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Marching on one leg

Technical fiction brings commercial reality

HATCHCOVERLESS container ships with a complete cell guide system to secure their cargo are considered to be the ultimate box ships in terms of safety and port turn around by their operators, yet few have been built so far. Now, ten open-top vessels – dubbed the ‘Speedboats’ by their original operator – are finally all operating successfully in the charter market, thanks to some imaginative thinking.

These ten 1,733-TEU nominal capacity vessels, with an exceptionally high service speed of 25 knots, were originally commissioned by the then privately owned Norasia. Following its sale to the CSAV Group, they were taken over by Abu Dhabi Container Line (ADCL) which ran them in a high speed shuttle service between Hong Kong and Trieste. But cavitation and bearing problems and a declining liner market brought a swift end to the service and disaster for ADCL; the ships were arrested in ports around the world.

Following their auction on behalf of their main creditor and its subsequent purchase of the ships at half their original construction cost of \$35M each, V.Ships was appointed as technical and commercial manager with a view to operating them in the box ship charter market.

Even at a knock-down price – still a bargain after spending \$2M per vessel on drydocking and repairs – the ships faced an over-tonnaged market. Worse, their design’s inherent high freeboard penalised them in GT measurements and few liner operators would touch the ships.

But V.Ships is now seeing the fruit of some lobbying in the right places earlier this year, and its experience is instructive. Then, “all we could get was fill-in business,” recalls V.Ships’ commercial manager, Michael Price. Now, the ships are seeing real business and there is talk of other operators placing orders for this sort of ship.

The problem was that the ships load nine laden TEU high in one stack from tanktop to the height of the ship’s rail, with no underdeck

space. But they were measured as if they had underdeck space from tanktop to rail.

Imaginary deck

It took a joint approach to sort out the mess. In co-ordination with Bahamas Maritime Authority, the vessel’s flag state, LR produced a report arguing that their innovative and money saving design was being penalised by incorrect application of ITC 69 regulations. LR assigned a virtual deck for the ships roughly in the region of a fifth-tier container and measured the vessel on this basis, resulting in a GT of approx 15,000 GT.

And what a difference that made. A year ago, the vessels now known as the ‘Shire’ class were obtaining rates of only \$5,000 per day on short-term or round voyage charters. Now, they are getting longer term fixtures and can benefit from the improved market; recent fixtures have seen rates climb to in excess of \$10,000 per day. For example, APL has taken of the *Perth* for a four-month period at \$10,250 and shorter term fixtures have seen rates up to a heady US\$12,000.

While these ships get into their stride, conventional container ship owners are pushing the boundaries of on-deck box stowage to up to seven containers high using the archaic lashing rod/twistlock system to secure them; meanwhile, ever more containers are being lost overboard.

Solutions is dedicated to spotlighting technical solutions to commercial problems, but the story of the hatchcoverless box ship, from its inception in the 1980s until now, has been one of a technical solution causing its own commercial problem. It has taken what some would see as a commercial fiction to break the impasse and make the technical solution work.

The whole episode demonstrates that technology and commerce are the two feet on which progress marches forward. The hatchcoverless ship serves as a reminder that, while it is possible to hop for a short distance, a broken nose is the most likely outcome. **S**

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Fumigation blamed for port deaths

CHEMICALS used to fumigate a timber cargo have been blamed for the deaths of four stevedores last month at India's Visakhapatnam Port Trust (VPT). One dock labour board employee and three stevedoring company workers were about to unload timber from the Thai-flagged bulk carrier *Tharinee Naree* when they collapsed and died on the spot.

The vessel's hatch was open at the time of the incident and "chemicals used for fumigating the vessel are suspected as the prime cause of these deaths, possibly by causing asphyxiation", a port official said. The port authorities have filed a case against the ship's master. An inquiry is being carried out by the plant quarantine officer, port health officer and harbour police team. **S**

Rolls-Royce buys VT Controls

ROLLS-Royce has bought the marine-related business of UK company VT Controls for £11M (\$18M), marking "an important element of our strategy for growth in the marine sector," said Rolls-Royce president Saul Lanyado in a statement last month.

The company will be incorporated into Rolls-Royce's Marine Electrical Systems business unit, which was set up

earlier this year, where it will boost the unit's support services for "marine projects involving major electrical systems," the statement notes. The unit's headquarters will move to VT Control's premises in Portsmouth, on the UK's south coast.

VT Control's aerospace and oil and gas divisions are not included in the purchase. **S**

Serenade enters service

Serenade of the Seas was due to enter service as this issue of Solutions went to press. The ship was delivered by Meyer Werft in Germany at the end of July but formally christened in New York on August 22 before operating to Canada and New England for its autumn programme. The ship is the third Radiance-class ship and is powered by a combined gas/steam turbine plant supplied by General Electric and two 20,000-kW Azipods.



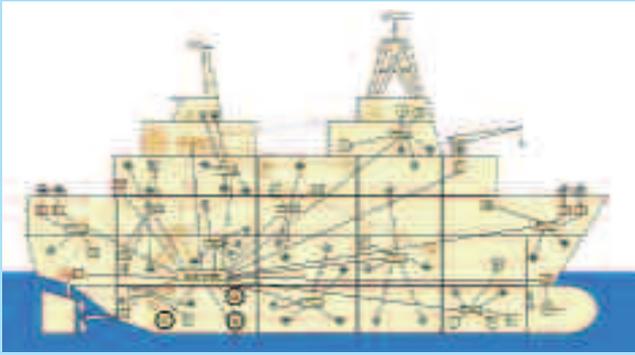
GT success prompts imitators

MORE operators are keen to follow V.Ships' lead in having their open-hatch container ships re-rated for GT. The ship manager succeeded in having its Bahamas-flag Shire-class ships re-rated six months ago and has reported good employment since. High GT values have been the major stumbling block for open-hatch vessels, which otherwise offer operational benefits, since they can discharge and load much faster than conventional container vessels, which is important for the 1,000-1,500 TEU feeders that call at several ports each week.

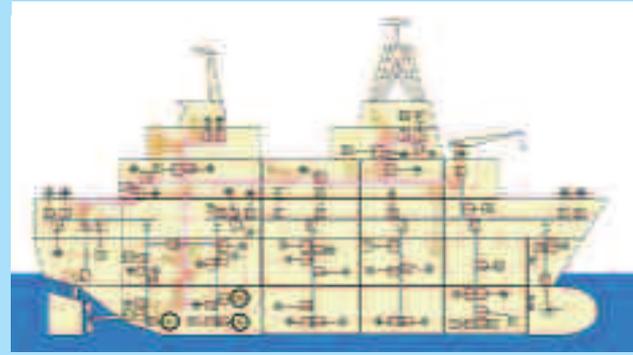
While the reduced GT currently applies to only vessels registered in the Bahamas, *Solutions* understands that the Dutch Transport Ministry is studying a request from P&O Nedlloyd to have its Dutch-flagged open-hatch vessels remeasured, something it has been keen to do since V.Ships' initial success. Managers at Rotterdam, a major port of call for feeder vessels, told *Solutions* that it is open to suggestions regarding a revision of port dues for open container ships.

Other short sea operators are now said to be looking into the possibility of ordering such vessels. **S**

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Shop primer 'prevents corrosion' in cargo tanks

SHOP primer paint "can be considered safer than epoxy coating" as an anti-corrosion treatment for VLCC cargo tanks, believes Mitsui OSK Lines (MOL) after research carried out with JFE Steel and Chugoku Marine Paints.

Shop primer is made mainly of zinc, MOL pointed out in a summary of its findings last month, and over time this transforms into a "fine hard coating of iron and zinc oxide". Analysis of a sample bottom plate cut from a VLCC after 2.5 years in service showed that this oxide coating had more than tripled in thickness over that time, from 15 µm to 50 µm.

MOL believes that double-hulled VLCCs are more at risk to corrosion because of their flat tank bottoms, which "may prevent formation of [an] oil-coating," its report notes, "increasing the possibility of corrosion."

Masaaki Yutani, manager of MOL's environment and technology group, explained that crude oil washing systems are more effective at removing any

protective oil film from the unobstructed surfaces of double-hulled tanks.

As a result, there is more pitting in the steel and MOL checked for pitting to assess its coating options. It inspected the 20 mm-thick cargo tanks of a number of VLCCs and found typically about 50 pits of 4-7 mm deep. In the tankers coated with epoxy, however, it found more than 1,000 pits and, on ships aged five years, 2,000 pits.

On this basis, it concluded that "VLCCs coated with shop primer have fewer and shallower pits." Once an epoxy coating is damaged, it noted, "that part will progressively corrode."

Using primer rather than epoxy clearly leads to cost savings, but Yutani insisted to *Solutions* that "we are talking about this not from a cost but from a safety point of view." But he estimated that primer costs about \$250,000 less per ship than epoxy and agreed that maintenance costs would be reduced; "2,000 pits will cost a lot more than 50 pits to repair," he commented. **S**

STX tests first licensee-built L21/31 engine

THE first MAN B&W L21/31 engine to be built by a licensee has been tested in Korea, where it was built by STX. An MAN B&W spokesman described the event to *Solutions* as "a landmark for production in Korea." The five-cylinder engine produces 950 kW at 900 rpm and is aimed primarily at the auxiliary generator market, although it can also be configured as a propulsion unit for small vessels.

It is said to be lower and shorter than comparable engines and is claimed to have a robust design with low maintenance requirements. It has proved popular with ferry operators and the first L21/31 engine entered service last year on board the ferry *Princess of Scandinavia*.

DFDS Tor Line was also an early supporter, taking 16 eight-cylinder versions for a series of newbuildings at Flensburger.

STX unveiled its engine on the 25th anniversary of its licence agreement with MAN B&W, prompting Claus Windelev, senior vice president of MAN B&W Diesel, to describe the occasion as "a historic moment, which reaffirms the long and strong ties between our two companies."

TD Kim, CEO and president of STX echoed those sentiments. "I am very proud of this achievement," he told his guests, and underlined the engine's benefits, saying that its design will allow longer times between overhauls.

This first engine is destined for one of three 73,000-DWT products tankers on order at the STX shipyard for Greek owner Byzantine Maritime. Each ship will be fitted with three of the engines, for power generation purposes. **S**

Volvo and Wärtsilä to co-operate

ENGINE makers Volvo and Wärtsilä are planning to co-operate on service and delivery for their commercial shipping customers. Volvo now offers engines of up to 1,500 kW, which are being installed as propulsion units in small vessels and as auxiliaries in larger ones. Under the planned agreement, Wärtsilä will sell and service Volvo's auxiliary engines and gensets.

Welcoming the move in a statement last month, Göran Gummesson, Volvo's

vice president responsible for its marine engines said that the deal "can strengthen both companies' total customer offering." And Tage Blomberg, group vice president of Wärtsilä's service division, described the move as "a significant step" for the company.

