained on board; transferring or disposing of those residues; operating the oily water separator in respect of non-automatic disposal methods; and transferring and collecting bilge water and sludge.

The UK Club's suggested standard format concentrates on these issues. It covers the identification, location and volume of tanks, the quantities within them and detailed records of operations.

# Major research project completed

**A multi-national team has completed a major research project into the technology necessary to manufacture higher-efficiency engines with ultra-low emissions.**

**A** group of more than 40 European engine component suppliers, equipment manufacturers, universities, research institutions and shipping companies, led by leading diesel engine groups MAN Diesel and Wärtsilä Corp, has finished a major 43-month research project called Hercules (High Efficiency R&D on Combustion with Ultra-Low Emissions for Ships). The project had a budget of Eur33 mill, partly funded by the European Union (Eur15 mill) and the Swiss Government (Eur2.5 mill).

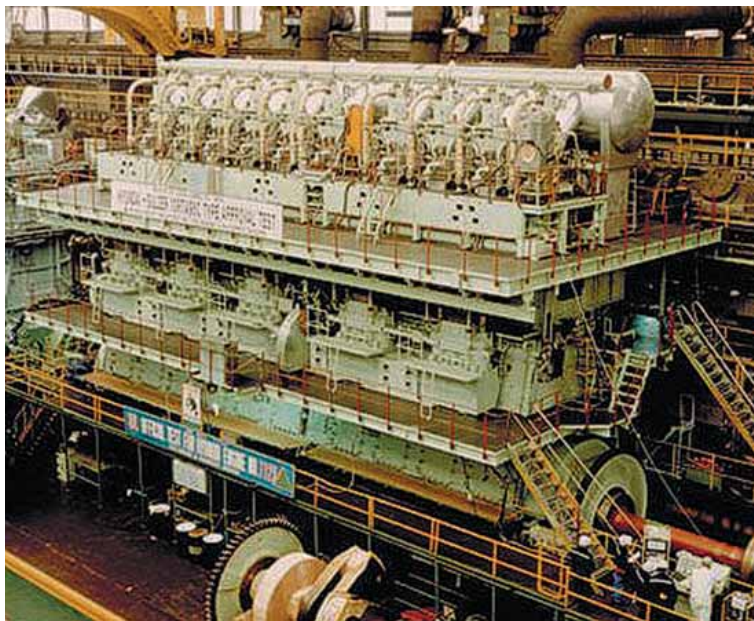
Wärtsilä claimed that the results would allow the participating companies to develop marine diesel engines with technologies, components and equipment that will achieve drastically lower gaseous and particulate emissions. At the same time increased engine efficiency and reliability would result, thereby reducing fuel consumption, CO<sub>2</sub> emissions and engine life-cycle costs.

The results of the research were being shared among the participants and were expected to be incorporated in engines introduced during the next 10 years or so.

The project has been undertaken through a series of nine interrelated work packages (two missing numbers were reserved for packages that were not adopted):  
**1) Extreme design parameters** Knowledge about a diesel engine operating under extreme conditions was gained with advanced research engines capable of coping with severe mechanical and thermal loads. These engines featured variable valve timing,

common rail fuel injection and so on, allowing the researcher to adapt the running conditions.

This work package included a study of the influence of advanced working cycles on engine performance and emissions, finding design and material solutions for engine components operating under extreme conditions and performing full-scale and rig tests to evaluate the technologies.



**Hercules is to be followed by Hercules B.**

The fuel spray and combustion conditions were studied by using optical equipment to look into the combustion chamber through quartz windows.

Vital engine components situated around the combustion chamber and reciprocating parts were evaluated and redesigned with respect to the increased mechanical load and thermal load applying advanced design and material solutions.

**2) Advanced combustion concepts:** Three-dimensional CFD (computer fluid dynamics)

simulation tools were applied to engine combustion for optimising the combustion systems, involving the development of new models as well as the extension and adaptation of existing sub-models.

The developed models were applied to a very large number of cases and the results compared to measured data to ensure the models validity over a wide range of engine types and sizes and

varying operating conditions.

A major achievement was the development, manufacture, installation and testing of a novel test rig for the fundamental investigation of fuel sprays, combustion and emissions formation in large-bore 2- and 4-stroke engine cylinders.

Combustion system optimisation tests were performed beforehand to identify and verify combustion concepts for achieving lower emissions.

**3) Better turbocharging systems** The potential benefits of variable-

geometry turbocharger systems, as well as systems with power take-in/take-out and multi-stage turbochargers were investigated. New concepts for variable turbocharging were also studied and developed. The potential of power take-in/take-out systems was verified with prototype tests on two-stroke engines, while that of two-stage turbocharging was verified on four-stroke engines.

Power take-in systems have great potential for improving part-load behaviour of 2-stroke engines as turbocharging efficiency and thus charge air pressure are considerably increased in comparison to using conventional electrically-driven blowers.

Two-stage turbocharging systems were shown to improve considerably the performance on four-stroke engines, showing potentials for reducing NO<sub>x</sub> emissions by up to 50% at certain load ranges together with some savings in fuel consumption. Good part-load performance was ensured by using a variable inlet valve closure system which enables the Miller effect to be varied according to engine mean effective pressure (BMEP).

**4) Turbocompound, 'hot engine'** The potential benefits of combined cycle systems, also known as turbocompound, were investigated. Different turbocompound alternatives were simulated in computer models. These included 'hot mode' simulations with a two-stage turbocharging system.

A substantial number of prototype 'hot engine' components were developed, manufactured and tested (piston, cylinder liner, steam injection system, exhaust valve

seat ring, turbocharging system, and others). These components were resistant to heat and hot corrosion and could actively contribute to the principle of low heat rejection, as well as to a heat balance, that is state-of-the-art from the points of view of heat recovery and overall system efficiency.

Also included in this work package was research to find the combined optimum for the total process. The main success criteria were the optimal efficiency (CO<sub>2</sub> reduction) of the system as a whole.

This research confirmed that dedicated design of gas power turbines, boiler elements suitable for operating under high exhaust gas pressure and steam turbines developed to actual steam conditions must be made if optimum efficiency is to be obtained. Calculations confirm that choosing the optimal combination of known machinery gives potential for improving combined efficiency by some 3% - 5%.

**6) Emissions reduction methods (internal - water):** Various ways to use water inside engine cylinders to reduce NO<sub>x</sub> emissions generation at source were studied and further developed: the intake air humidification and fuel water emulsion systems for 4-stroke engines, and the direct water injection (DWI), as well as the scavenging air moistening (SAM) systems for 2-stroke engines.

Appropriate computer simulation approaches were devised for the above techniques. Extensive simulations were run for identifying the most suitable geometries and operational parameters.

The systems were further developed by field testing, as well as the experience gained from additional endurance tests in the laboratory.

The systems were successfully tested in collaboration with shipping companies Moller-Maersk group and Wallenius Lines in prototype installations on board some of their vessels.

**7) Emissions reduction methods (internal - exhaust gas):**

Particulate matter emissions from 2- and 4-stroke marine diesel engines were characterised in terms of physical and chemical properties; size distributions were measured, and particulate matter deposited on filter samples was chemically analysed.

The results showed that engine tuning parameters did not have sufficient influence to significantly reduce particulate matter emissions. However, fuel quality did have an impact. Particulate emissions decreased with increasing fuel quality and decreasing sulphur content.

Data resulting from these measurements provided a basis to investigate particulate emissions systematically and to state that the current particulate formation models would have to be adapted.

Correlation with after-treatment technologies investigated in work package No 8 showed that there was a need to explore new technologies for marine diesel engines running on heavy fuel oil in order to reduce particulate emissions to the same extent as for passenger cars.

A complete exhaust gas recirculation (EGR) system for 2-stroke engines was developed including a novel exhaust gas cleaner (scrubber). A potential for NO<sub>x</sub> emission reductions up to 70% was confirmed. Tests on different combustion gas recirculation (CGR) systems were carried out.

**8) Emissions after treatment:** After treatment of engine exhaust gases was also studied. Non-thermal plasma (NTP) equipment was used to demonstrate NO<sub>x</sub> reduction at laboratory level under conditions representative of the exhaust gas composition from a 2-stroke research engine. Results showed that considerable development work needed to be done before NTP systems could be considered a viable proposition for large diesel engines.

A wet scrubber prototype was designed and tested on a 4-stroke research engine. The prototype removed an average of 95% of the SO<sub>2</sub> and 42.8% of the particulate matter in the exhaust

gases, according to ISO 8178.

The shipboard monitoring system was installed on the 8-cylinder 2-stroke engine of a Maersk vessel.

Attention was also given to new measuring techniques. A measuring concept for emissions originating from individual engine cylinders was developed on the basis of preliminary tests and simulations. The sampling proved to be the most critical issue in the arrangement and must be further improved to obtain better results.

Further, Infra-red spectroscopy was tested against the standard NO<sub>x</sub> measuring method.

**9) Reduced friction:** One way to increase engine efficiency is to reduce internal engine friction losses. This required developments in lubrication and tribology.

During the research, valuable information regarding the friction losses was obtained and significant differences depending on engine size were found. A new, 'environmentally friendly', non-metallic bearing material with improved mixed friction properties and reduced friction losses was developed and a new bearing geometry concept created.

A tribometer (friction test-rig) with the capability to determine friction losses accurately and reliably and wear resistances of the piston ring and cylinder liner materials was studied.

A hydraulic simulation model and a device to predict accurately and measure the fuel injection rate of a common-rail fuel injection system were developed. A common-rail system with optimised fuel injection characteristic for a 1,000 kW/cyl engine was tested, and a significant reduction of fuel consumption was achieved.

