Digital Ship
June/July 2009
www.thedigitalship.com

Inmarsat launches FB150

Exciting times at Inmarsat – the last member of the FleetBroadband family has been introduced to the market, with the FB150 now ready to enter service, while the company has acquired its biggest distributor and now even owns a VSAT division. *Digital Ship* spoke to Inmarsat about the implications

Inmarsat has launched the final addition to the FleetBroadband family with the introduction of the FleetBroadband 150, offering simultaneous voice, SMS and IP data at up to 150 kbps over a terminal costing less than $5,000.

The above deck equipment measures approximately 20cm in diameter and weighs between 2kg and 4kg, which should allow potential users to install the system in just a few hours by carrying it on deck.

Communications hardware companies Thrane & Thrane of Denmark and AddValue of Singapore will act as the initial manufacturing partners for the terminals.

Piers Cunningham, maritime business director at Inmarsat, described the launch as a "significant milestone" in the evolution of the FleetBroadband portfolio.

"We promised to deliver a sub-$5000 terminal for small vessels, and we have delivered on time and on specification," he told us. "The antenna weighs approximately 3 to 4 kilograms, and is about the size of a basketball. A pretty small basketball!"

"The below decks unit is probably about half the thickness of a telephone directory and about the same size, very small. It has all the primary ports, two RJ45 LAN ports, one RJ11, one NMEA input/output, and an on-off switch – everything you need to get you up and running pretty quickly."

FB150 equipment costs less than $5,000, and offers 150kbps over a 20cm antenna

"We've got something for everyone now, from the most technically compliant ship to the owner or ship manager who just wants to give IP capability without the commitment of a larger terminal."

The company has confirmed that the newly launched terminal will be available on the market almost immediately, available for provisioning, operation and billing as of the 30th June.

Testing of the system has been underway ahead of the launch, in conjunction with the antenna manufacturers and a number of vessel operators, who cannot currently be named under non-disclosure agreements signed during the type approval process.

"There's been a substantial amount of investment put into the evolution of the core network and the equipment that we're putting into the field, through AddValue Communications and Thrane & Thrane initially," said Mr Cunningham.

"At the moment we've worked with the manufacturers and a number of shipping lines, and they've gone through extensive alpha and beta testing. The areas we've tested in are basically in every ocean region that the I-4 (satellite) footprints cover, we've had an FB150 in each one."

"It's rock solid and I think it's got a good market pedigree, and allows the owners that don't have

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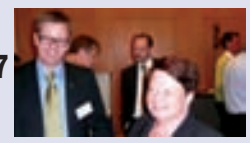

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a technical requirement for such high speed connectivity, for whatever reason, be it operational or that they can't accommodate a larger unit, or for budgetary reasons don't want to spend on a larger terminal, to have a choice."

These trial vessels have been running a full range of varied software systems as part of this testing process, utilising the IP capabilities of the FB150 to access any number of web-based applications.

"They've been fundamentally exactly as you would see on a deep-sea vessel, voice and data comms, access to online information like port arrival forms or chart updates, e-mail, and all of the usual backbone applications," said Mr Cunningham.

"Pretty much everything that we tried on FB250 or FB500 was just brought straight across. It's still the same core network, there are no modifications. The beauty of FB150 is that it operates in its core module on the same stable BGAN platform that more than 2,000 ships using FleetBroadband are currently enjoying (see page 6)."

"For my mind I think it will be the Mini-M for the 21st century and will go from the largest vessel down to the smallest. It could be a primary terminal, it could be a dedicated crew terminal, it could be a back-up terminal. It's entry level, but without sacrificing quality."

Cost and competition

The FB150 will be offered under the same tariff structures as currently apply to the rest of the FleetBroadband portfolio, from simple 'pay as you go' billing, to entry level data-bundled packages, and right through to gigabyte usage shared among entire fleets.

The low-cost satellite IP terminal market sector is certainly one that is not short on competition, but Mr Cunningham is not overly concerned with how rival offerings will affect demand for Inmarsat's latest system.

"Is it a competitor to (Iridium) OpenPort, or Thuraya IP?" he said. "I suppose you've got to have something viable to compete with first of all, and that's debatable, but it will certainly do what it says on the tin."

"It's priced aggressively, both in terms of hardware and in terms of the airtime, is globally deployable and easy to install, and gives these kinds of technical capabilities to vessels that couldn't accommodate a larger terminal."

Mr Cunningham also wished to point out that the FB150 differs from some of these competing services in that its maximum bandwidth speed will be available to anyone who acquires the antenna, irrespective of any airtime deal they may enter into.

"The 150 kilobit standard IP backbone comes with the rations, it's not dependent on what commercial package variant you take, you get access to the full power and capability of the terminal whether you're a 'pay as you go' customer or are taking on any one of our other packages," he said.

"Unlike other services where you have to commit to a substantial duration or volume commitment in terms of the amount you pay per month to get the full rations of their bandwidth, presuming that bandwidth can actually be operationally deployed, with FB150 it comes regardless of commercial package chosen."