The combined operation will be introduced into a number of regional markets in the short term, with global coverage planned to follow suit in the future. **S**

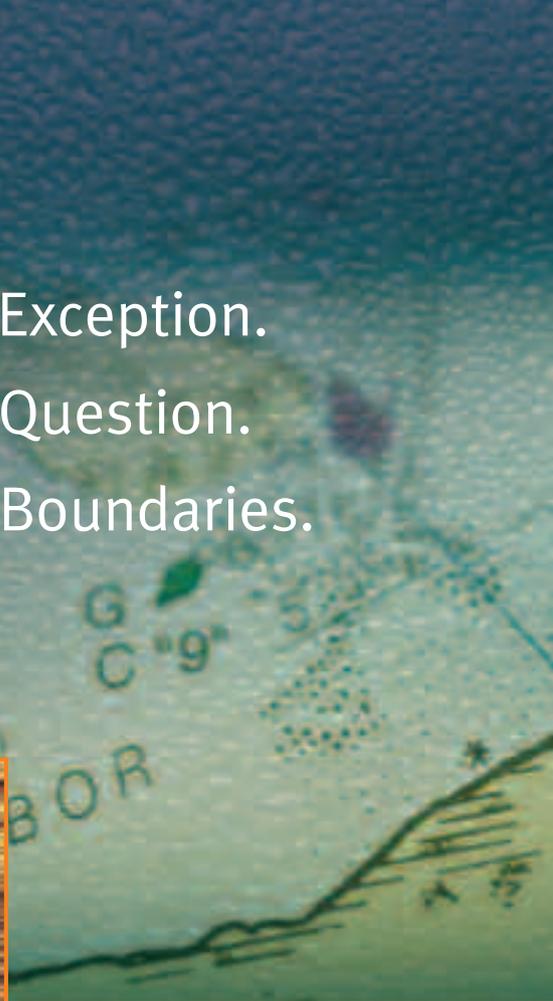
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Admiralty adds Africa to ENC service

ELECTRONIC navigation charts (ENCs) of Durban, South Africa are the first non-European ENCs to be offered by the UK Hydrographic Office.

The Durban ENC is the start of a series of 80 ENC cells from the South African National Hydrographic Office due to be released over the coming months. Until now, the Admiralty ENC service, launched in July 2002, has only covered European waters and includes ENCs from

the UK, Belgium, Germany Portugal and Spain. Negotiations with other ENC suppliers are underway to increase the coverage within Europe and beyond.

The South African ENCs are being released to the 14 shipping companies participating in the Admiralty ECDIS Service trials now taking place before the full commercial launch later this year. The cost of the new ENCs has been set at £15.50, the same as comparable paper charts. **S**

BP revises distance tables

A complete revision of the BP Shipping *Marine Distance Tables* is under way and is expected to be completed in time for publication next year.

BP Shipping has teamed up with software-specialist AtoBviaC to bring the *Marine Distance Tables* into line with modern trading routes, larger ships and increasing numbers of ports in more regions of the world. The new *Marine Distance Tables* will be available as computer software, via the internet and in book form.

Distances will be available to over 2,000 ports and more than 150,000 freshly calculated distances are expected to be in the first release. Ports will be selected from the existing publication, *Worldscale ports* plus additions from *Lloyd's Port*

Call Data. Voyage planners will be able to see the start point and destination, routing options and basic navigational information.

AtoBviaC has enlisted a team of experienced masters to ensure the new versions reflect current trends in sea-borne transport. Routes will comply with mandated traffic separation schemes, known voluntary schemes and national and international regulations. Among many new features will be the ability to select routes avoiding environmentally sensitive areas as well as shortest routes. New capabilities will make the *Marine Distance Tables* attractive to other sectors of the shipping industry such as dry bulk, containers and demurrage interests, not just oil and gas vessels. **S**

Iridium gets into text

SATELLITE service provider Iridium has joined the text revolution and launched SMS (short messaging service) to commercial users.

Text messages of up to 160 characters can be sent between subscribers and to and from e-mail addresses and the company plans to extend it to other cell phone networks by the end of the year. Messages sent but not collected will be stored for up to 8 days.

In June Iridium introduced a short burst data system for transferring compressed data files up to 1,960 bytes but messages on the SMS will not be compressed. **S**

A change in the weather

ONE of the oldest names in weather routing services has disappeared but the service it provided will continue.

Oceanroutes which had been in business for over half a century was taken over by its US parent Weathernews in 1993 and has now adopted that name. The company is currently introducing Orion Pro, an upgrade to its on-board ship routing system, and Metwatch, a new Web-based service for the oil and gas industry. **S**

BIMCO's latest idea

BIMCO has released an updated version of its Internet-based charter party editing system under the title 'idea 2003'. The upgraded service provides users with a number of new features such as exchanging documents for editing online; customising the appearance of amended forms and incorporating company logos into bills of lading. A new add-on feature allows written and audio notes to be attached on-screen to any part of a page of a document produced by idea 2003.

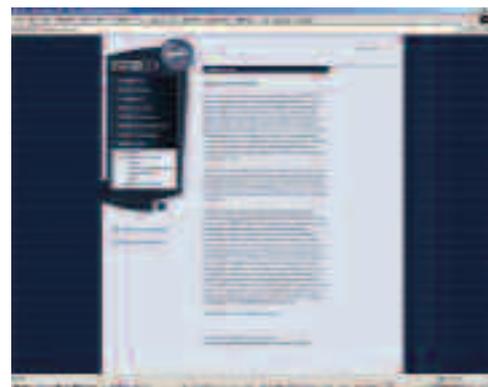
Since its launch two years ago, the system has grown rapidly and there are currently 440 companies in 50 countries using the service.

The new custom edit feature allows users to choose what colour inserted and struck-out text will be and whether edited text will be in italics, bold or underlined. As an add-on feature to idea 2003, Adobe Acrobat can be used to add "sticky" notes and even audio comments anywhere on the pages of a charter party or other agreement created by idea 2003. The annotated document can then be returned by e-mail to the original author of the document for further revision.

The system now contains over 40 electronic forms and a number of non-BIMCO forms are in the process of being added, including several charter parties from major charterers.

Idea 2003 is available at an annual subscription rate of \$100 for BIMCO members and US\$200 for non-members until October 31, 2003.

For more details visit BIMCO's web site at www.bimco.dk **S**



Ready for the gold rush *Europe's yards catch their breath*

CRUISE ship construction is the last bastion of European ship yards yet to fall under the Asian onslaught. While South Korea and eventually China may have aspirations to build large passenger vessels, only Japan's Mitsubishi HI has yet managed to wrest any contracts from the grip of the half dozen or so European yards that dominate this sector. And yet those yards cannot feel comfortable and secure; while they do still have work – in some cases through to 2006 – that is the tail end of a flurry of orders placed before 2001.

Kværner Masa-Yards (KMY) does have the prospect of being granted the contract for what is being called the *Ultra-Voyager* class but that apparently depends upon the strength of the dollar against the euro. Should the Royal Caribbean Cruises' project materialise, the new 160,000-GT ship will eclipse Cunard's 150,000-GT *QM2* ending its reign as the largest passenger vessel ever built. Details on other dimensions, speeds and equipment have not yet been revealed, although the announcement of the deal in June hinted that the *Ultra-Voyager* would be roughly 15 per cent larger in space and passenger capacity than the *Voyager*

class vessels, the last of which – *Mariner of the Seas* – is due for delivery by KMY Turku next month.

Long term confidence in the cruise market is becoming more evident as the sudden shock of terrorism fades and life returns to normal, but shipyards must build to survive and unless orders come soon, some of them will be in trouble. With almost a half share in the sector, Fincantieri must be sleeping easier than the likes of Chantiers de l'Atlantique, KMY or Meyer Werft, the other major players in cruise ship construction. Chantiers' parent company Alstom was given a cash injection by the French government last month and that, together with some orders for ferries and LNG ships, should keep the St Nazaire yard in business ready for a new round of cruise ship ordering predicted by 2008.

Heavily discounted prices at travel agents for cruise holidays might seem proof that the sector is overtonnaged yet some within the operating sector are predicting a massive surge in demand for berths and, by implication, new ships over the next five years. Speaking at the May Cruise and Ferry conference in London, George



Designers believe that ships should no longer look like ships and should be 'a destination in themselves' – this is the Royal Promenade on Navigator of the Seas

Michaelides general manager marketing, Louis Cruise Lines, described cruising as 'the fastest growing sector of the global leisure industry' and said he expected that the European cruise market would undergo a 75 per cent increase in the next five years.

Other analysts predict rises of lesser magnitude but none are talking of a drop in overall demand. Good news for shipbuilders and equipment manufacturers, but something of a headache for the designers because 'making the ship fit the passenger' is seen as the best way of tapping the potential market for cruising. Cruising is no longer the preserve of the wealthy, even if the upper end of the market is the most publicised, and ships are now being designed to match a whole range of different categories of passengers and lifestyles.

Keeping the customers satisfied

If designers see the ship itself as becoming the destination, then the ports of call during the voyage are merely diversions. If they succeed, the extra cost of providing on board golf courses, rock climbing walls or circus-style entertainment can be recovered by reducing the number of port calls, saving tens of thousands of dollars



Lloyd Werft's special relationship with NCL continues with the completion of Pride of America seen here ready for the 25 m extra section to be inserted (Photo: Ralf Whitthohn)

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each time and persuading passengers to spend their holiday cash on board rather than in the souvenir shops and bars ashore. Providing dynamic positioning systems on new cruise ships will assist them in remaining offshore allowing passengers intent on visiting foreign countries to be tendered ashore while the ship itself will incur less if any port charges.

If the predictions and designers' views are indeed the future for cruise ships, then there will be a large number of ships that will need refurbishing, upgrading and converting to meet passenger demands and expectations. That alone will provide work for shipyards, particularly those like Lloyd Werft which has become something of a specialist in cruise ship conversions.

The German yard is currently working on completing and lengthening the *Pride of America* for Norwegian Cruise Lines (NCL). The ship, along with a second which remains unassembled, was supposed to have been the first US-built cruise ship in 40 years when work began on it at the Ingalls yard in Pascagoula. When the owner, American Classic Voyages went bust, the two ships were sold to NCL which towed the partially built hull across the Atlantic to the German yard in December last year.

With the original steelwork completed in July the ship was then cut and work has begun on inserting an extra 25-m section into the ship bringing its new length to 281 m. Reportedly, two extra engines are being added in the new section and cabins for a further 500 passengers will also be installed.