Simulation techniques for a tuned/adaptive mass damper were developed, and a significant reduction of the vibration levels was achieved, allowing a much wider engine operating field.

**10) Adaptive and Intelligent engine:** The objective for the 'adaptive and intelligent' engine was to create engine systems and

components that adapt to prevailing operational conditions, as well as to component status. This involved self-learning systems based on monitoring with reliable measuring equipment with goal-oriented performance under all boundary conditions, together with engine mode changes based on manual or self-detected requirements.

Significant improvements in performance and reduced emissions were obtained by using an advanced embedded speed controller, also by introducing a new method for sharing the load of several shipboard generating sets or propulsion engines, with self-adapting properties and fault-tolerant operation.


A new adaptive multi-model controller structure for optimised performance of non-linear processes was developed. Tests were also made with dual control for speed and timing using advanced controllers with increased accuracy. Advanced engine balancing diagnostics for common rail engines were tested and verified.

A new method was also developed to ensure advanced fuel injection system reliability by a novel redundancy strategy. Improvements were also achieved in the reliability of adaptive control methods for gas engines by the development of new methods for accelerometer sensor analysis and condition monitoring.

### Next step

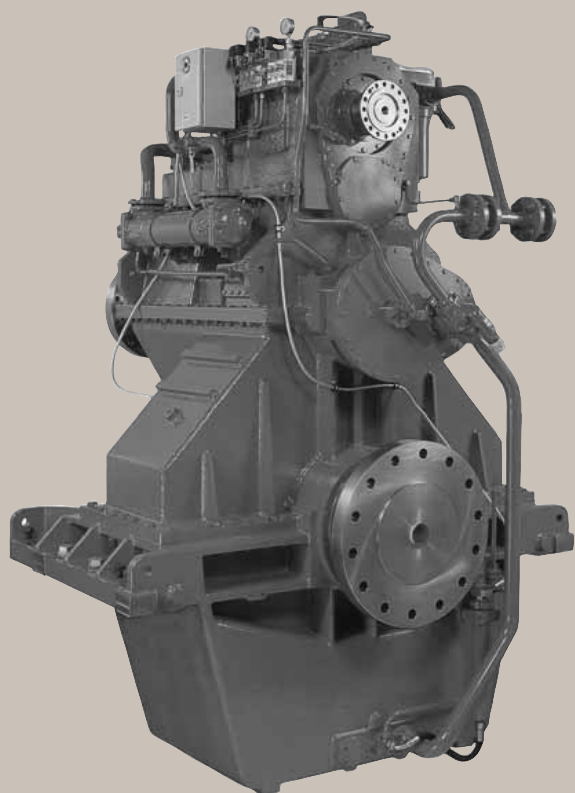
MAN Diesel and Wärtsilä have proposed a follow-up to Hercules in a new large-scale collaborative research project - Hercules-B - announced in October 2006. A proposal was submitted to the European Commission within the 'FP7 Co-operation Work Programme: Theme 7-Transport' in June 2007 and it was expected to have been evaluated by the end of September this year.

The principal aim of Hercules-B based on the developed knowhow and results of the original study, was to considerably improve the efficiency of marine diesel propulsion systems.



Propulsion systems  
for today's sea-going vessels

Photo courtesy of Niveko



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# Broadband slowly becoming accepted

Despite initial fears over the cost involved, more and more shipowners are embracing the concept of broadband communications.

**T**he take up of shipboard broadband services on standard commercial vessels, such as tankers, has thus far been slow. This has resulted in at least one high profile casualty this year - Broadband Maritime.

However, most of the major communications concerns are offering broadband packages, which tend to have been taken up by larger players, for example BP (see page 27).



BP is fitting all of its vessels, including LNGCs and production facilities with Broadband. Picture credit BMT SeaTech.

## Upgrading Fleet

Inmarsat is to launch FleetBroadband later this year, complementing its successful Fleet series. An illustration of their popularity came in August when Inmarsat claimed the milestone of activating its 10,000th Fleet 77 terminal.

This was reached with the installation of the voice, fax and high-speed data service on the newly delivered VLCC *Samco Europe*. The 317,000 dwt tanker, handed over to Samco Delta in April 2007, is registered in Marseilles and managed by V Ships France. The service is now being provided through Inmarsat distribution partner Vizada, formerly Telenor/France Telecom.

"Vessels operating in a modern fleet are increasingly reliant on communications, particularly data communications", said Capt Philippe Watteau, managing director of V Ships France. "Reliable communications play a central part in effective shipmanagement and operation, whether by providing essential weather information and chart updates for vessel navigation, supporting much-needed crew communications, or maintaining connectivity with shore-based vessel management. Owners also like to know that vessels can be reached at any time and at any point on their route.

"When reviewing which service to install on *Samco Europe*, we

selected Fleet 77 because of its compelling track record in the maritime industry, and because of its strong combination of functionality, ease of installation and use, and support for safety services and port communications requirements."

Launched in 2002, F77 is the flagship of the Fleet range, providing global voice, 128 kilobytes per second ISDN and IP data connectivity to support shipmanagement applications, online navigation resources, vessel telemetry, e-mail and other data communications. The service incorporates the latest Global Maritime Distress and Safety System (GMDSS) features, and is compliant with the International

Ship and Port Facility (ISPS) code.

## Satcoms giant formed

Apax Partners has acquired Telenor Satellite Services and has integrated the company into recently formed global satellite communications service brand - Vizada.

Vizada, owned by Apax Partners France, was the name originally chosen for the re-branded France Telecom Mobile Satellite Communications, which was finalised in June this year. Telenor Satellite Services now becomes part of this service.

By combining the two communications giants, Vizada claimed that it can now provide customised and off-the-shelf



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communication solutions, an extensive global distribution network and several decades of satellite experience.

A worldwide network of more than 400 distribution partners is now available and due to the tie-up Vizada has become one of the world's largest providers of two-way satellite communications services.

The company offers both mobile and fixed satellite communications services from multiple satellite systems such as Eutelsat, Inmarsat, Intelsat, Iridium, Loral, New Skies, SES Americom, and Thuraya, among others.

In the near future, Vizada's services will be organised into two lines of business - mobile satellite services (MSS), offering standardised communications solutions, and fixed satellite solutions (FSS), selling VSAT and integrated hybrid networks.

Vizada's MSS business will

work closely with a network of more than 400 reseller partners to distribute communications mainly through the Inmarsat, Iridium and Thuraya satellite systems. Its product range combines off-the-shelf services with a complete range of value-added tools and applications to match the requirements of its varied customer base, the company said.

By combining the two communications' giants, Vizada has become one of the world's largest providers of broadband fixed satellite solutions for maritime and land-based customers. Using a variety of global and regional satellite network operators, Vizada has the experience and expertise to custom design VSAT and integrated hybrid networks for large organisations with multiple remote sites, such as BP.

It is a leading provider of managed maritime VSAT solutions that extend corporate IT

functions to commercial shipping. Vizada also offers a mix of value-added services extending the capabilities of its fixed communications portfolio.

The new company operates globally with subsidiaries located in Europe and the US, Latin America, the Middle East, North Africa and the Pacific.

As mentioned, one of Vizada's clients is BP, which signed an agreement with Telenor last year. This called for a three-year communications package for global broadband services over satellite.

At the time, the two-part agreement, including Telenor land-based and Sealink at-sea broadband communications services, was one of the largest of its kind in terms of numbers of sites, vessels, and systems included.

The contract established the terms and conditions for upgrading the communications systems of ships and production

facilities, as determined by BP, by providing very small aperture terminal (VSAT) equipment and services to BP's entire fleet, which surpassed 80 deepsea vessels by the end of last year, plus several offshore rigs, and land-based production facilities.

By the end of last year, around 20 BP vessels had been fitted with Telenor's Sealink services.

This deal was part of BP's modernisation and fleet expansion programme, which included the provision of all of the company's vessels and production facilities with state-of-the-art, always-on voice and data communications for business operations as well as for crew morale and welfare. It delivers services having speeds of up to two megabits per second and even faster.

Telenor used its teleport facilities in Norway and the US to support this global communications agreement with BP.

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# CapRock signs up Seatrans

**W**ith SeaAccess, shipping companies can more efficiently operate their fleets, captains on board vessels can leverage the corporate network and crew members can take advantage of services designed to help keep them connected, CapRock claimed.

SeaAccess represented the next step in CapRock's involvement in the shipping industry following the launch of the new maritime service division last year.

"CapRock has been delivering reliable communications to customers with maritime operations for more than two decades," said CapRock president, maritime division, Tore Hilde.

SeaAccess provides multi-line voice with toll quality connections, Web and e-mail access, Internet VPN capabilities and broadband data speeds starting at 64 kilobytes per second. Global (C-band) solutions are available for vessels making deepsea voyages and regional (Ku-band) solutions for

**Last April, CapRock announced the launch of SeaAccess Communications™, its new broadband maritime service providing always-on corporate networking and crew morale solutions.**

vessels operating in specific waters, such as coastal.

CapRock's CEO Peter Shaper said. "With 10 regional support centres strategically located worldwide, customers can rest assured that support is always nearby."

One of CapRock's selling points was that SeaAccess provides an always-on service at a fixed price. This eliminates the need for shipping companies to restrict communication usage based on the often high rates associated with metered services and enables them to budget predictable monthly costs. And, as the commercial shipping industry continues to face challenges with recruiting and retaining talented crews, shipping companies are always looking for advantages to enhance the quality of life on board their fleets.

SeaAccess provides services specifically for crew morale, including pre-paid calling plans, hosted e-mail services and wireless Internet connections, the company claimed.