Lloyd Werft appears to have a particularly good relationship with NCL having completed the *Norwegian Sky* for it from the hull of a ship originally intended for Costa. It will also be providing a haven for NCL's oldest ship *Norway* which arrived at the yard in July following a fatal boiler explosion some weeks earlier. A decision on its future has yet to be made but there are rumours that the steam turbines could be ripped out and replaced with diesels. The cost of doing that has been estimated at \$200M which may leave replacing the ship's boilers as a cheaper option. The other alternative of scrapping the 43-year old veteran would leave many passenger ship aficionados horrified as the vessel is considered to be the last of the true Atlantic liners. **S**

Designing for the future



Deltamarin's folding bow idea (see p12) would allow extra space amidships and another deck – marked here in red

OF ALL the cruise ships ever built the *Titanic* more than any other has influenced passenger ship design across the decades. That is not because of any particular features it contained but more because of the ones it did not. Had there been enough lifeboat capacity and had the ship not sunk, it is questionable if there would ever have been a SOLAS convention or the regulations contained in it. There have been other passenger ship disasters since the loss of that great and ill-fated ship but it is probably true to say that the modern cruise vessel is the safest type of ship afloat thanks in part to the regulations laid down in SOLAS.

However, those regulations have also been a constraining factor on naval architects and designers and, despite the amazing innovations and awe-inspiring creations that are the hallmark of the modern cruise ship, the next generation of vessels may be the first for a century where truly radical ideas have been allowed to be realised.

Large passenger ship safety and construction has been on the IMO's agenda for some time now but has been overshadowed in recent years by security issues, bulk carrier concerns and an accelerated phase out of single-skin tankers. The Maritime Safety Committee (MSC) held its 77th session in London earlier this year and, although it received reports of work done by no less than four sub-committees, the target completion date for new recommendations and regulation was extended to next summer's 78th session.

Designers get a free hand

One aspect of the SOLAS regulations that has already changed is that relating to fire prevention and protection. Under Regulation 17 of the revised SOLAS Chapter II, an alternative risk-based

approach is now permitted. This means that some more leeway has been given to designers and equipment such as the directional sound systems developed by Sound Alert may now be acceptable.

While the new regulation came into force for new ships in July 2002, few designers have yet had a chance to explore all the possibilities that may open up to them because so few orders for new ships have been placed since then, and of those that have, most are for ships of existing designs. Also holding back development is uncertainty over exactly how administrations will interpret the new regulations and what will be allowed – together with waiting for approval of the computer programs used to simulate fire evacuation scenarios.

But consideration must still be given to future cruise ship design even if exactly what is allowable and what is not has still to be decided. The cruise ship industry itself has its own views on how future ships should be built and equipped and has two organisations, the ICCL and the CSSF involved in putting forward ideas to the IMO and implementing policies in excess of SOLAS requirements.

Those ideas are eminently sensible and laudable but, apart from the proposal that all ships should have redundant and separate propulsion and steering systems, they are hardly likely to produce any thing different from what might now be considered a typical cruise ship. Ideas for floating islands and gigantic constructions for tens of thousands of passengers are, on the other hand, almost pure flights of fancy and unlikely to be seen for many a year if ever.

In between these two extremes there are thoughts and ideas circulating among



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the more serious organisations that might be involved in constructing the next generation of cruise ship. Ignoring the cosmetic aspects of design, there are three main factors to take into consideration – size, power and layout.

Borrowing bows from ferries

Size is clearly important to ship operators judging by the trend towards larger ships, and chief among the considerations is the route and purpose of the ship. Round the world itineraries demand that the ship be able to pass through the Panama Canal and some innovative ideas and a freer hand with regard to regulations has allowed Finland's Deltamarin to propose a design for a 'Super Panamax' cruise ship with a gross tonnage around 10 per cent more than is currently possible.

The most revolutionary aspect of the design that was described by Deltamarin's business development director Markku Kanerva at this year's Cruise and Ferry exhibition in May is a folding bow of the type usually found on ro-pax ferries. Kanerva explained that adding an 11-m folding section to the bow of a ship with an overall length of 305 m (Panama maximum is 294 m) would allow the ship into the locks but, more importantly, the additional length at sea and its effect on the ship's displacement would allow a complete deck to be added.

Less obvious features of the design involve a complete rethink of machinery and service spaces. Combining the effects of SOLAS Chapter II, Regulation 17 and new probabilistic damage stability rules, means that conventional thinking can be discarded. Under the new rules all limits on B/5 longitudinal bulkheads, B/10 deck height, margin line criteria and similar restraints will disappear, compartmentation will not be limited to transverse bulkheads and the position of bulkheads – other than the collision bulkhead – will not be predetermined.

Deltamarin proposes that all machinery spaces should be aft and the space freed up used for services such as stores and baggage, laundry and workshops. Compared with current designs, that would also permit the lower passenger cabins to be located on deck three rather than deck four. Alternatively, the freed space could be used for entertainment or other revenue-earning activities. **S**

Problems for pod makers

UNTIL the current generation of cruise ships was conceived, designers had always been conservative when it came to choosing power and propulsion systems. Steam turbines were gradually replaced by diesels engines but conventional propellers and rudders were standard until the first pods made their appearance on the *Elation* in 1998. Now it is almost unheard of for a large cruise vessel to be built without pods but even today not all of the teething troubles that might be expected from such innovative technology have yet been ironed out.

Both the leading brands – ABB's Azipod and Rolls-Royce/Alstom's Mermaid – designs have been, or are, the subject of legal claims by disgruntled owners upset by highly public failures and cancelled cruises. ABB's problems have been far less than those suffered by its rival with only the failure of the pods on *Paradise* being of any consequence. Carnival apparently settled for a payment of \$18M plus a commitment to replace at no cost any other units that failed.

The Mermaid pods seem far more accident-prone with all four of Celebrity Cruises' *Millennium* class being affected by mechanical and electrical problems

causing cancellations and expensive drydocking for repairs. Installation work on the four Mermaid pods for the *QM2* was also delayed because of faults discovered on the first to be delivered to the ship in February this year.

Unfortunately for Rolls-Royce and Alstom, the *QM2* floating out ceremony in March was relegated to a drydock party and the absence of the pods was duly noted by the shipping and cruise press brigades, who remembered the cancelled press cruise on *Constellation* in May 2002.

Compensation claim

Celebrity has now brought a case against the two companies involved in making the Mermaid pods, alleging 'defective design' and 'fraudulent claims' and seeking \$30M for loss of revenue.

At the root of these claims is a series of bearing and seal failures that might be attributable to unexpected stress loads placed on these areas during normal operations. A contributing factor could be the inexperience of navigators using pods and attempting manoeuvres that, while technically possible, are beyond the design operational limits of the equipment. The latter point can be addressed



Pods are now standard fittings on cruise ships. These are ABB Azipods on *Radiance of the Seas*

by better training using simulators before allowing a 'novice' handler to be let loose on the real thing, but the more fundamental design problems must be solved if pod makers want to keep their stranglehold on the market.

A newcomer to the cruise ship pod market is the Dolphin system developed jointly by Wärtsilä and STN Atlas, which has made its debut on Radisson's new 42,000-GT *Seven Seas Voyager* built by T Mariotti in Genoa. The ship may not be in quite the same size sector as most of the pod-driven ships, but it does compete on luxury with all 700 guests being accommodated in suites with private balconies. **S**



The empty pod mountings on QM2 at what was supposed to be the ship's floating out ceremony in March bear silent witness to the troubles being experienced by Mermaid pods.

Playing with power options

CRUISE ships are prodigious consumers of power and demand has increased along with passengers' expectations of luxury. The trend towards pods as the first choice for propulsion has allowed a much more flexible approach to satisfying both power demand and a need to reduce the environmental impact of producing it. They have also made it much easier to

achieve redundancy and improved safety by allowing engines to be placed almost anywhere within the ship.

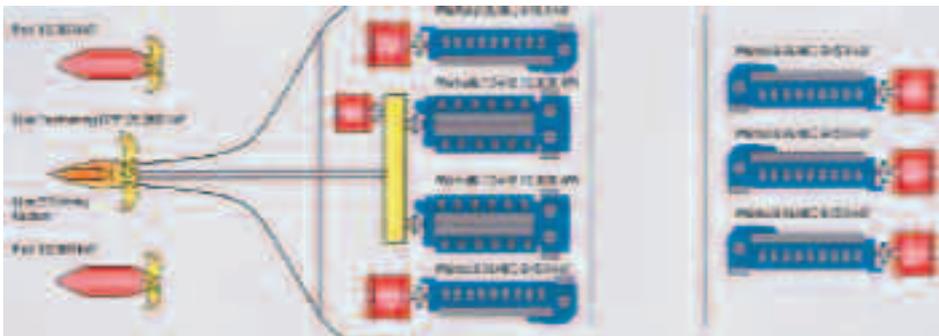
Electricity to power the pods and satisfy the hotel loading can be produced by diesel engines, steam turbines and – increasingly common – gas turbines used in a variety of combinations. A proposal by Wärtsilä envisages a combined diesel-electric and diesel mechanical design

(CODED) which uses two electric powered pods alongside a conventional propeller powered by one or more diesel engines.

In developing the CODED proposal, Wärtsilä compared the capital and operating costs with a conventional diesel-mechanical drive system and a typical diesel-electric podded layout and decided that the CODED solution was economically efficient. It also offers a better redundancy capability because it uses three propulsion systems rather than two.

A typical pod-propelled design using two 22.5 MW pods would have six 12.8 MW diesel gensets whereas Wärtsilä's CODED layout would use two 12.8 MW engines backed up by five 9.45 MW gensets. The mechanically-driven CPP would be powered by the engines

Wärtsilä proposes a CODED propulsion package for future cruise ships



Innovative new C2G centrifugal pump

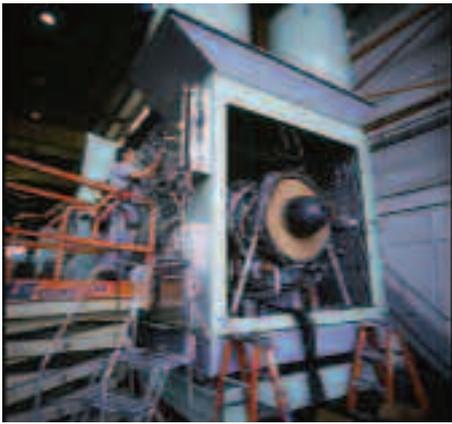
Hamworthy KSE has more than 100 years experience in design and manufacturing of centrifugal pumps for the marine industry. Continued research and development has resulted in the launch of a new pump series, the C2G. Using CAD technology and the most advanced Laminated Object Manufacturing machine for pattern making, the new pump has better hydraulic efficiency and features a high degree of standardization of components, hence lower operating costs. The range covers all duties onboard sea-going vessels.



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Gas turbines from General Electric, such as this LM2500+ destined for the QM2, are installed on many cruise vessels

through a reduction gearbox with steering provided by a Lips efficiency rudder. The gearbox would be fitted with a power take-in from an electric motor to provide redundancy in the event of one of the main engines failing. Two pods of 12 MW each placed either side of the mechanical drive would provide the electric element of the system.

While Wärtsilä is not promoting a power system involving gas turbines, its engines are being used in such configurations. Princess Cruises' *Coral Princess* is fitted with two 16V46 Enviro-engine gensets of 16.8 MW output each and a General Electric GE LM2500+ gas turbine of 25 MW in a CODAG system. Cunard's *QM2* uses the same engines but has two gas turbines and four gensets. Relying on two GE gas turbines alone, Royal Caribbean International's *Serenade of the Seas* has them in a COGES layout with the exhaust gases from the turbines used to generate steam in an exhaust gas boiler which in turn powers a Fincantieri steam turbine.

General Electric has a dominant position in the cruise ship market and has 26 turbines fitted or on order for a total of 21 ships. In July this year alone three vessels – *Serenade of the Seas*, *Island Princess* and *Oosterdam* – were all delivered with GE turbines providing power. Although acknowledged as expensive to run, gas turbines are much cleaner than diesel engines and are virtually pollution free, making them particularly useful for environmentally sensitive areas. In addition they are relatively compact for their output and can be installed in funnel casings so releasing valuable space for revenue-earning purposes. **S**

Genesis of a cruise ship

Latest offspring of a long relationship

WHEN Fincantieri delivered Holland America Line's (HAL) cruiseship *Oosterdam* on 12 July this year, the new ship - built at the Marghera (Venice) yard - became the tenth new ship that HAL has added to its expanded fleet over the past ten years and every one of them was constructed by the Italian builder.

In fact the 84,000-GT vessel is the second newbuilding in what is intended to be a four-ship series supplementing the previous two classes, which also consisted of four ships apiece. Four 55,000-GT *Statendam* class vessels were built between 1993 and 1996 and four 60,000-63,000-GT ships in the *Rotterdam/Amsterdam* class between 1997 and 2000. The new larger series, called the *Vista* class, is claimed as the most luxurious conceived for the owner: The *Zuiderdam*, the prototype in the series, was delivered last November while the two remaining sister ships will be delivered in spring 2004 and early 2006. The *Vista* class ships are 290 m long, can carry 3,200 people (2,388 passengers and 812 crew) at a cruising speed of 22 knots.

The *Oosterdam* is the 26th ship Fincantieri has built for the Carnival-Princess Cruises group and over the next three years a further nine ships will be built for several companies in the group at the shipyards of Monfalcone, Marghera and Sestri Ponente. On the same day of the *Oosterdam* delivery, a second and related event occurred at the Marghera shipyard: the keel-laying of the *Queen Victoria* for Cunard Line (Cunard,



like HAL, is of course owned by the Carnival group). The 85,000-GT vessel, Cunard's first Panamax unit, is scheduled to be launched in May next year and delivered in March 2005. Although very slightly larger than the *Vista* class, *Queen Victoria* is derived from the same design.

This huge amount of work from Carnival (worth \$12Bn to date) has allowed Fincantieri to grab a market share of 49% in the cruise ship sector and it also succeeded in gaining the only two new orders given by ship owners following the tragic events of 11 September 2001,

Class differences

The *Vista* class, designed for ocean-going unlimited world-wide cruise service, is completely new and very different in comparison with both the *Statendam* and *Rotterdam* class previously built by Fincantieri. The very name *Vista* itself gives an insight into the main aim pursued by the ship's architects and designers of giving the passengers ways to enjoy to the utmost the external views from the ship.

As an example, an idea borrowed from some modern high office and hotel buildings but never before seen on a cruise ship, is installing external lifts allowing a 180 degree panoramic view



Fincantieri's latest delivery for long standing customer HAL – the Oosterdam is the second in its class and will be a half-sister to Cunard's Queen Victoria

over the sea to passengers as they travel between decks. A second remarkable feature is the spacious staterooms, of which 85 per cent are outside and 56 per cent have private balconies, consistent with a trend started in 2000 for Carnival Group with *Costa Atlantica*, built at KMY of Helsinki.

The external profile of the ship is very classic but, where many cruise ships have an almost completely white superstructure, the *Oosterdam's* blue hull and blue glass windows combined with the white metalwork give it a distinctly striped appearance. The horizontal lines are interrupted in the middle by the vertical blue glass elevator trunk that characterises the ship, together with the small twin funnels, making it easily recognisable from afar.

Generally the lay-out is the same as most modern Panamax cruise vessels; with narrow superstructures but taller, to optimise and increase the number of outside cabins decks and



Usually hidden under luxurious floor coverings, floating floors increase passenger comfort considerably by dramatically reducing vibration

maximise the number of balconies, with passenger lounges on decks close to life boats or high up and connecting to the open decks. The ship has the maximum possible beam (32.3 m) but not the length; at around 285 m it is almost nine metres shorter than can be presently accommodated in the canal.

Innovative propulsion

This ship is a move forward in many ways, although for this category of vessels technical choices are limited by several constraints such as Panamax dimensions, draught, weather criteria, available passenger and machinery space and commercial considerations. Nevertheless, some innovations are included and while performance may not outstanding it is more than sufficient for the type of work the ship has been designed for. During sea trials a service speed of about 22.5 kt was achieved by its Azipod propulsion and this is apparently slightly higher than the contract called for.

The *Vista* class ships are the first HAL vessels to combine diesel and gas turbine electric propulsion. The power plant consists of five Wärtsilä diesel generators backed up by a GE gas turbine, very handy when cruising in environmentally sensitive areas where low emissions are compulsory. In such circumstance the gas turbine provides all the necessary power for the hotel and essential services allowing the diesel engines to be shut down when the ship is stationary.

A great deal of thought has been given to vibration levels and by using floating floors and other damping devices one can



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hardly feel the ship even when sailing at top speed and on the aft main restaurant, just above the propellers. The highest vibration level measured on board during trials was less than 1.2 mm/sec², around one third of the maximum contractual limits.

All public lounges are concentrated on decks 2, 3 and 9 and above, and despite the longer room lengths compared with the previous class, architect Dingeman and his team at VFD, responsible for the decoration, have done a remarkable job. The ship has a yacht-like atmosphere, with a lot of small, intimate and comfortable corners where every passenger can find a place to relax.

Accommodation on the ship is available for 2,388 passengers and consists of 924 cabins or suites of varying sizes including two penthouse suites, 60 suites, 100 mini-suites, 460 deluxe cabins and 39 large standard cabins. The 812 crew members have a further 468 cabins between them. The spacious passenger cabins are described as well decorated and the ships have a mixture of

cabin types that the typically older-than-average HAL passengers are said to really appreciate, especially the large balcony size in the outside cabins.

For optimising passenger flow on decks and service in the aft main dining room, the main galley has been duplicated portside on decks 2 and 3; so there is a direct access from both the passenger public decks to the main restaurant without compromising the service flow of the waiters from the galley.

The common link of all the new HAL ships, from the passenger angle, is their very sophisticated style, which includes rich art collections presented in an imaginative way. On board the *Oosterdam* there are over 1,700 different materials, sourced from all over the world, some very precious and used in relatively small quantities. Since each type of material has to be documented and approved, designers and suppliers faced a mammoth task.

What's next?

For the time being, Fincantieri does not foresee any further size increases for

future HAL ships because the type of service and cruise experience the line offers its passengers is not considered compatible with post-Panamax ships. "Market requirements are well established nowadays: higher outside passenger cabins with a balcony is one of them but not the only one" states Fincantieri's Maurizio Cergol, cruise vessel chief designer.

Owners themselves appreciate a ship's quality and technical performance, he believes. "This is the main reason why our clients remain or return to us," he believes. "The design and production process always improves when several experiences are brought in. All the knowledge gained working with an owner becomes company know-how, there is no watertight segregation of knowledge inside Fincantieri's Design and Technical Departments," he says.

Five into four

Originally the *Vista* class order for HAL was of five units, until one was diverted to Cunard and will be built as the *Queen Victoria*. Spring 2004 will see the delivery of the *Westerdam* and the final ship is expected early in 2006.

When the contract for re-branding *Queen Victoria* was signed in late 2001, Fincantieri and Carnival also agreed to a re-scheduling of the other HAL ships, beginning a process that ultimately led to the new *Caribbean Princess II* – the 116,000 GT *Caribbean Princess* was launched on 4 July 2003 – to be delivered in 2006.

Cunard's *Queen Victoria* will be somewhat different from *Oosterdam*, due to the insertion of a 16th deck bringing capacity up to 2,543 passengers and 866 crew and increasing the ratio of outside cabins from 85 to 86 per cent out of a total of 984 staterooms.

This first ship for Cunard ever designed by Fincantieri, due by Autumn 2005, is especially significant. "We have made remarkable joint efforts to create a ship expressly tuned to the style of such a prestigious brand" said Enrico Buschi, Fincantieri's head of cruise ships business unit. "Starting from an existing design, important innovative features have been added: the public areas have been reviewed and redesigned and all the accommodation has been adapted to the requirements and expectations of Cunard guests," he said. **S**

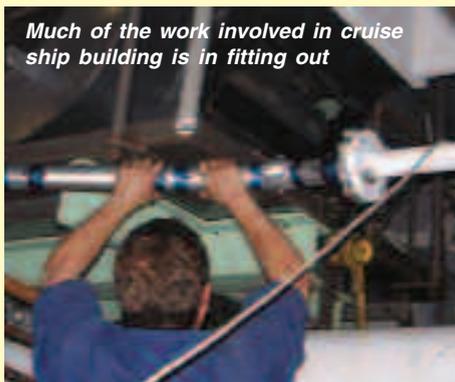
Finishing touches

ALL modern cruise ships are built using the block system, allowing the main hull and machinery to be completed in a comparatively short space of time. The number of blocks will vary depending on the size of the ship – 94 were used for the *QM2* – and yards are employing every means possible to reduce the number. But once completed, a vast amount of fitting-out work still remains to be done. Cabins are usually pre-fabricated to save time and lifted on board where they are connected to the mains services. Then the real work of bringing the designers' dreams to reality can begin

in earnest. The amount of materials used in a modern cruise ship is astounding as the figures below for the *QM2* will illustrate:

- 300,000 steel sections
- 550,000 m² of coatings
- 250 tonnes of paint
- 2,500 km electric cabling
- 500 km of ducts and pipes
- 2,000 bathrooms
- 80,000 lighting points
- 250,000 m² of fitted carpet
- 120,000 m² of insulating material
- 3,000 telephones
- 8,800 loud speakers
- 5,000 fire detectors
- 8,350 automatic fire extinguishers
- 1,100 fire doors

Even a smaller ship the size of *Serenade of the Seas* which, at 90,000 GT is only 60 per cent the size of the *QM2* and 45 m shorter, will have similar statistics, for example 2,200 km of electric cable, 220 tonnes of paint and 200 km of pipe work. Meyer Werft, which built the smaller vessel, has over 20 Tracto-Technik pipe bending machines and uses an automated system to ensure exact size of pipes for prefabricating purposes. **S**



Much of the work involved in cruise ship building is in fitting out

Anatomy of a queen

NOW being fitted out at Chantier de l'Atlantique's St Nazaire yard is Cunard's *QM2* proclaimed by its owner as the largest, longest, widest, tallest and most expensive passenger ship in history. It is also said that when it enters service next January it will become the flagship of the British merchant marine. While it is true that the vessel will sail under the red ensign, there will be many who will question its Britishness; the ship having been built in France, powered by US and Finnish machinery, propelled by Swedish/French pods and, not least, owned by an American parent company. In fact only the bridge equipment and stabilisers will have been supplied by British firms (Kelvin Hughes and Brown Brothers respectively).