SeaAccess also offers shipping companies the benefit of their vessels virtually becoming 'offices at sea,' CapRock said. Ships can access the corporate network and run key IT applications previously limited by low data speeds of alternative solutions. Similar to all of CapRock's broadband VSAT services, SeaAccess is a managed turnkey solution providing customers with on-site equipment, service, maintenance, network monitoring and support that includes 24/7 access to a help desk.

Following its launch, Norwegian shipowner Seatrans

has signed up with CapRock for its broadband maritime service.

"Ensuring a good working environment on the vessels that we operate is a top priority for our company," said Seatrans director shipmanagement, Leif Larsen. "With SeaAccess, we will be better able to take care of our crew and, in turn, attract top employees to help us continue providing customers with excellent service."

The deployment of SeaAccess represented Seatrans' first adoption of an always-on VSAT service. Previously, Seatrans relied on various on-demand satellite communications, which charge customers by the minute, or by the amount of data sent and received, resulting in the need to limit communications to keep costs down. With SeaAccess, on board personnel have unlimited access to always-on voice, data and fax applications for a fixed, monthly price that is predictable. The contract also includes installation, service and support over the period of the agreement.

The Seatrans Group is a fully integrated shipping company with in-house chartering and operations, shipmanagement, crewing, and accounting services. The group consists of Seatrans AS as the management company and several shipowning and chartering companies. The company operates 27 vessels of which 22 are under group ownership. Seatrans has a shore staff of 95, and employs about 570 shipping personnel from Norway, Poland, Croatia, Romania and the Philippines.

Seatrans operates chemical and product tankers, plus general cargo vessels.



Seatrans has signed up to CapRock's broadband service

# Radio Holland goes broadband

**During the middle of this year, Radio Holland (RH) launched a new VSAT package.**

This hardware, airtime and leasing package comes in one box. The standard package provides internet access, voice lines and three bandwidth levels, which fulfills the needs of most customers, RH said.

The easy to install package is called 'CONNECTOR by Radio

Holland' and is available at all RH's branches worldwide. Full support is also available from RH's branches. CONNECTOR by Radio Holland offers a reliable, cost effective, always-on broadband communication solution and is supported by Radio Holland Connect, the satcom competence centre within the Radio Holland Group.

RH said it had realised that it was evident that an 'always on' connection was key for maritime business processes. The maritime industry can now experience the benefit from among others a fixed fee per month and easily

transferring and processing (large) quantities of data via an 'always on' connection. RH also said that the use of broadband services in the maritime industry is growing, due to operational reasons and crew welfare. One of the tools to keep crew happy is to offer them internet access, the company said.

CONNECTOR by Radio Holland includes:-

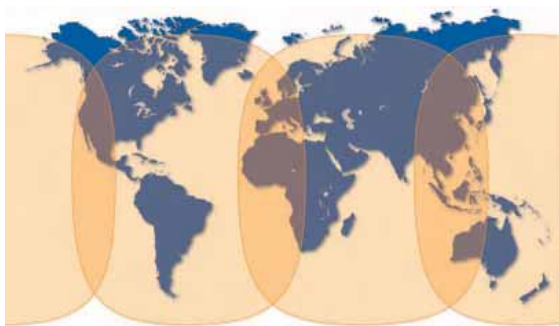
- Always-on unlimited internet access.
- Ku-band on all major shipping routes and global coverage on C-band.
- Guaranteed quality of service.
- Contention ration 7:1.
- Two voice lines (minimum).
- Voice break-out to PSTN.
- Quality hardware.
- Global installation & maintenance through RH's global network of more than

50 branches on major shipping routes.

■ Leasing. Satellite operators Intelsat and SES Global are the key suppliers for RH's satellite capacity. The C-band services are based on three Intelsat satellites covering the globe, excluding the poles.

For the Ku-band services RH has made a combination of footprints covering a major part of the globe, including the North Pacific and North Atlantic.

Three different bandwidth levels are offered: -  
**Level 1** - 128 kbps ship to shore / 128 kbps shore to ship maximum two voice lines.  
**Level 2** - 128 kbps ship to shore / 256 kbps shore to ship Maximum four voice lines.  
**Level 3** - 256 kbps ship to shore / 512 kbps shore to ship Maximum eight voice lines.



RH's C-band satellite footprint

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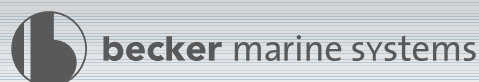
Kormarine, Booth No. P12, Bexco, Busan, Korea, October 24th-27th, 2007



Europort Maritime, hall 1, booth 1203, Rotterdam, Netherlands, November 6th-9th, 2007



Marintec 2007, German Pavillion, Shanghai New International Expo Centre, Shanghai, China, November 27th-30th, 2007



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# Keep an eye on your hull

The art of monitoring hull performance to save the all important cost of fuel is explained by Propulsion Dynamic's Daniel Kane.

**B**y monitoring hull performance in a proactive manner, owners and operators can save up to 10% on their fuel costs, Kane claimed.

He said that hull performance monitoring, both for long term and short term vessel operations, filled a gap in the methods of fuel conservation.

PD has developed CASPER, a hull monitoring system which analyses performance data while vessels were underway, isolating

the build up of ship resistance due to slime, fouling and corrosion.

CASPER is a web-based tool, which uses proprietary computerised mathematical models analysing ship resistance and propeller performance.

By analysing monthly reports, track changes in ship resistance and propulsion efficiency can be summarised in terms of speed and fuel penalties over a period of time. Kane claimed that by isolating hull and propeller resistance, the fuel consumption

implication become clear.

"The reports provide at-a-glance, tangible metrics so that fuel conservation, operations and maintenance departments understand with great clarity the effects of their decision on fuel conservation," Kane said.

He also explained that the CASPER technology had been in use for over 10 years analysing the performance of over 150 vessels.

Kane gave an example of an Aframax on which he said that the effect of slime would increase fuel consumption by 9%. Although this figure seemed high, he claimed that if an operator were to programme his ship to sail at the design speed and then closely monitor fuel consumption, he would notice the difference straight away.

He said that the key is to use a true speed analysis to compare the actual condition while on

voyage with that of the trials data. When on trials the ship's hull and propeller would be clean and smooth.

"By investing money in the drydock to re-establish a pristine hull surface, significant fuel savings can be made," Kane explained.

The graph, PD's 'time history of the added resistance', showed a tanker approaching its first drydocking schedule with 50% added resistance. This equates to a 1.6 kn loss of speed compared to the speed gained on trials, or 25 tonnes per day of extra fuel when steaming at the design speed of 16 kn. Each added a resistance figure to a specific speed and fuel penalty in relation to the trial trip.

Kane claimed that the effects of propeller and hull cleaning, the coating selection and drydocking are clearly shown by the changes in resistance.

## Monitoring vessel efficiency

**One company working closely with PD among others is Chevron.**

Fleet technical manager Christopher Brown explained that the oil major operates 25 vessels, including crude oil and product tankers.

Many of the vessels operate in and around the US Gulf and the west coast of the US on lightering operations and short coastal runs.

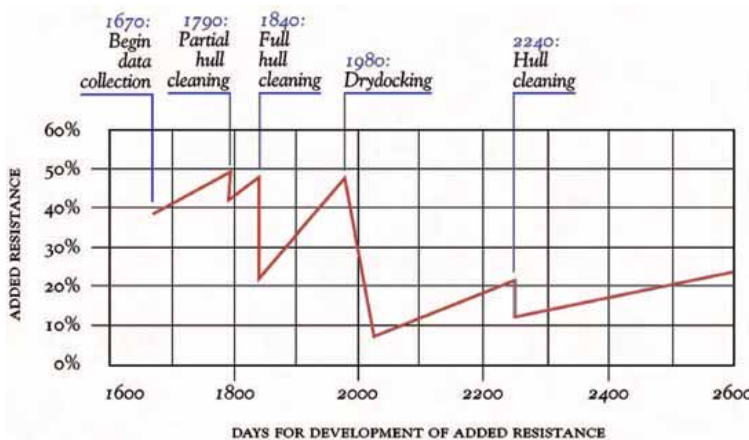
"We are interested in monitoring our vessels performance, not just so we can identify opportunities to save on bunker cost, but to ensure our ships emissions are minimised. We use PD and are pleased with the results," he said.

He also said that Chevron has worked with PD on several

'specialty' projects as well as general ones in efforts to better meet its customers needs.

At present Brown is working alongside North West Shelf Shipping Services, which operates nine LNGCs from the Australia's North West Shelf to Japan and has projects in South Korea and now China.

"Looking after vessel efficiency helps us optimise vessel scheduling, identify opportunities to optimise cargo delivered and reduce the impact on the environment," Brown added. One area currently being looked at with PD is the evaluation of silicon-based coating performance as clean hulls make for greater efficiency. ■



PD's time history of added resistance.

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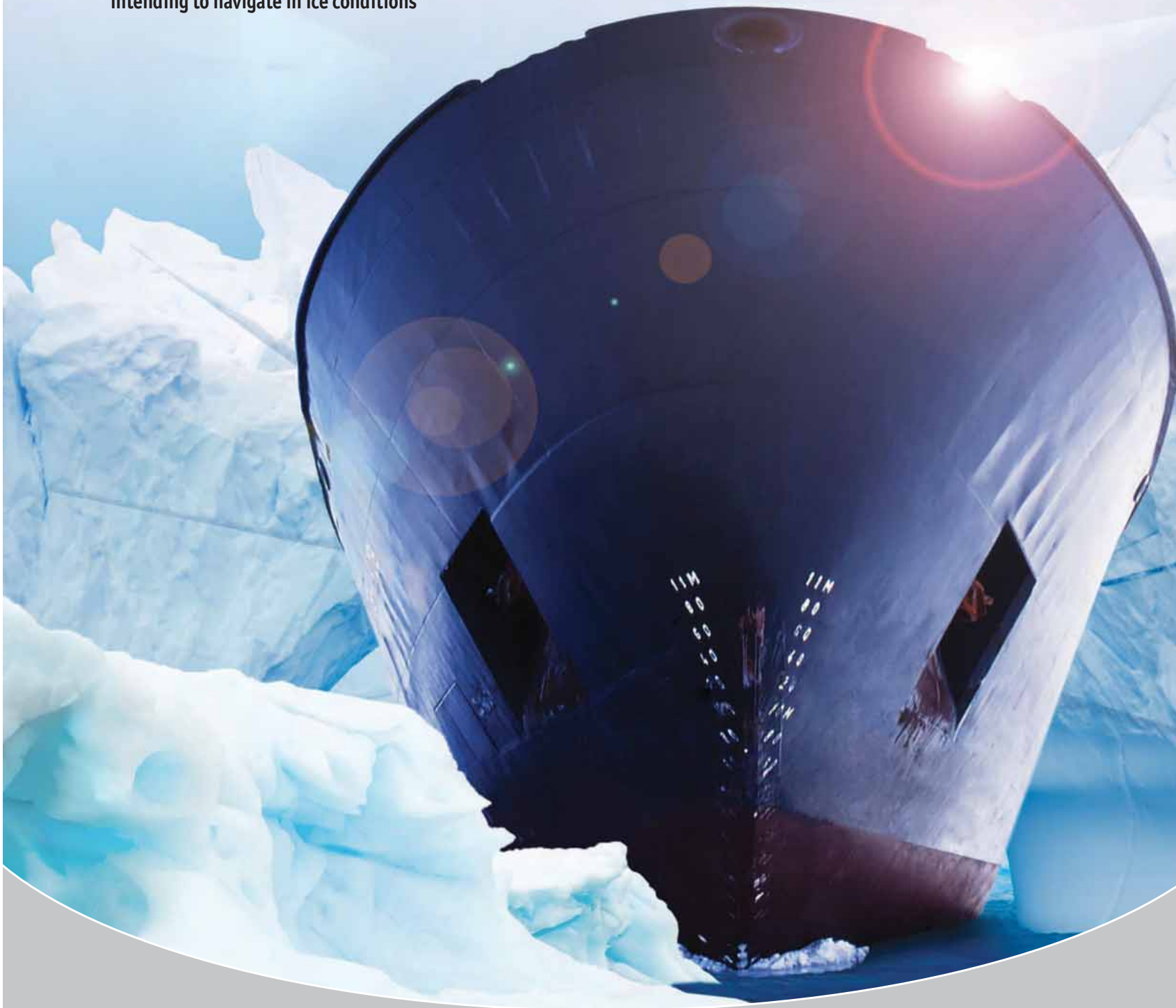
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He also said that the same methods of analysis can be used for trim optimisation, since the trim could be represented as either an added or reduced resistance, thus contributing to fuel savings.

Monitoring the hull performance over a period of time allows the operator to chart and analyse the various hull coatings, such as soft silicone, hard siloxane fowl release, glass flake, conventional and others. Also fuel savings could be predicted when opting for an in-water service and the efficiency treatment in drydock

could be calculated as it related to new base line fuel consumption figures.

Kane explained that although fouling and hull cleaning have been in existence for decades, the new technology allowed an operator to decide when to carry out underwater cleaning for maximum fuel efficiency and coating integrity, plus the method of benchmarking the fuel efficiency of new coating systems on different vessels, even if no cleaning is anticipated.

On the accompanying graph, the



hull cleaning of a containership indicated fuel reduction of around 12 tonnes per day sailing at 24 kn.

With higher fuel prices, an operator could benefit from considerable savings, Kane said. **TO**

## Record year for Portland

### UK's Portland Port's service station has announced a record year for underwater work.

The port said that a number of shipowners, operators and managers had taken advantage of the huge cost and time benefits of calling at Portland for their repair and maintenance work while afloat.

Record numbers of vessels are

calling for such services as interim class dive surveys, underwater and on board repairs and ownership changes, the port claimed.

The former UK navy base's natural advantages of safe, deep and clear waters combined with the expanding skills base available within the port has helped the number of calls to swell.

Portland boasts two international dive companies

operating on site, plus two growing marine repair and engineering companies making the area an attractive alternative to some of the larger traditional ports.

Both UMC and Dive Technologies have bases at Portland. Dive Technologies is the UK arm of Gibraltar-based Scamp.

Companies such as Carl

Buettner, BP Shipping, Euroship Services, Novoship, Enterprises SA and V Ships have all used Portland thus far this year.

Many of the vessels calling for such services also take advantage of the other one-stop-shop services available by way of bunkering, transferring stores and crew while at anchor, or removing slops and take on fresh water while alongside. **TO**

## THINKING OF UNDERWATER WORK AFLOAT? THINK PORTLAND PORT!

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- Underwater Welding
- Underwater Painting & Adhesives Blanking
- Permanent Hull Insert Repairs Afloat
- Anode installation/replacement

**THINK PORTLAND PORT!**



# Successful afloat welding repairs undertaken

**UMC International recently attended a 33,771 dwt vessel at Algeciras, to undertake underwater repairs. Qualified UMC divers were rapidly dispatched from the company's Rotterdam office to the Bay of Gibraltar.**

The first part of the operation included the supply, delivery and installation of 30 anodes by means of underwater welding, with 18 fitted on the rudder and stern frame and a further 12 anodes fitted inside the bow thruster tunnel.

During the installation of anodes on the rudder, divers discovered that the bottom of the rudder had been in contact with an unknown object. This had resulted in two lifting eyes on the tail bottom plate being bent and evidence of a crack in the bottom plate.

The problem was resolved by underwater welders V-shaping the cracked area and re-welding with the use of 3.2 mm underwater electrodes.

For the second part of the repairs, the dive team was then asked to carry out an insert plate repair to the central fresh water cooler. This involved the provision of an external cofferdam, which was designed and supplied by UMC's technical division. The cofferdam was placed over the discharge pipe to enable the old pipe to be cut from the hull shell and a new pipe to be fitted.

On a global scale, requirements for underwater welding are huge, and to fulfill this need, UMC said that it employs full time divers with underwater welder qualifications to ANSI/AWS D3.6-93 Class B welds, certified by Lloyds Register.

To complete the internal repair, the Class B welds were fully

NDT tested and certified by the attending class surveyor as satisfactory.

Worldwide UMC, now part of V Ships, offers a full range of underwater engineering and shiprepair applications, including weld seam repairs and rope guard replacements. Waterborne repairs and maintenance assist in increasing through-life performance and profitability of shipping by greatly reducing the need to for a vessel to dock, the company claimed.

Founded in 1972 as the Underwater Maintenance Co by former Royal Navy divers, UMC now has operational dive centres in Southampton, Plymouth, Portland, Rotterdam, Dubai and Fujairah. Agents are located in Greece, Cyprus, Monaco and Norway.

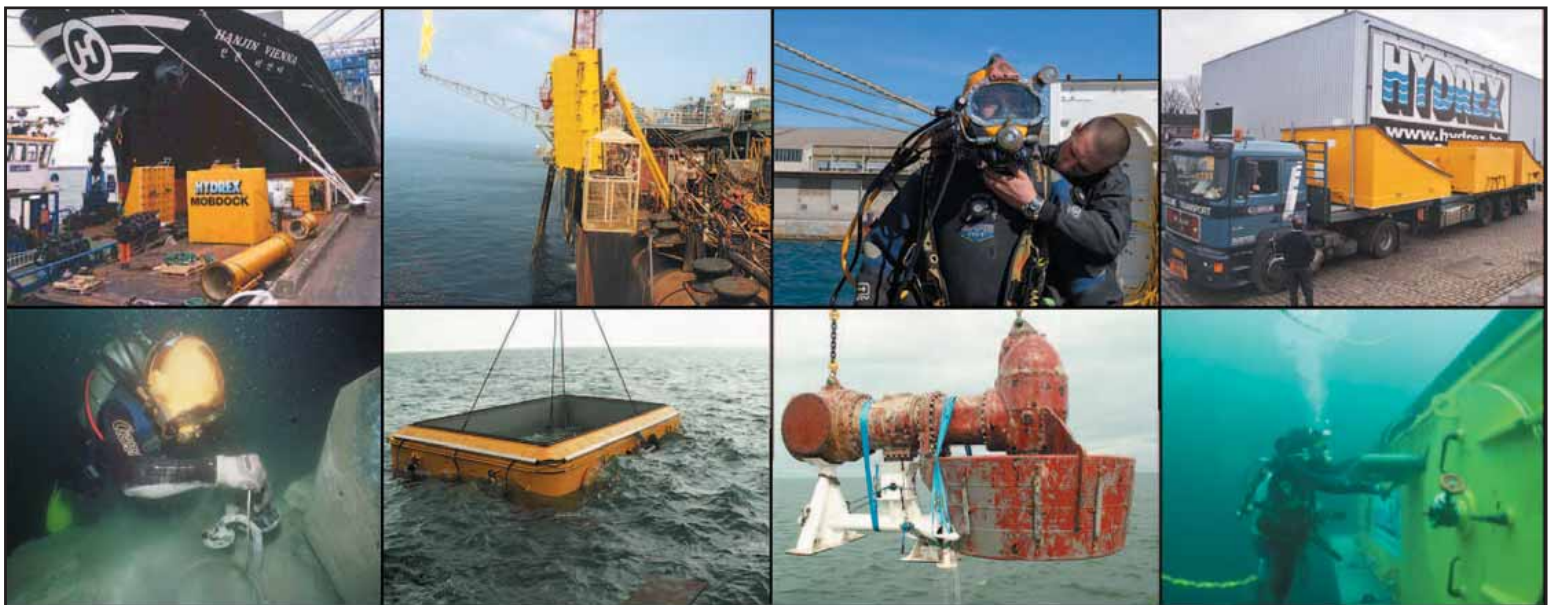
In 2006, UMC was purchased by large shipmanagement concern V Ships, following the retirement of owner David Jones. UMC now operates within the V Ships marine services division.