But to criticise the ship for nationalistic reasons would be churlish for it is indeed a very fine ship. At first glance the ship's lines are much more traditional than many modern cruise ships with a longish foredeck and the superstructure being set back well away from the stern at the lowest level and increasingly so the higher the deck is positioned.

The hull is made from extra thick steel



Queen Mary 2 takes shape at Chantiers de l'Atlantique

to withstand years of Atlantic batterings and appears to be very streamlined, but the superstructure rises almost vertically from the weather deck to the bridge where many contemporary ships use a sloping form that mirrors the shape of the hull.

What will not be on view when the ship is at sea are the four Mermaid pods – two fixed and two fully azimuthing – or the three forward bow thrusters (rated at 3.2 MW each) that together can either push the ship along at 30 kt or allow it to berth in most ports without the aid of tugs. The *QM2* is equipped with an Alstom dynamic position system that will allow the ship to hold its position continuously almost anywhere or be used for berthing once the exact coordinates of the berth have been programmed.

Power in plenty

Power is supplied by a CODAG arrangement comprising four Wärtsilä 16V46 gensets of 16.8 MW output each and two General Electric LM2500+ gas turbines rated at 25

MW each – in all a total of 117.2 MW of which 86 MW will be consumed by the pods when running at full speed. Cunard claims that the ship's power is almost double that of most 100,000 GT ships, and is sufficient to cover the lighting needs of a city the size of its home port, Southampton.

The two gas turbines are located behind and slightly below the funnel to accommodate their need for a high volume air intake without using valuable space for large amounts of ducting. The four gensets on the other hand are located low down in the ship where their weight will aid stability. A generator is connected to the gas turbines, which run at 3,600 rpm, using a reduction gearbox but it is not intended that the turbines will be used continuously and they will only be run when a high speed is required or in emergencies.

Clean and green

Environmental considerations go beyond the installation of Enviro-engines and include coatings, waste treatment and refrigeration systems. Jotun Sea Quantum, a copper oxide self polishing anti-fouling, is the coating that has been chosen to meet the new anti-fouling regulations and the ban on TBT paints.

Black and grey water are treated in a Rhodia membrane bioreactor that breaks it down to a standard very close to that for drinking water, comfortably exceeding most current surface water legislation in the US and Europe. Sludge from the plant is sent to the food waste treatment plant for further processing and then either pumped into the ballast tanks (eliminating the use of seawater ballast and the risk or species transfer) or used for washing decks and windows or in the ship's laundry. Oily wastes are treated using an Alfa Laval system that reduces oil content to less than 5 ppm. Remaining oil and sludge are burnt in the incinerators or boilers or else pumped ashore. Food waste is also incinerated but paper, cardboard, plastic, glass and cans are all collected and packed for recycling ashore. **S**



A cross-section diagram of QM2's main features

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Accidents raise safety concerns

ATENTION is rightly being focused on marine evacuation systems (MES) following a fatal accident on board a P&O ferry during an evacuation drill earlier this year (see *Solutions* August 2003), but much more needs to be done with regard to lifeboat launching arrangements as well. The number of accidents occurring during lifeboat drills is damaging to the confidence of those that may have to use them during an emergency. MES, whether chutes or slides, are most commonly found on passenger vessels where they are supposed to enable large numbers of people to be evacuated quickly, but the majority of cargo vessels still rely on lifeboats or liferafts.

The IMO is also concerned that the same problems plaguing lifeboat launching arrangements are also occurring with the fast rescue boats which are now mandatory on ro-ro passenger vessels. Following two years of investigating the problem, the IMO Maritime Safety Committee (MSC) has made some recommendations in MSC/Circ. 1094 issued in June – mostly concerned with positioning and crew training – but has recognised that more needs to be done and its review of the problem is ongoing.

Manufacturers of life boats are not complacent. Ove Roessland, the incoming

chairman of the International Lifesaving Appliance Manufacturers' Association (ILAMA), has made it a priority to resolve the issue. In a statement made when taking up his position in July, Roessland – who is also the managing director of Schat-Harding – said: “there are too many accidents occurring because critical parts of live saving appliances are either not serviced or serviced by untrained personnel.”

While that may be true, the UK's Marine Accident Investigation Branch (MAIB) investigators also blame failure of on-load release mechanisms and design faults in the equipment itself, along with insufficient attention by those issuing type approval for the hostile environment in which lifeboats are stored and used. Another contributing factor identified by MAIB investigators is that davits, lifeboats and winches are often sourced from different places and the combinations chosen are not always best suited to each other – sometimes being extremely dangerous.

Considering that davit launched lifeboats have been part of a ship's equipment since before the days of SOLAS, it is puzzling as to why no safer method of securing and launching has yet been devised.

Roessland believes that the inspection and servicing regime for liferafts is much better and he hopes that can be extended to lifeboats. But while liferafts may be safer, there is still an issue of incompatibility between systems and life jackets as highlighted by the training accident.

More new ideas

Appliance manufacturers have yet to develop any of the novel systems that have featured in past issues of *Solutions*, such as making part of the superstructure a self-contained survival craft or the Rescue system – which incidentally still features on the Norsafe Internet site as the system of the future. But there are some items of new equipment that look to address particular areas of the market.



NME's latest addition is designed for small ships

Hammar has marketed a remote release system for liferafts for some time now. A vacuum pump operates the release unit in which a sharp knife slices the rope sling holding the liferaft. It has now developed an electronic version for releasing multiple liferafts on board passenger vessels. The system can operate off the ship's emergency power or a back up battery and more than one control panel can be incorporated so that the system can be operated from any of several points.

Norwegian safety equipment specialist Viking has just launched a mini-chute MES that can operate from the deck of small vessels or a side-shell door for larger ships. The chute height can vary from 5 m to 12 m depending upon the model selected. Another Norwegian company, Norwegian Marine Equipment, has produced what it claims is the smallest free-fall lifeboat on the market with a length of just 4.9 m. The new model has a capacity for 19 people and the company now claims the largest enclosed (102 persons) as well as the smallest lifeboats on the market. **S**

Hammar's remote-controlled lifeboat release system



Incoming ILAMA chairman Ove Roessland wants to improve lifeboat safety.

Clearing up confusion

IMO throws light on safety rules

THERE have been some far reaching changes to various aspects of the SOLAS regulations over the past few years including a completely revised Chapter II dealing with fire detection, equipment and extinguishing. At the last meeting of the IMO's Maritime Safety Committee held in London at the end of May, some housekeeping was found to be necessary in tidying up some of the loose ends of the changes that had come to light.

Of immediate concern to ship operators is clarification on the number of Emergency Escape Breathing Devices (EEBDs) that need to be carried. EEBDs became compulsory equipment for all ships in July 2002 but there has been some confusion as to carriage requirements for ships built since July 1, 2003, prompting the IMO to issue its circular 1081 in June.

This lists the requirements as:

In accommodation spaces:-

Cargo ships

- two EEBDs plus one spare EEBD

Passenger ships with less than 36 passengers

- two EEBDs for each main vertical zone (except those defined in Chapter 11-2 regulation 13.3.4.5) plus a total of two spare EEBDs

Passenger ships with more than 36 passengers

- four EEBDs for each main vertical zone (except those defined in Chapter 11-2 regulation 13.3.4.5) plus a total of two spare EEBDs

In machinery spaces of category A containing main engine:-

- one EEBD in engine control room (if located in machinery space);
- one EEBD in workshop areas where there is no direct access from workshop to escape way;
- one EEBD on each deck or platform

The IMO has clarified how many EEBD sets, such as this one from Unitor, should be carried by ships



level near the escape ladder constituting the secondary means of escape from the machinery space

In machinery spaces of category A not containing the main engine:-

- one EEBD on each deck or platform level near the escape ladder constituting the secondary means of escape from the machinery space

For all machinery spaces, different numbers and locations may be determined by the flag state taking into account layout dimensions and manning levels.

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permitted on ships built since July 2002, but the IMO is concerned about ships that still use this type of equipment instead of the now mandatory (on new ships) self contained breathing apparatus (SCBA). IMO's concerns about the dangers associated with smoke helmets has led it to issue a circular (MSC/Circ. 1085) recommending ship owners to replace the smoke helmets with SCBAs. A phase-out of smoke helmets will probably be welcomed by crew members because of the difficulties experienced in using them. More importantly, with very few training establishments now giving instruction in using smoke helmets, their continued use on board could be a safety hazard in itself.

No more sprays

July 1 this year was also the final date for ships built before July 1998 to replace oil fuel pipelines with double skinned pipes and to fit spray guards or shields around flanged and threaded connections in high pressure fuel pipes located near high temperature sources. Small engines of less than 375 kW may, as an alternative, be enclosed instead of being fitted with jacketed pipes.

In its latest news bulletin, Norwegian P&I club Gard highlights an interesting anomaly in the regulation on pipelines between pre- and post- 1998 built ships.

As well as having to jacket high pressure fuel lines, new ships also have to treat lubricating and other flammable oil pipes in the same manner, but older ships do not. As Gard points out, if it makes sense on newer ships then the regulation should also have retroactive validity. Lubricating and hydraulic oils may have higher flashpoints than fuel oil but all will ignite at temperatures of around 250°C and, given that an exhaust channel could easily reach 400°C, the risk from these oils is also significant.