## Mobdock use

**Hydrex mobile mini drydocks (mobdocks) create a dry environment around an underwater object (see page 42).**

Mobdocks come in large or small sizes and enable work to

be undertaken in similar conditions to those found above water. They can be used for sealing off exterior sections of a hull, while welding work is ongoing inside the vessel and in large constructions to seal off both ends of a thruster tunnel. ■



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# “Pan Pan, Pan Pan, Pan Pan<sup>1</sup> - I need medical advice”

In the search and rescue (SAR) region that is designated the responsibility of the UK, generally considered to be 1-1.5 mill sq miles, the Marine and Coastguard Agency (MCA) has contracted the Aberdeen Royal Infirmary, along with the Queen Alexandra Hospital at Portsmouth, to provide an emergency radio medical advice line, writes Brian Warshaw.

A senior member in the emergency medicine department at the Portsmouth hospital explained to *TANKEROperator* how the system operates. 'In the event of a medical problem, the ship will call the Coastguard who will contact us and put us in direct satellite telephone communication. At our end, the call will always be taken by a senior or experienced doctor in the emergency department,' he explained. 'After the ship's officer has reported the symptoms and condition of the patient, use is made of the medical guide which all vessels must carry; in the case of UK flagged ships, this is the Ship Captain's Medical Guide, which is available through the MCA.'

Most of the calls received at Queen Alexandra Hospital were capable of being resolved, according to the Consultant, without resort to a SAR helicopter, or the vessel being diverted to the nearest port. Should this be deemed necessary the decision would be made through discussion between the master, the Coastguard, and the assisting doctor. 'The vessels,' he said, 'carry a comprehensive supply of drugs and medical equipment, and providing that the emergency doctor doesn't slip into the use of medicalese, we find that the ship's officer is usually very efficient and competent in using our advice to



Tempus 2000 remote medical diagnostic equipment (from RDT. See page 36).

assist the injured or ill seafarer. In some cases the ship might contact us for repeat advice or reassurance during the voyage, while in other cases we would ask them to report on the progress of the patient.'

Calls from the vessel can be sent via satellite, radio or telephone to any of the MCA's 18 rescue co-ordination centres. Although the experience of the Queen Alexandra Hospital is that all the references have been from English speaking vessels, this need may not always be so, and the MCA has in place contracts

with translation services that offer a 24/7 service to assist with any foreign language speakers.

The UK's current obligations stem from European Council Directive 92/29/EEC legislation on minimum safety and health requirements for improved medical treatment on board vessels, which requires member states to designate one or more centres to provide radio medical advice to ships. This service is available free of charge, and provides support in cases where an individual suffers either illness or an accident at sea, and its

purpose is to supplement the first-aid training of the ship's crew, and the written guidance that is available on the vessel.

Seafarer's welfare regulations are the result of action taken by two UN agencies, the International Labour Organisation (ILO) and the International Maritime Organisation (IMO). The most important being *The promotion of seamen's welfare* (ILO 48, October 1936); *Medical advice at sea* (ILO/World Health Organisation 106, May 1958); *Health protection and medical care for seafarers* (ILO 164,

September 1987); and the *IMO MSC/circ 960: Medical assistance at sea* (June 2000).

Radio medical advice has its origins as far back as 1920, when the Seaman's Church Institute of New York obtained a commercial radio license and was able to communicate over a range of 2,500 miles. This was followed by medical centres being established by Sweden in 1922, and Japan during 1928; the most recent being Denmark, which established a centre in 1992.

**Dedicated team**

The radio medical centres, unlike the system of transferring calls from vessels to the hospital accident and emergency departments of contracted hospitals, as in the UK, are staffed by a dedicated team of doctors operating on a continuous 24-hr basis. Typical of these is the Rome-based Centro Internazionale Radio Medico

(CIRM), founded in 1935.

CIRM employs nine doctors and a medical director, who can consult specialist physicians if the need arises. It also has eight telecommunications staff including the manager. The duty-doctor, by means of consecutive calls, maintains regular contact with the ship requiring radio medical assistance until its arrival in a port with adequate facilities to treat the patient, or until the recovery or evacuation of the patient has been completed.

In 2006, CIRM assisted 1,623 ships, employing an average of 10 exchange calls. Three hundred and one vessels or 19% were registered under the Italian flag, although many of the others were Italian controlled ships under different flag states. The calls related to 329 injuries caused by accidents, 289 problems with the digestive system, 187 urinary infections, 186 respiratory diseases, and 651

other medical issues.

The third system of providing medical assistance is through a commercial organisation such as US-based MedAire, an independent operating company based at Farnborough, UK, and partner companies throughout the world. MedAire's Medical Advisory System (MAS) provides services to the Stolt-Nielsen Group, which operates more than 130 parcel tankers and Keystone Shipping, another oil tanker operator out of the US.

'MAS helps our commercial shipping clients prevent medical situations from escalating; and coping with them as they occur', said Jill Drake, MedAire's marketing director. 'When unforeseen medical situations arise in even the most remote or unforgiving environments, MAS has the proven ability to provide best-in-breed life-saving medical expertise, education and equipment. We call it the three Es.'

A subscriber to MAS receives round-the-year medical coverage, patient evacuation and repatriation, and provides a medical inventory control system contained in nine colour-coded pouches that are the equivalent of one year's supply of all the drugs needed on a deepsea or coastal vessel. The system eliminates the need for the regular medication stocktaking reviews, keeps track of expiry dates and maintains a re-ordering system throughout the year.

According to the company, all it takes is one call to its Maritime Global Response Center to activate the vessel's emergency plan. The shipping company's designated person is notified, incident information is relayed to them, and medical advice is immediately made available to the responsible ship's officer. First-aid training courses are also available at a number of sites in the US or directly on board the

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ship. MedAire can also advise on medical equipment and diagnostic technology to be included on the vessel.

### Crew training

For a radio medical advisory service to operate effectively it is necessary for a member of the crew to be trained to a high level in first aid. By tradition, international, and national regulations, the captain is designated responsible for medical care in the absence of a doctor on board. In practice the captain is joined by the first and second officers in having received the relevant training as part of the progress to obtaining a master's certificate.

The officer designated to take charge of medical care on seagoing ships must meet the standard of competence in medical care set out in the four-column table in Section A-VI/4 of the STCW Code. The standard, which is higher than elementary first-aid, must be met by officers at the operational level under Chapters II and III. The student must be able to organise and manage the provision of medical care on board defined under Table A-II/2 of the code.

The Warsash Maritime Academy, part of Southampton Solent University, is one of several training establishments to offer a full range of first-aid courses that comply with STCW'95. The courses range

from the one-day elementary first aid training to the five-day proficiency in medical care on board ship.

At the senior level, the officer will already have completed a four-day proficiency in medical first aid on board ship before undertaking the medical care certificate, and have sufficient knowledge to enable him or her to take immediate action in the case of injury or illness. Warsash's marketing manager Nigel Holloway said that, '...at this level a student would be expected to be able to provide medical care to the sick and injured while they remain on board and to identify symptoms based on the concepts of clinical examination and medical history, plus apply treatment that is appropriate and conforms to accepted medical practice.

'The officer will learn to take appropriate protection against infection and spread of disease, and administer drugs in compliance with accepted medical practice and manufacturers recommendations. A patient's condition should be monitored and any changes recognised promptly,' Holloway explained.

To obtain the certificate, Holloway said that the student should demonstrate understanding and proficiency in head and spinal injuries; injuries to ear, nose, throat and eyes; external and internal bleeding; burns,

“ By tradition, international, and national regulations, the captain is designated responsible for medical care in the absence of a doctor on board. ”

scalds and frostbite; fractures, dislocations and muscular injuries; wounds, wound healing and infection; pain relief; techniques of sewing and clamping; management of acute abdominal conditions; minor surgical treatment; dressing and bandaging; general principles of nursing and nursing care.

The training is demanding; but on completion the seafarer will have sufficient knowledge of medical stores and equipment on board to be able to diagnose medical problems, to provide medical care to the sick and injured while they remain on board, and to participate in co-ordinating medical assistance.

Seafarers work in a high-risk environment, and are also at special risk from acute illnesses due to their inability to be directly treated by a physician or specialist. Although the training of medical carers on board ship has probably reached its peak, and advice from medical specialists is fast and effective, many seafarers who would recover if they were on land, die at sea.

It would appear that the next

stage of improved medical welfare for seafarers lies with the application of remote medical diagnostic tools such as the Tempus System. The Tempus 2000 is manufactured by a UK company, Remote Diagnostic Technologies, and enables a medical carer to take and transmit live information to the land-based advice centre. It is equipped with a 12-lead ECG apron that enables transmission of full cardiac details, essential for identification of serious heart complaints; a capnometer that measures respiration rate and exhaled carbon dioxide; a pulse oximeter to measure blood oxygen level and pulse rate; a blood pressure monitor; and an infrared ear thermometer that measures core body temperature. An integral digital camera, housed in the wrist-keypad operating device, can be used to photograph an injury or affected area of the body. **TO**

**1. The urgency prowords "Pan Pan x 3" are used on MF DSC, VHF DSC, VHF Channel 16 or INMARSAT, to call for assistance.**

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# Flame arrestor arguments heat up

**T**he 83rd session of the Marine Safety Committee (MSC) meets in Copenhagen in early October at which a decision is needed. Since February 2004, when the Danish Maritime Authority (DMA) discovered and reported its observations that several vessels carrying highly flammable chemical products were being conveyed in tanks equipped with what it considered to be inappropriate flame arrestors, a debate had ensued with increasing intensity. The main protagonists emerged as the DMA, and the International Association of Classification Societies (IACS), with the battleground being the MSC's Fire Protection (FP) sub-committee and the Bulk Liquids and Gases (BLG) sub-committee.

The dispute was over a single word - *dedicate* - as it was used in paragraph 1.2.3 of MSC/Circ. 677. It stated, "These standards are intended for devices protecting cargo tanks containing crude oil, petroleum products and flammable chemicals. In the case of the carriage of chemicals, the test media referred to in section 3 can be used (these are given to be gasoline vapours, technical hexane vapours or technical propane). However, devices for chemical tankers *dedicated* to the carriage of products with a MESG less than 0.90 mm should be tested with appropriate media."

The IACS' contention was that *dedicated* meant the vessel must be used *solely* for chemicals specified for the higher class of flame arrestor before a device

## The IMO must decide which of two sub-committees made the correct interpretation for the selection of devices to prevent the passage of flame into cargo tanks on chemical tankers, argues Brian Warshaw.

certified with a MESG less than 0.90 mm was necessary. Whereas the DMA maintained that the conveyance of just one of these products rendered the use of a flame arrestor with a MESG above 0.90 mm unacceptable.

At its February 2007 meeting, the FP sub-committee sided with the DMA's interpretation; but two months later, the BLG sub-committee went along with the IACS argument. Denmark formally wrote to the IMO expressing, "...concern on the matter of the different conclusions from FP 51 and BLG 11, regarding the subject of devices to prevent passage of flame into cargo tanks, and requests the committee to consider the issue and take action as appropriate."

Denmark concluded by stating that, "...to maintain compliance with existing equipment certification and consistency with other standards in this field, the observations referred to in the Danish paper FP 51/18 should be noted. The procedure concluded at BLG 11 is not in accordance with the provisions of IBC Code and MSC/Circ.677 as amended, and there would be serious complications with regards to the other mentioned standards."

A paper has also been submitted by the Community of

European Shipyards' Associations (CESA), which gave the opinion that it was, "...imperative that construction and certification of vessels is carried out to the same standards in all cases."

CESA suggested that if the IACS definition of *dedicated* was, in this case, to be understood as meaning *exclusively designed and exclusively used for*, then it, "...would allow significant reductions in the cost of construction of such vessels... [and] the risk associated with this interpretation would not be greater than that for the existing vessels referred to in document FP 51/18." It also believed that it would be advantageous if the meaning associated with the word *dedicated* could be understood in approximately the same manner in all IMO texts. At present, however, it was not universally applicable, citing the recently elaborated coating standard for dedicated seawater ballast tanks, as it presumably applied also to tanks that would on occasion be filled with fresh water ballast.

In a personal letter unrelated to the MSC meeting; but commenting on the decision of the April meeting of the BLG, Fer van de Laar, currently managing director of the International Association of Ports & Harbors (IAPH), referred to

his previous activities as a representative of the government of The Netherlands at meetings of the Inter-Governmental Maritime Consultative Organization some 30 years earlier. After reviewing his archives from the time, he recalled that the discussions at the various committees had concluded that, "... one should use special test gases when it was known in advance that products requiring such testing were going to be carried.' He said that it followed where the devices on a tank had only been tested for products with MESG exceeding 0.90 mm, a ship operator could only carry such products in that tank. If a product with a lower MESG needed to be carried, then the device should be tested with an appropriate test gas reflecting that property.

Dismissing the argument over clogging, he said, "... it was ensured from the inception of the standards that the devices would not be prone to the phenomenon of blocking. High velocity vent valves, by their very design, rely on high speed movement of air and gases that will prevent any build up of material, and flame arresters at vacuum side inlets are exposed to flows of air only.'

The MSC meeting is bound to make a definitive decision on what is meant by the word *dedicated*, unless it decides to appoint a sub-committee to review the technical evidence. This would be viewed by many as unnecessary prevarication, and would leave the shipping industry in a state of disbelief and confusion for at least a further 12 months.



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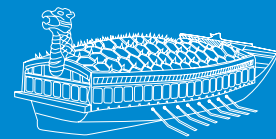
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## MAN Diesel's tanker success

**During August, MAN Diesel started acceptance testing of the final engine out of a series of eight ordered by Bremen-based Harren & Partner.**

These were contracted to be fitted on board eight 16,500 dwt product and chemical tankers being built at the Jiangnan Shipyard in China.

Of the eight vessels ordered by Harren & Partner, six were delivered between November

2004 and November 2006. The final two were scheduled for handover later this year.

The tankers have a liquid cargo capacity of 19,500 cu m, an overall length of 144 m, a beam of 23 m and a loaded draught of 8.4 m.

Each of the tankers feature a single six cylinder inline version of the 48/60B heavy fuel main engine. Rated 6,300 kW at 500 rev/min, the 6L 48/60B engine transmits propulsion power to a single MAN Diesel Alpha CP

propeller via a Renk reduction gear.

Built to Ice Class 1A, the vessels also feature a take-me-home device whereby the 1,500 kW A van Kaick shaft generator on the reduction gear can act as a motor, drawing electrical power from the ships' auxiliary engines.

MAN Diesel said that the eight engines were among the first examples to be sold of the further developed 'B' version of its type 48/60 diesel, featuring enhanced fuel consumption and reduced

emissions among other improvements.

MAN Diesel also said that the positive market introduction of its type 32/44 CR engine with common rail fuel injection continued to gain momentum.

Following its launch in September 2006 at SMM, by mid-June 2007 the company had sold 22 of the new engines with a total output of over 148 MW.

The orders included seven engines for tankers being built for Turkish owners.



One of the first of the chemical/product tankers delivered to Harren & Partner fitted with a MAN Diesel prime mover.

## SAM wins US order

**Hamburg-based SAM Electronics has received its first US order for diesel electric propulsion plant.**

This covers the supply of the latest medium voltage PWM (pulse width modulation) converter technology and two 4.65 MW induction motors for each of three 188 m long chemical and product tankers being built at Atlantic Marine for AHL Shipping Company, Texas. They are destined for long-term charter to Shell Trading, Texas from 2009-10.

The order forms part of a single-source contract secured by parent organisation L-3 Communications of New York under which SAM will also supply Nacos 35-5 integrated navigation command units and GMDSS A3 communication networks while associate L-3 subsidiary Valmarine of Norway will provide its Damatic DNA integrated multi-function automation systems.

The vessels will be the first Jones Act tankers to be constructed under common structural rules (CSR) adopted by IACS.

## New plant for dual-fuel engines

**Ground-breaking of the new manufacturing plant for Wärtsilä 50DF dual-fuel engines, took place on 5th September with a ceremony at the Yeongam, South Korea site.**

The project is a joint venture between Wärtsilä Corp and Hyundai Heavy Industries HHI. The new company will be known as Wärtsilä-Hyundai Engine Company. It was unveiled in January this year.

It will be dedicated to

producing Wärtsilä 50DF dual-fuel engines for LNGCs. Demand for this sector is expected to continue to grow in tandem with the increasing global demand for natural gas. South Korea currently has a share exceeding 70% of the LNGC shipbuilding market.

The Wärtsilä 50DF dual-fuel engine moves away from the traditional steam turbine machinery to a dual-fuel-electric concept with the benefits of much better operating economy and lower exhaust emissions. It can

be operated on natural gas, marine diesel oil (MDO), or on heavy fuel oil (HFO).

Wärtsilä claimed that the engine can smoothly switch between fuels during operation and is designed to give the same output regardless of the fuel.

To date Wärtsilä has received orders for 206 Wärtsilä 50DF engines for 52 LNGCs. The factory, which is scheduled to be in production by the second half of 2008, will produce approximately 100 engines per year.

## Biofuels - a future in marine applications

### Will the use of biofuels be extended to marine 2-stroke diesel engines? In the long term - Yes, said MAN Diesel.

MAN has several orders for 2-stroke biofuel diesel engines for land-based applications. These operate with palm oil of varying quality which, according to MAN, underlines how 2-stroke engines can tolerate different fuels.

The company said it also has projects where tallow is used in preference to palm oil.

Quoting Thomas Knudsen, senior vice president research and development speaking in Diesel Facts, 'Generally, when it comes to the many different biofuels and other alternative fuels that are out there, the extent to which we can make them fluid, with the correct viscosity, and centrifuge and filter them is paramount.

'If we can do all of this, then we can burn them. A 2-stroke engine has such effective combustion abilities that we are not dependent on the value of the cetane number,' he stressed.

The 2-stroke engine is highly

relevant within certain power ranges and not least when high efficiency is needed, when talking of biofuel. The thermal and electrical efficiencies of a 2-stroke engine are higher than that of a 4-stroke engine and hence the larger engine along with biofuels is of great interest to MAN.

Furthermore, biofuels are expensive and therefore a high, 2-stroke, operating efficiency is paramount, according to Knudsen.