Gard also makes the valid point that insulation on new engines is perfectly adequate but during maintenance when the insulation is removed, it often becomes damaged or some parts are not refitted correctly increasing the risk of fire. The association recommends its members to consider this aspect carefully when ensuring that the new pipeline regulations are being implemented and to pay particular attention to exhaust insulation. **S**

Looking after yourself

Seafarers could do more on safety

IN HIS final address to delegates attending the IMO's Maritime Safety Committee's 77th session in London in May, outgoing secretary general William O'Neil drew attention to statistics issued by the Lloyd's Underwriters Marine Intelligence Unit that showed a marked decline in ship losses over the ten year period from 1991 to 2001. Annual ship losses for vessels over 500 GT were down from 180 in 1991 to just 80 in 2001, in gross tonnage terms the decline was from 1.75 M GT to 0.75 M GT.

While those figures may reveal an improvement in terms of property loss, they do not necessarily mean that life on board ships has become any safer overall. There is concern, for example, over the number of accidents involving fatalities and injuries that occur during lifeboat drills which has been estimated at around a dozen deaths each year and ten times as many injuries. O'Neil may have had those figures in mind when he went on to admit that the IMO "has not reached the end of its voyage and more needs to be done to create a safer and secure maritime world".

It is difficult to pinpoint any one particular reason why casualty statistics are showing an improving trend and it is probably a combination of the ISM code bringing greater safety awareness, Port State Control preventing obviously

unsafe vessels from putting to sea and actions such as IACS' bulk carrier initiative and enhanced survey procedures. Better equipment and improved technology for detecting fire and other hazards will also have played a part and will doubtless continue to do so in the future.

Personal safety

What cannot be legislated for is the unfathomable personal disregard for safety that so many seamen seem to have. It is all too common to see crew members working on ships without protective clothing, taking unnecessary risks and generally putting their own and others' lives in danger. What also needs to be questioned is why so many ships that have been forced by a PSC inspection to bring their safety equipment up to scratch are found to offend time and time again in subsequent inspections.

It is understandable – but not defensible – that a ship owned by a rogue operator can be kept short of spare parts and repair equipment. But if serviceable life saving equipment were ever on board, then it should be in the crew's interest to keep it in that condition. A lack of training may be to blame in some cases, but not on all occasions when simple checks might be all that is needed to be done. **S**



Not every ship takes its training as seriously as seen here

Security alert

IN ADDITION to what might be considered true safety equipment, the fledgling International Ships and Port facilities Security (ISPS) Code may have some effect on the equipment that ships are obliged to carry, although its main thrust is considered to be in management and operational areas. Some observers believe that the IMO has become almost obsessed with security issues since the end of 2001, to the extent that more serious and urgent work is being neglected.

However the ISPS code is now incorporated into Chapter XI-2 of SOLAS and will come into effect on 1 July 2004. Also included in the new Chapter XI-2 is regulation 5, which will require ships to be fitted with some covert alerting device or system.

This regulation requires that the equipment or system is in place on the majority of vessels by 2004 and on all ships by 2006. Guidance issued by the IMO suggests three possible options for complying, only one of which will involve fitting additional equipment to ships. Covert tracking systems have been available for some time now from suppliers such as Purplefinder and have been featured in past issues of *Solutions*.

The devices use one of the Inmarsat systems to send an automatic position report at pre-programmed intervals. In an emergency, a covert alarm can be activated remotely which will cause the device to send different messages alerting shore offices that something is amiss. Typically, the devices are small shoebox-sized and can be disguised so as not to be obvious. For high risk ships the possibility of fitting more than one device could be considered as a fail-safe in case one of them is discovered and disconnected by intruders.

The other options suggested by the IMO involve either a modification to normal GMDSS systems for activating alarms or using key words in routine messages to shore – both of which pre-suppose that the communication equipment of the ship remains operational but which might not be the case if taken over by intruders. **S**

Stating the obvious

AMARINE superintendent, who admits that his company is probably operating at the lower end of the professionalism scale, told *Solutions* that the latest amendment to SOLAS Chapter V Regulation 28 requiring ships to submit daily position reports is a perfect example of how out of touch some regulators are – “because that is something that even poor operators do as a matter of course.”

The daily report, which should contain details of a ship's position speed and course along with any other relevant details, is said to be an aid to rescue centres in an emergency. But, as the superintendent said, that is why EPIRBs and SARTs are required equipment under SOLAS. He also questioned how it is to be policed, adding that the ships belonging to any operator that did not take such elementary precautions were likely to be in such a bad state of repair that they would be stopped from sailing by PSC inspectors long before any investigation was initiated into whether reports were sent. **S**



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More news on the aliens

Research could muddy waters in ballast debate

A RESEARCH project investigating plankton populations and movement in the Pacific has produced some results that may add fuel to the continuing debate on ballast water management. Findings so far suggest that coastal organisms can be found in the deep ocean, raising questions about the logic of ballast exchange to prevent moving alien species around the globe.

Last month *Solutions* reported on the second GloBallast symposium and makes no apologies for returning to the subject so soon because of the impending adoption of the IMO convention next February, and a possible mandatory imposition of ballast water exchange by the US authorities later this year. The Pacific research discussed on these pages is an extension of a similar project that has been operating in the Atlantic since as far back as 1931. The project is currently funded by the *Exxon Valdez* Oil Spill Trustee Council's Gulf Ecosystem Monitoring Program and the North Pacific Research Board.

Dr Sonia Batten, Pacific CPR project (CPR: continuous plankton recorder; see box) co-ordinator told *Solutions* that the aim of the project is concerned not with ballast water management but natural changes in numbers of plankton and the movement of populations around the oceans. Even so, some of its findings may add weight to arguments against ballast water exchange and, some would say, the likely efficacy of any ballast water treatment in preventing species transfer.

Plankton are at the start of the food chain in the ocean. Animal (zoo) plankton feed on plant (phyto) plankton and in turn they are eaten by fish, sharks and even large whales. They are incredibly numerous, mostly microscopic and incapable of much movement simply drifting around in the currents.

Away from the ballast water issue, interest in plankton has been focused recently on the fact that they may be good indicators of the state of the oceans. Because they have little control over where they go, their numbers and distribution are determined by the

conditions they are exposed to. They also have very short life spans – mostly from days to a few months, so populations react rapidly to changing conditions. These two factors, together with the fact that they form the food chain supporting valuable fish stocks, make them prime candidates for studying the effects of climate change on the oceans.

Industry involvement

One of the pioneering owners – Polar Tankers – first became involved in the plankton research in summer 1997 when its ship the *Polar Alaska* (then known as the *Arco Alaska*) towed a CPR from Valdez, Alaska to Long Beach, California. This was a trial exercise for the Sir Alister Hardy Foundation for Ocean Science (SAHFOS) which runs the plankton recorder survey in the Atlantic. The contribution of Polar Tankers was crucial in getting the Pacific research under way. The collaboration between Polar and SAHFOS gained the support of the North Pacific Marine Science Organisation.

The open ocean areas of the Pacific are expensive to study and little detail is known about the marine organisms that

CPR research: Can you help?

CONTINUOUS plankton recorders (CPRs for short) were invented in the 1920s by an English scientist, Alister Hardy. His machines could be towed behind vessels to collect marine plankton and the Sir Alister Hardy Foundation for Ocean Science commemorates his work.

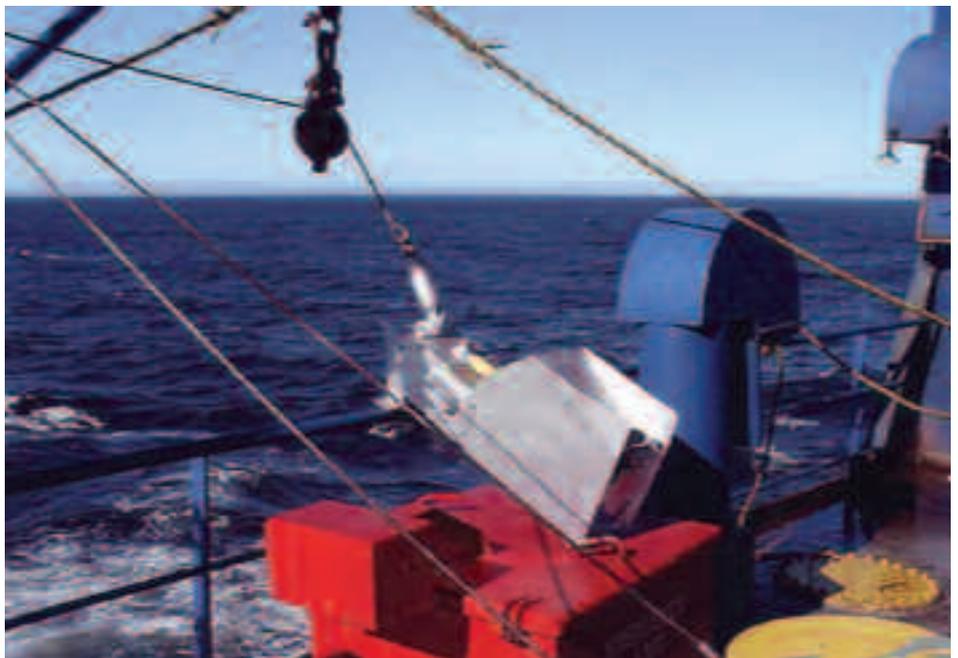
The devices have been used ever since in the North Atlantic and more recently in the North Pacific. However, it is hugely expensive to send research ships to sea and towing CPRs can be done just as easily by commercial ships.

So Dr Sonia Batten, who co-ordinates the Pacific CPR project, acknowledges the assistance of those ship owners that have already assisted in her research.

If you have ships operating in the region and are willing to take part in this project, contact Dr Batten via e-mail at soba@mail.pml.ac.uk and invite others to offer their services as well.

More information on the CPR project can be found at www.sahfos.org **S**

The CPR equipment that ships taking part in the survey would need to have fitted.



inhabit areas far from shore. The need to address the impacts of climate change added impetus to begin a systematic plankton survey in the North Pacific.

The same Valdez to California route has been sampled five times from the *Polar Independence* and the *Polar Alaska* through the spring and summer (when plankton are most abundant). The programme was also joined in 2000 by Seaboard International Shipping which operates a regular bulk lumber service between Vancouver and Japan with the ro-ro vessel *Skaubryn*. The ship towed a recorder from Vancouver to Japan initially once in each summer and now three times per year. This deployment is the longest ever tow of a CPR.

Three years of samples

The plankton collected by the CPRs is processed in the SAHFOS laboratory in the UK and, after three years of sampling, sufficient data is now available to say something about the type and quantity of plankton. This is the first time that such data has been available through the seasons on such a large scale in the North Pacific. Of particular relevance to the ballast water debate is the discovery that coastal plankton are carried far out to sea in eddies of water that spin off the continental shelf in winter. One of the arguments advanced in favour of ballast water exchange is that coastal species are not present in the deep ocean and clearly that view now has to be questioned.