MAN has invested in biofuelled 2-stroke engine technology and in principal claimed that all the company's 2-stroke engines are biofuel ready. Knudsen explained that the company will market the concept and MAN already has projects for marine engines in southeast Asia that operate with palm oil.

In the future Knudsen said he expected to see more engines of this type operate with biofuels as in light of the Kyoto protocol, they are considered CO<sub>2</sub> neutral. In Europe, due to the lowering of CO<sub>2</sub> emissions, more orders for biofuel friendly engines were

expected.

Knudsen explained that the main challenge is corrosion caused by fuel in the fuel injection systems and the fuel treatment systems due to the fact that many biofuels can turn rancid and therefore become acidic. He warned that the way biofuels are handled will assume the utmost importance.

He said that MAN's target was to make the engines and preconditioning units insensitive to fuel quality, that is to make the

engines insensitive to fuel's acidity and TAN (Total Acid Number) value. MAN has attempted this and said that it will carry out a demonstration towards the end of this year.

MAN is primarily working on land-based engines and said for the marine sector, overall development needed to be viewed more long term. The oil companies have predicted that it will be possible to produce biofuels in amounts that can satisfy world shipping.



One hundred per cent biodiesel fuel made from recycled cooking oil.

## ULCC benefits from a new hull coating

### International Paint (IP) has successful completed coating work on one of the world's largest crude oil carriers, the 442,500 dwt V-Plus TI Africa.

One of four sisters owned and operated by Overseas Shipholding Group (OSG), the 2002 South Korean-built vessel recently drydocked in Dubai where the coating was applied.

With a total fleet of 144 vessels, OSG is committed to reducing the environmental impact and achieving maximum fuel efficiency. With this in mind, the company said it carefully considered the choice of coating

systems for the massive 20,000 sq m of underwater sides on the 3.2 mill barrel vessel. The decision to use the patented Intersleek 900 fluoropolymer foul release coating was based on experience gained with Intersleek 700 silicone based products already in use on three OSG owned VLCC's.

Captain Robert Johnson, OSG's head of worldwide shipping operations explained, "OSG decided to apply International Paint's Intersleek 900 on the *TI Africa* as we believe the benefits from this type of antifouling coating will contribute to a reduction in the vessel's environmental footprint by eliminating biocides and reducing

emissions, while at the same time enhancing the vessel's efficiency through the water. Our decision to upgrade to the 900 series followed the successful in-service results of Intersleek 700 on three of our VLCC vessels".

Introduced in February 2007, Intersleek 900 is claimed to be exceptionally smooth with unprecedented low levels of average hull roughness, excellent foul release capabilities and good resistance to mechanical damage.

In terms of fuel efficiency and emissions, Intersleek 900 offers predicted savings, depending on application and in-service conditions, of a further 2% in comparison to Intersleek 700 and

6% in comparison to SPC antifouling, although in-service experience on a range of vessel types has shown savings considerably higher than this.

IP said that the potential exists for even greater savings in comparison to controlled depletion antifouling (CDP). The absence of biocides also offers cost advantages at the next drydocking on treatment and disposal costs of wash water and blasting abrasive.

Thus far, 42 ships worldwide amounting to over 2 mill dwt of vessels have already been coated with Intersleek 900. Some 30 more vessels are currently scheduled to be coated in the near future.

# CP propeller system launched

**Rolls-Royce (R-R) has developed a new Kamewa CP-A hub for controllable pitch propellers from its established XF-5 design.**

Hubs for controllable pitch propellers are mature products and development is by evolution, not revolution. However, by examining all the mechanical and hydrodynamic aspects of hub design using the latest tools and techniques, it has been possible to improve the power to weight ratio by about 20% without compromising its strength, with the added benefit of greater wearing surfaces for the blade bearings, R-R claimed.

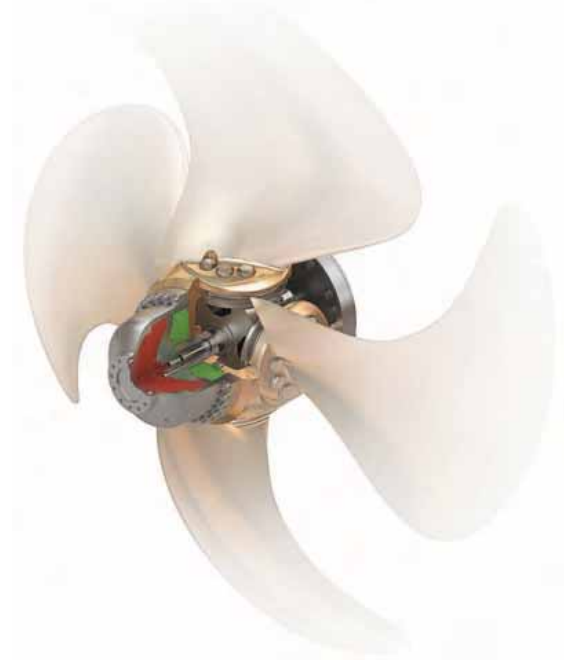
The operating principle of the XF-5 hub has been retained. This is a simple, compact and strong arrangement in which the pitch of the blades is set by a hydraulic piston connected to a crosshead in the hub which carries slide blocks riding on pins in the blade feet.

As standard with R-R CP

propellers, the blades bolt onto the hub and are individually designed to suit the vessel and its operating conditions. However, compared with the earlier design it has been possible to modify the shape of the blade root to give slightly more space between blades and an improved contour for the whole blade root/hub, reducing the risk of root cavitation and providing a small but significant increase in efficiency of about 1.5%.

The new hub is being offered in two main versions. The CP-A standard covers speeds up to about 30 kn while the CP-A/H is intended for faster vessels. They are suitable for the full range of applications and the new hub will be offered in a wide range of sizes, covering powers above about 500 kW with no defined upper limit. Thus the hub design will cover both the present and the anticipated future controllable pitch propeller market.

Both nickel aluminium bronze



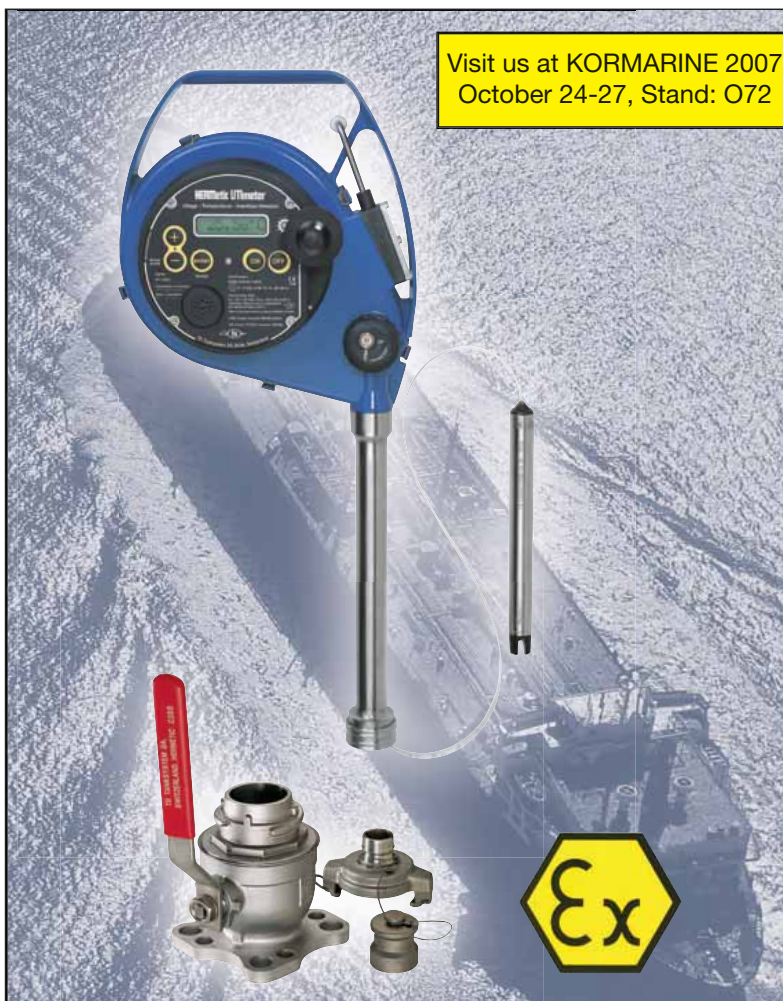
**The new Kamewa CP-A hub has an improved power to weight ratio, larger blade bearing area, and a significant increase in efficiency.**

and stainless steel hubs and blades will be available, covering normal and Ice Class requirements. For extreme environmental demands, a special version with double seals at each blade can be specified.

In parallel with the redesign of

the hub, the hydraulic system has also been updated.

The control system for the new propeller is based on the R-R's common control platform, with a bus connection between the pitch setting system and the bridge levers and displays.



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## Gas carrier stern tube repairs

**Stern tube seal repairs and replacements can now be carried out underwater and in situ, rather than enter drydock as before.**

Hydrex first made a breakthrough in 2002 when it launched what is now known as 'flexible mobdock (mobile mini dry dock) technology'.

This method of replacing stern tube seals underwater has now been approved by classification societies and can be adapted to most kinds of stern tubes to create a dry underwater environment around the seals. Seal repairs and replacements are carried out in co-operation with the top seal specialist companies.

Flexible mobdocks can easily be transported worldwide by plane, making it a simple matter to arrive almost anywhere in just the time it takes to fly there, armed with all the equipment needed and ready to work immediately.

Once a dry environment is created inside the mobdock, specially trained divers can disassemble the seal and bond a new one in place. All this can be done while the ship is carrying out its usual cargo or other commercial operations in port. By bringing drydock conditions to the ship rather than having to take the ship to drydock, a



Work space established around the vessel

considerable amount of time and money can be saved.