According to Dr Batten, the project has detected distinct communities made up of different types of plankton in different regions of the North Pacific and one of the most striking results has been the variability between years in the amount and type of zooplankton present. In most areas sampled along the route there was more plankton (in terms of numbers) in 1997 than in 2000 and 2001 (samples from late summer 2002 are still being analysed). However, the actual amount of plankton (in terms of weight, or biomass) changed too, and in 1997 there was less biomass than in 2000 or 2001.

Dr Batten's latest report shows that this is because the type of plankton also changed with far fewer small zooplankton after 1997 and more larger zooplankton. However, the area close to Alaska seemed to be showing the opposite pattern. This shows that the different regions of the North Pacific do not change uniformly.

Some scientists now think that the ocean changed suddenly in about 1999 from the warm regime of the previous decade to a different, cool regime. Such shifts are often very sudden and, although little is known about how they are caused, they seem to affect the whole ecosystem. It is believed the cooler regime may be more favourable to salmon and other larger animals, which prefer to feed on larger zooplankton.

During 1997 and 1998 the North Pacific witnessed an El Niño event. El Niño occurs periodically, every 5-7 years, and in this region is evident as unusually warm surface waters. This may have had some influence, although as yet researchers are not sure how that translates into more plankton. 2002-2003 may also be experiencing a weak El Niño event and it will be interesting to see the effects of it on the plankton this year.

Bird and whale data

In summer 2002 the project expanded with the collection of seabird and whale observations from on board the *Skaubryn* (in collaboration with the Point Reyes Bird Observatory and the Canadian Wildlife Service). This was the first time that data on the bottom and top of the food chain had been simultaneously

One of the arguments advanced in favour of ballast water exchange is that coastal species are not present in the deep ocean and clearly that view now has to be questioned

collected on the scale of an entire ocean.

In June 2002 more than 112,000 birds were counted and recorded and this number was even greater in June 2003. Work is now underway to

compare the seabird communities with the plankton communities. Dr Batten hopes that this will provide insights into why certain bird species are in particular regions, and how this changes with the seasons. Not only would this show the implications for the fish and whales that feed directly on the plankton – where the food is and when it is there can change dramatically from year to year and month to month – it may also provide ships with a method of knowing where high densities of plankton are by identifying bird and animal species which feed upon it.

“This survey is already proving to be of great interest to marine biologists and fisheries scientists from around the Pacific and we hope it will continue for years to come,” said Dr Batten. “This type of collaboration with industry and the commercial vessels is one of the few ways that scientists can hope to monitor the oceanic world and gain an understanding of what goes on there. The science community is indebted to Polar Tankers and Seaboard International for their help with this work”. S

An end to voluntary practice

THE US Coast Guard (USCG) is proposing to withdraw self-regulatory privileges from ship owners and operators because of the low rate of compliance with ballast water management guidelines.

Currently all ships with ballast water tanks are obliged to perform an open-ocean ballast water exchange if arriving at a US port from outside the EEZ and providing the safety of the vessel is not jeopardised.

Investigations have shown that less than half of ships comply and, as a result, last month the USCG filed notice on the Federal Register to impose a mandatory ballast management plan for all ships in US waters. Effectively this would involve

the same conditions that now exist within the Great Lakes applying to the whole country.

Under the US rules open-ocean exchanges must take place at least 200 nautical miles from the coast and in areas exceeding 2,000 m in depth (the IMO definition of open-ocean is only 500 m deep). Exemptions are still possible on safety grounds and in cases where deviating to an area exceeding 2,000 m would be considered unreasonable. However, the USCG intends to monitor all claimed exemptions closely and will take actions in cases of abuse.

The public and industry have until October 28 to respond to the proposals before the USCG acts. S

A small ship with big ideas *Whitchampion sets a new standard*



Whitchampion's versatile cargo options further develop Whitaker's bespoke design ideas

WHILE Whitaker's latest newbuild bunker tanker is not big, it is quite clever. The *Whitchampion* is the newest addition to the UK coastal operator's fleet and the second to be built in Gemi in Tuzla to a bespoke design by Delta Marine of Istanbul. It joins sistership *Whitchallenger*, delivered last year, but it has some key differences from that outwardly similar ship. And it may not be the last for the Turkish yard if the design proves its worth and there is demand from charterers for its special skills.

The design could be a solution to increasingly tighter legislation on single hull small tankers. The EU, mindful for once of the practical realities of the bunker business, seems to have backed off from legislation mandating double hulls for all tankers, but it will only take one more incident to change thinking once again, at which point this twin-hulled design will be well placed to attract suitors.

So what is John H Whitaker (Tankers) getting with these innovative ships? At 4,450 DWT the vessels are the biggest in the company's fleet and will do wonders to its age profile. Coastal operators have

long been squeezed by oil companies and older tonnage has been a consequence. Now a spate of building looks set to flush out some of the older units as most majors distance themselves from the high profile high risk coastal ownership.

It would take a computer program to sort out the different restrictions that apply to smaller vessels when considering the optimum size for the trade. It is not just the physical constraints; draught is always a weighty issue and overall length has long been important. But beam too is a consideration with canals and locks on small ports on rivers and even height has to be thought of to avoid serious embarrassment with bridges. Equally important are the labyrinthine calculations needed to ensure that port charges are optimised since a small difference in the gross or net tonnage can sometimes be a real loss of profit on a voyage.

Yet cargo is king and it is its cargo capabilities that separate *Whitchampion* from its sister. With its fully coated tanks and stainless steel deepwell pumps, it meets Whitaker's aim, as managing director Mark Whitaker explained, of wanting maximum flexibility in the clean

oil trades, even though its first contract with Texaco sees it carrying fuel oil.

Versatile tanks

The vessel is well equipped to service the demands of the products trades, as well as the bunker trades, with seven sets of cargo tanks, each fitted with individual deepwell pumps and able to load, carry, and discharge seven grades fully segregated. Following some expensive problems with hydraulics on some of its older ships, it was decided to drive the deepwell pumps electrically using "soft start" technology, which gives maximum flexibility from the ship's four generators, Whitaker explained. Pump motors were up-rated to deal with the expected service in heavy fuel oil and discharge rates of up to 700 tonnes/h can be achieved.

All cargo tanks are served by individual Hamworthy KSE Svanehoj electrically driven deep-well pumps each with a maximum discharge rate of 200 m³/h, each with speed control via individual frequency controllers and fitted with an integral compressed air-driven stripping system. All pumps and associated pipework is stainless steel and the design allows the easy dismantling of the pump

head for maintenance. As back-up, a bulkhead valve between each pair of wing tanks allows free flow between tanks if necessary to balance loading or discharge or as an emergency system should a pump fail. As the vessel is initially planned for use in the bunker trade, there is also an in-tank blending system allowing the efficient production of different specification fuels.

Cargo heating is via conventional in-tank coils using isothermic oil heated through a Wanson Thermopac boiler rated at 1,162 kW – powerful enough to raise the cargo temperature by about 10°C per day and maintain a temperature of 70°C throughout. All deck pipework is stainless steel and a variety of cross-overs at the manifolds allows considerable flexibility. Hose handling is effected with a Mariner electric hydraulic crane located on the centre line forward of the manifold and with a capacity of 0.9 MT at 18 m radius. Further small cranes are fitted aft for stores handling.

The vessel is also fitted with four 100 m³ tanks designed for carrying lube oils served by a 50 m³/h pump located in a small pump room forward of the engine room. These tanks will be valuable for providing lube oil services to ships that

The choice of an MaK engine was based on good experience of this make. The 6M25 model has a longer stroke and slower speed than the 8M20 first proposed



Whitchampion's cargo tanks include stainless steel deepwell pumps to handle clean oil cargoes

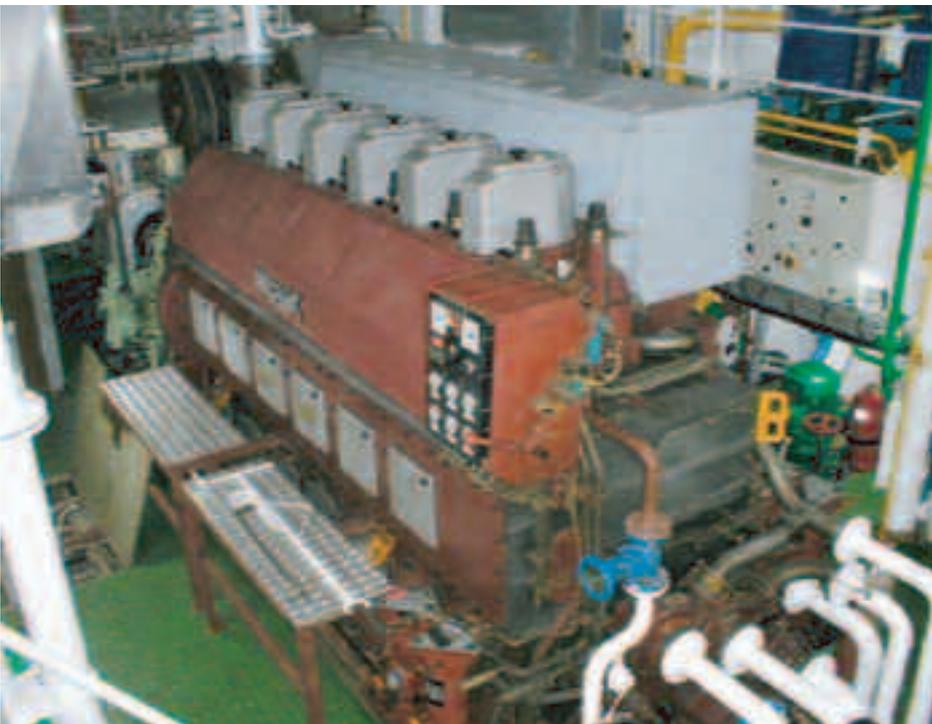
are being bunkered by the *Whitchampion*. There is also a slop tank on board.

With coatings very much part of the life of a vessel, Whitaker has chosen a full epoxy coating from International Paint in all the cargo tanks, specifying Intershield 300, a coating that is expected to be easy to clean after carrying black oils or clean products and to offer good heat resistance properties.

In fact, Intershield 300 is widely used on the ship. The lube oil tanks are also coated with it, as too are the ballast tanks and decks, a choice made to obtain “the maximum level of protection and ease of maintenance,” explained Whitaker.

Up-rated engine

The owner has opted for an MaK main engine, based on its experience with these in other vessels and their prevalence in the second hand ship market. A



Principal Particulars

Whitchampion

Length, oa	84.95 m
Length, bp	80.80 m
Beam, mld	15.00 m
Draught, mld	6.30 m
Depth, mld	8.60 m
Deadweight	4,450 tonne
Gross register	2,965 GT
Net register	1,355 NT
Cargo capacity	5,094 m ³
Main engine	MaK 6M25
Output	1,850 kW @ 750 rpm
Speed, 85 per cent MCR	10.9 kt
Class	LR+100A1, Double Hull Oil Tanker, ESP, +LMC, UMS, NAABSA
Design	Delta Marine, Istanbul

single MaK 6M25 four stroke diesel engine drives a four bladed variable pitch Kamewa propeller at 210 rpm through a Rolls Royce Ulstein reduction gearbox.