Recently a 290 m LNGC had a leaking stern tube seal and contacted Hydrex to replace all fore and aft seals of its outer bearing in La Ferrol, Spain. One of their specialist underwater teams flew out with the necessary equipment to undertake the work.

The poker gauge measurements showed that the wear down was within the required limits. Then the rope guards of both the fore and aft seal assemblies were removed and the split rings of the aft seal assembly were taken off. When this was done the flexible mobdock was installed over the assembly to create a dry underwater environment and then the needed equipment was brought inside.

Then all the seal rings were loosened and the liner was cleaned and smoothed. In the meantime, preparations of the new seals were done on the surface by Aegir and Kobelco specialists and the seals brought inside the mobdock.

During this operation it was discovered that a leak in the oil seals of the fore assembly allowed air to escape from the flexible mobdock. As a consequence not enough air pressure could be built up to bond the new seals in the aft assembly. To remedy this, the divers inserted a temporary seal in the fore assembly to close the gap. With the pressure restored inside the underwater habitat, the four seals of the aft assembly were easily replaced and a test showed

that no oil was leaking from the assembly. The split rings were then reinstalled onto the assembly and the flexible mobdock removed.

After the temporary seal had been removed and taken back to the surface, the mobdock was set up around the fore assembly and its seals were replaced in the same manner as on the aft assembly. The mobdock was removed from the fore assembly, the wear down measured of both assemblies and both rope guards were reinstalled.

While the entire operation was a difficult one as this configuration of seals had not been tackled before and unexpected complications arose, divers worked around the clock in shifts.

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# Environmental and lubricating protection of marine diesel engines

## (Part B - Scrubber technology)\*

It is essential to observe oxidation in the cylinder liners, bearings and crankshaft journals by recording the sulphur content in the fuel oil in combination with the correct lubricant base number (BN).

By the combination of sulphuric acid from high sulphur fuels, the moisture of the air sucked in, the thermodynamic condition created inside the cylinder by the temperature and compression, a light oxidation is ingrained of the cylinder liner's surface.

The incoming lubricating oil with its alkaline reaction, usually calcium salts, regulates the oxidation to the required level to produce an adequate lubricating oil film on the cylinder liners' walls. The lubricating oil's BN is the degree to which it can control the acid. The bigger the number, the greater its ability will be to control the sulphuric acid.

In addition to the lubrication, the NB stipulates the degree of oxidation, but doesn't neutralise it. The control of oxidation is very important for maintaining the correct level of tribology by holding the necessary film of lubricating oil during piston reciprocation.

If the controlling acid becomes near perfect by a high BN lubricating oil, the cylinder liner's surface will become polished, thus will not hold the necessary lubricating oil film with the result that scuffing and wear could destroy the cylinder liner and worse.

The operation of an engine using incompatible lubricating oil

### Scrubber technology is beneficial both for the environment and for diesel engine lubrication.

and fuel sulphur content will create the risk of glazing, scuffing and wear, or the over oxidation of the cylinder liners. The advantage of lubrication, achieved through tiny pores created by the light oxidation of sulphur acid, is that it is extended to the bearings and crankshaft journals.

#### Risks

The operation of a diesel engine with low sulphur fuels is considered to be problematic, due to the reversing of the equation between the required degree of controlled oxidation, glazing prevention, scuffing and wear, BN lubricating oil reaction and eventually the complete lack of direct lubrication by sulphur.

The total alkaline reaction of the lubricating oils must be proportional to the sulphur content of the fuels. The minimum feeding rate for an adequate film of lubricating oil of BN 70 today is about 0.5 grams per brake

horsepower per hour with fuels of about 2.5% sulphur. The average sulphur content in high sulphur fuels worldwide is about 3%.

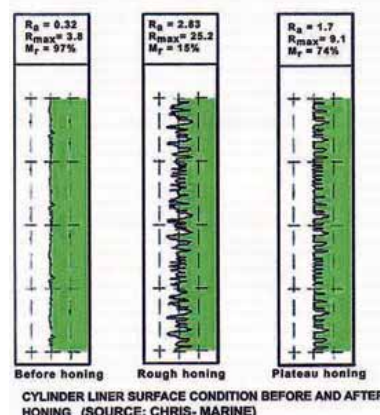
When an engine is burning 1% sulphur fuel with a feed rate of 0.5 grams per brake horsepower per hour, its cylinder liners will not only become over neutralised from sulphur oxidation, but will also be subjected to polishing, scuffing and wear.

With fuels of low sulphur content of around 0.5%, it will be necessary to perform careful adjustments with low BN of around 40-50. This will necessitate frequent and careful cylinder liner and piston ring inspections before the correct level of lubricating oil dosage can be determined. This will have to be repeated each time the sulphur content in the fuels is changed.

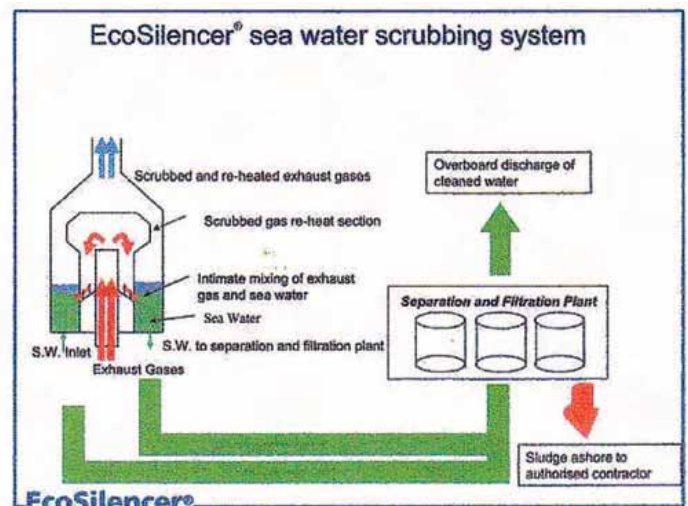
The prime diesel engine safety factor is to be able to correctly

evaluate its general condition after prolonged use with low sulphur fuels. As this will be impossible to undertake by engineers while the vessel is in operation, it should be necessary to open the cylinders three or four times per year for inspection and/or regular cylinder liner honing maintenance and similar due care with the bearings and crankshaft journals.

According to our experience, the cylinder wear not only in a 2-stroke engine with residual fuels of around 3% sulphur content will be similar either with residual fuels with a reduced feeding of BN 70 cylinder oil, that is 0.3 grams per brake horsepower per hour due to poor lubrication, or with a very high feeding of 1.5 grams per brake horsepower per hour cylinder oil due to high wear from glazing caused by deposits. In both cases, this also involves piston ring wear, the need for reconditioning piston crowns and cylinder liners, plus the necessary delay while the vessel is in port undergoing maintenance.



cylinder liner surface condition



ecosilencer scrubbing system

In order to be in a position to correctly evaluate the negative results from low sulphur fuels' combustion, we must always know the physical and chemical characteristics of the fuels used, starting from the vessel's trials. The cylinder liner life fitted in a 2-stroke engine under regular operating conditions can well exceed 45,000 hours.

### Calculation

Hypothetically, it has been calculated that with low sulphur fuels it would be difficult to exceed 35,000 hours of operation.

Basically, the cylinder liners' condition and the combustion chamber characteristics of 2-stroke diesels throughout their life are governed by the conditions of the initial operations of their pistons, piston rings and cylinder liners for the vessels' trial period. Frequent initial cylinder liner inspections and adjustments according to

their programme and thereafter, frequent periodical checks and maintenance will ensure a maximum operational life. This becomes more imperative with low sulphur fuel oil.

For the restoration and regular maintenance of the cylinder liners, a periodic honing must be made in three consecutive finishing preparations of the cylinders' surface. In 2-stroke diesel engines using high sulphur fuels, this maintenance work may be undertaken optionally at the four-year survey. Thus far, it is not possible to define exactly when this should occur when low sulphur fuels are being used, but it will obviously be much more frequent. This also concerns the piston rings, bearings and crankshaft journals.

### 4-stroke diesels

Although not subject to analogous complicated lubrication adjustments to cylinders, the 4-

stroke engines have the same need for light oxidation from sulphur in the fuels for proper lubrication and maintenance of their cylinder liners, bearings and crankshaft journals.

Whereas accumulations in way of piston rings are avoided by the continuous lubricant splashing, they must be more frequently inspected for proper lubrication and possible wear in their cylinders, bearings and crankshaft journals when fuel with a very low sulphur content is being burnt.

Specially distilled bunker fuels should be subject to careful purchases and simultaneous analysis according to the internationally approved standard ISO 8217/2005, available from [Kaminco@kamenis.com](mailto:Kaminco@kamenis.com). The analysis must include indications of quality, sulphur content and particularly of abrasive elements, which cause wear. These abrasive elements need special care. They become more destructive in 2-



George S Kaminis.

stroke engines when using low sulphur fuels and a high BN lubricant at a reduced feeding rate, even if this is taking place in short intervals.

Note: How SOx problems in the Baltic were erroneously diverted against ships will be tackled in a future issue of *TANKEROperator*.

*\*This is the fourth article in the present series written by George S Kaminis.*



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World Shipping (China) Summit 2007 will be moving to Tianjin, where is well-known for the development of Binhai New Area (BNAT), the great event will take place on **November 1st – 2nd 2007**. With the unique location to connect Beijing and North part of China, port of Tianjin has proved itself as one of the hub ports with further aim to pool the functions of port logistics, free trade zone, Hi-tech, marine engineering, and shipping services together. We believe Tianjin will bring you new opportunities!

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