But this was not its first choice; initially Whitaker planned to use an MaK 8M20 machine, but decided to opt for the six-cylinder longer stroke and slower revving M25.

This has the advantage working at the lower end of its power range rather than the top end as would be the case with the 8M20. In addition, its rated output of 1,850 kW at 750 rpm allows more economical performance at slightly reduced revs, leading to reduced maintenance. It burns 5.9 tonnes per day of gas oil, although the engine can burn heavy fuel oil up to 700 cSt.

Manoeuvrability

Coastal voyages with frequent port calls and the demands of the bunkering trade mean that manoeuvrability is vital. So steering is via a high angle flap rudder, assisted by a 360 deg thruster fitted forward. As explained below, this unit is also intended to provide get-you-home propulsion in the event of a main machinery failure.

Electrically driven pumps, the thrusters and the deck machinery require a

Thruster power

WHITCHAMPION and its sister each boast a very high powered bowthruster that can thrust through 360 deg. The Verhaar Omega jet-type unit can absorb 441 kW and this is enough to provide get-you-home power sufficient for a speed of 4.5 kts.

But, unlike many thruster installations, this one is powered independently of the engine room; “we wanted to be absolutely sure we could limp home if we had an engineroom fire,” said Whitaker.

To achieve this, it is powered by its own 441 kW Cummins KTA19mk3 diesel engine, rather than by an electrical or hydraulic link from the main engine. So the thruster could be valuable if the main engine failed or if the propeller were damaged or fouled. “This cannot be said for conventional PTO ‘get-you-home’ systems,” said Whitaker. **S**

secure source of power and the vessel is fitted with a single shaft-driven Leroy Somer/LSA 47.1 M6 alternator with a rated output of 292 kW at 1,500 rpm. In addition, two Cummins/KTA19D(M)

diesel engines with output of 400 kW at 1,500 rpm drive twin Newage Stamford/HCM 534C alternators each with an output of 304 kW. An 80-kW emergency generator is also fitted. **S**

Double hulled but single minded

WHITAKER Tanker’s requirements were straightforward: “We wanted a simple, efficient and reliable ship,” said Mark Whitaker, its managing director, to *Solutions*. Its latest ship, *Whitchampion*, shares the same hull design as last year’s delivery *Whitchallenger*, but it has a few important differences that give it additional flexibility.

Both ships have been designed specifically to meet Whitaker’s operating requirements. For example, their length of 84.95 m was set by the need to access Peel in the Isle of Man, which was the smallest port that charterer Texaco served at the time and allows a maximum length of 85 m at its tanker facilities.

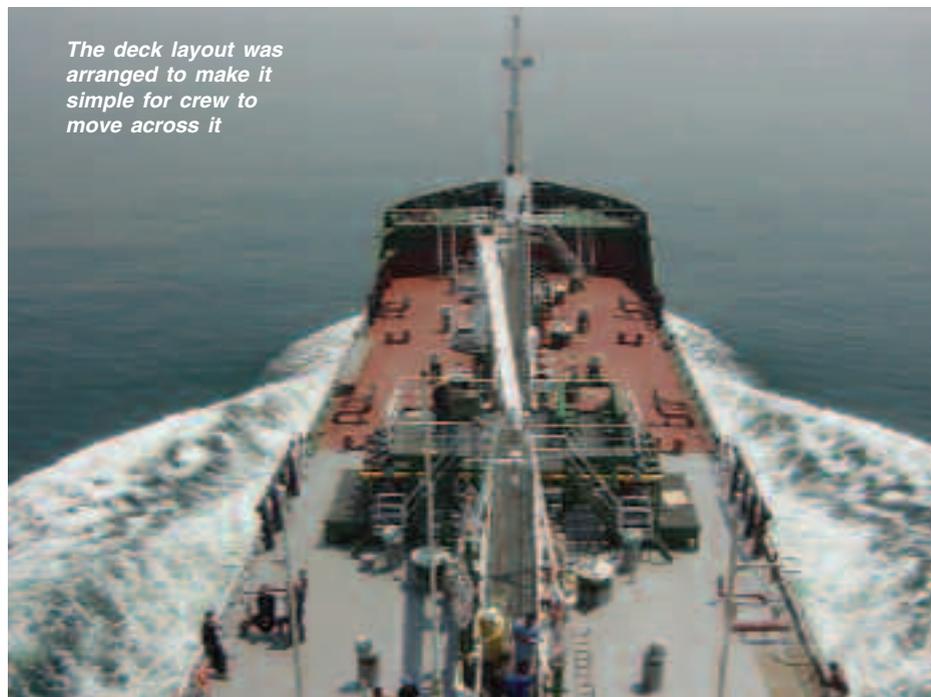
Ironically, by the time the first ship was delivered, Texaco no longer called at Peel, as the power station it served no longer used fuel oil. Instead, the oil major serves the port of New Ross in Ireland where a 100 m maximum length applies, so the ship is still well suited for this alternative port.

“The basic concept of the two vessels

was to make them as flexible as possible,” Whitaker said. Based on the maximum length set by Peel, the ships’ Turkish designer, Delta Marine, was given the brief to provide as much deadweight as possible.

Which it did. But the shipyard insisted that the vessel was model tested, “and thank goodness we did because the result of this was that the hull was improved, reducing the fuel consumption by 20 per cent and giving the added bonus of an extra knot of speed,” said Whitaker, “which made the \$40,000 investment look very reasonable.”

Many other aspects of the design also incorporated details that Whitaker specified, based on its experience with other ships. Deck layout, for example, is arranged to make it simple and safe for crew to move from one side to the other. The choice of MaK as the engine supplier was also based on the owner’s good experience of its machines and its unusual bow thruster arrangement (see box, left) also echoes installations on previous ships in its fleet. **S**



The deck layout was arranged to make it simple for crew to move across it

Latest sounds

AN UPDATED version of its ultrasonic thickness gauge has been released by Cygnus Instruments.

The new Cygnus 3 Ultrasonic Thickness Gauge uses the Multiple Echo technique recommended by class societies and allows metal thickness measurements to be taken whilst completely ignoring the coatings, only the metal thickness is measured. This means more time can be spent on checking the condition of the metal rather than having to remove and repair perfectly good coatings. It also has a datalogging feature that allows measurements to be downloaded to a PC in a format compatible with most standard software packages.

The new Cygnus 3 Datalogger is supplied as a complete ready to use kit including probe, software and spare parts. It comes in its own carry case with a two year warranty. **S**



The new Cygnus 3 ultrasonic thickness gauge does not require coating removal for accurate results

Upgrade for ballast monitor

A NEW version of its oil discharge monitoring and control system is available from VAF Instruments.

The new Oilcon Mk6 monitors ballast water during deballasting operations for contamination by oil using the company's same patented multiple scattering technology as earlier models but is much smaller and lighter than those and incorporates a number of new features. A new method of signal processing enables more flexible installation possibilities and, with more tankers being built without pump rooms, this gives the Mark 6 a considerable advantage over the older fibre optic signal transfer method. In addition, the company claims that using LEDs indicates longer life expectancy from the sensing system.

VAF says the Oilcon Mk6 satisfies IMO MARPOL Resolution A586(14). **S**

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High Voltage tests without shutdowns

NEW testing methods developed by Wyko allows rapid testing of high voltage (HV) equipment such as motors, switchgear and transformers without the need to take the system out of service during tests.

HV equipment is traditionally tested by dielectric loss analysis, a process that requires equipment to be shut down and then stressed up to operational voltage, which is time consuming and potentially destructive and which requires a large amount of testing and support equipment. Because of these factors it is quite usual for some ships to have their HV equipment tested only during drydockings and often only at the five-yearly special surveys.

Wyko's new system relies instead on Rogowski coils that can be permanently installed on the equipment under test and connected up to a compact suitcase-sized partial discharge detector when required. Rogowski coils work by sensing the magnetic field caused by a current without the need to make any electrical contact with the conductor. An air cored coil is placed round the conductor in a toroidal fashion so that the alternating magnetic field produced by the current



HV systems can be checked using a set of small coils and Wyko's compact detector

induces a voltage in the coil that is electronically converted to provide an output reproducing the current waveform.

The partial discharge detector can also be used with other input methods such as capacitive couplers, radio frequency current transformers and transient earth voltage probes, all of which are used in the alternative method and which may already have their own monitoring points on the HV equipment.

Wyko claims the new equipment can detect any defects the traditional method would have found but ship owners will be more prepared to make regular checks. **S**

Charts on demand in US

A SERVICE that can provide instant paper charts is being tested by US company OceanGrafix.

Using the latest advances in digital print technology, OceanGrafix has begun the tests at two locations in Louisiana and expects to expand the service if tests are successful.

Ships equipped with an ECDIS can already receive instant updates in a variety of ways but the majority of ships still use paper charts and finding a

current chart at short notice can be difficult. OceanGrafix's remote print service is being run in cooperation with the National Oceanic and Atmospheric Administration and produces fully corrected and up-to-date US charts on water-resistant or laminated paper.

The OceanGrafix, Charts-on-Demand nautical charts are fully corrected and up-to-date at the time of printing and include the latest local and NIMA Notice to Mariners Corrections. **S**

Scrapedown expenses

A TECHNICALLY advanced program to optimise cylinder oil feed rates in low-speed diesel engines has been introduced by ExxonMobil Marine Lubricants (EMML).

The 'Feed Rate Optimization' program is designed to help minimise operating expenses by analysing scrapedown oil collected from the engine's scavenge spaces as a way to detect changes in the condition of an engine's cylinders and to balance feed rates with lubricant selection. Reduced sulphur HFO is becoming more common and can cause sudden cylinder wear unless a correct lubricant is used or cylinder feed rates are adjusted.

Under EMML's program, samples of scrapedown oil can be sent ashore for full analysis but the program also provides a portable analyser for use on board allowing ship's engineers to have an early warning of cylinder wear. The Mobilgard Scrapedown Analyzer (MSA) instantly measures and displays the iron content of a used cylinder oil sample while a Signum Onboard Test Kit monitors lubricants for alkalinity retention (TBN), water contamination and changes in viscosity.

Keeping an MSA Logbook enables crew members to store results, graph trends and analyse relationships between variables. EMML claims that all the tools are easy to use. **S**



On board analysis of scrapedown oil using ExxonMobil's new system can detect changes in cylinder condition

G&O

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