Stratos acquisition

In addition to the launch of its new FleetBroadband terminal, another major recent development for Inmarsat has been the completion of the acquisition of its own largest distribution partner (DP), Stratos.

While this deal represents the first time that Inmarsat has had a controlling interest in one of the retailers of its own airtime, having previously been purely a wholesaler of services to DPs, the company is adamant that the move will not materially affect the way it does business for the foreseeable future.

Inmarsat has stated that Stratos will be kept running independently, and that there are no plans to change its name or rebrand, promising that, for the short term at least, things will stay exactly the same as they are now. It said that most of its business has always been through distribution partners, and the majority of that will be non-Stratos.

'The agreement Stratos signed was exactly the same as what our other DPs signed' – Piers Cunningham, Inmarsat

Mr Cunningham says that any suggestion that Inmarsat will begin to develop a more favourable relationship with Stratos than with its other DPs following the acquisition is nothing more than "speculation."

"I don't have a crystal ball to say what's going to happen, but we are committed to remain as a wholesaler and sell indirectly through distribution partners," he told us.

"I think anyone who realises the need for a competitive channel, and sees the maritime world having diverse established relationships, would see we don't want to unsettle that."

Inmarsat points to the fact that the conclusion of this acquisition has also coincided with all of its other DPs signing new agreements with the company, including second largest distributor Vizada, which agreed a five-year deal (see page 4).

"The agreement Stratos signed was exactly the same as what our other DPs signed, as part of our ongoing commitment to our distribution," said Mr Cunningham.

"We are running as a wholesaler, the maritime world is a complex one, and a very large one, and this is the best way to deal with it."

However, despite the renewal of these DP relationships, Mr Cunningham does admit that the contracts Inmarsat has with its partners are not simply an extension of the existing deals, but have been adapted to allow for changes in the commercial environment, though the details of these changes will not be made public.

"It's basically designed to give both sides commercial comfort as to our relative positions in the supply chain, but it has been modified in such a way, that has been signed by all parties, that is not as commercially restrictive as may have been the case in the past," he told us.

"It gives us a little bit more flexibility, and that's also mirrored by the flexibility and confidence it gives to the distribution partner. It's an arrangement for the current age."

VSAT from Inmarsat

Another interesting aspect of the Stratos development has been the fact that, in acquiring the retailer and its services, Inmarsat has also become a supplier of VSAT to the maritime market through Stratos' 'OceanVSAT' offering.

Mr Cunningham insists that the provision of VSAT services is not currently on the agenda for the Inmarsat management and is merely a legacy aspect of the takeover, though he does not discount the possibility that the situation may be reviewed in the future.

"As a network operator our inherent strength is our L-band spectrum capability and our network," he said. "Yes, Stratos has a VSAT capability, but equally so do many of our other distribution partners, they have a spread portfolio of services. I think it's just to be expected, in many ways."

"In terms of Inmarsat and looking forward, we certainly know which area of the world we operate in, but that's not to say that, going forward, that we wouldn't look strategically at other opportunities if there was a valid reason for doing so."

"That may or may not involve our distribution, that may be a corporate level decision to investigate other technologies, but at this point in time we've got our heads down delivering, at least in maritime, FleetBroadband and FleetBroadband 150."

Mr Cunningham also says that Stratos, still acting as an independent retailer, will remain free to advise customers to choose a VSAT product for their vessels if it is the right choice with regard to their specific circumstances.

"As customers have different technical requirements, different budgetary capabilities, different operational capabilities, each provider, whether part of the Inmarsat group or not, has to give impartial advice on what the needs are," he told us.

"The fact that Stratos is within the Inmarsat corporate structure doesn't necessarily say that we're going to see lots of FleetBroadband terminals fitted at the expense of some other technology that may have been a more logical fit."

"You certainly wouldn't fit an FB500 as the main passenger backbone on a cruise liner if 2.4m C-band VSAT was previously the logical fit."

However this new distribution arrangement for Inmarsat is to play out, the next stage of development for its new Stratos division will be watched with interest by many in the maritime community. DS

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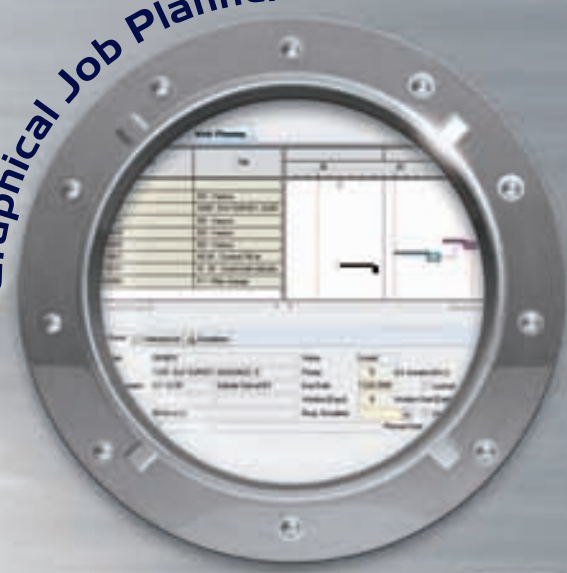

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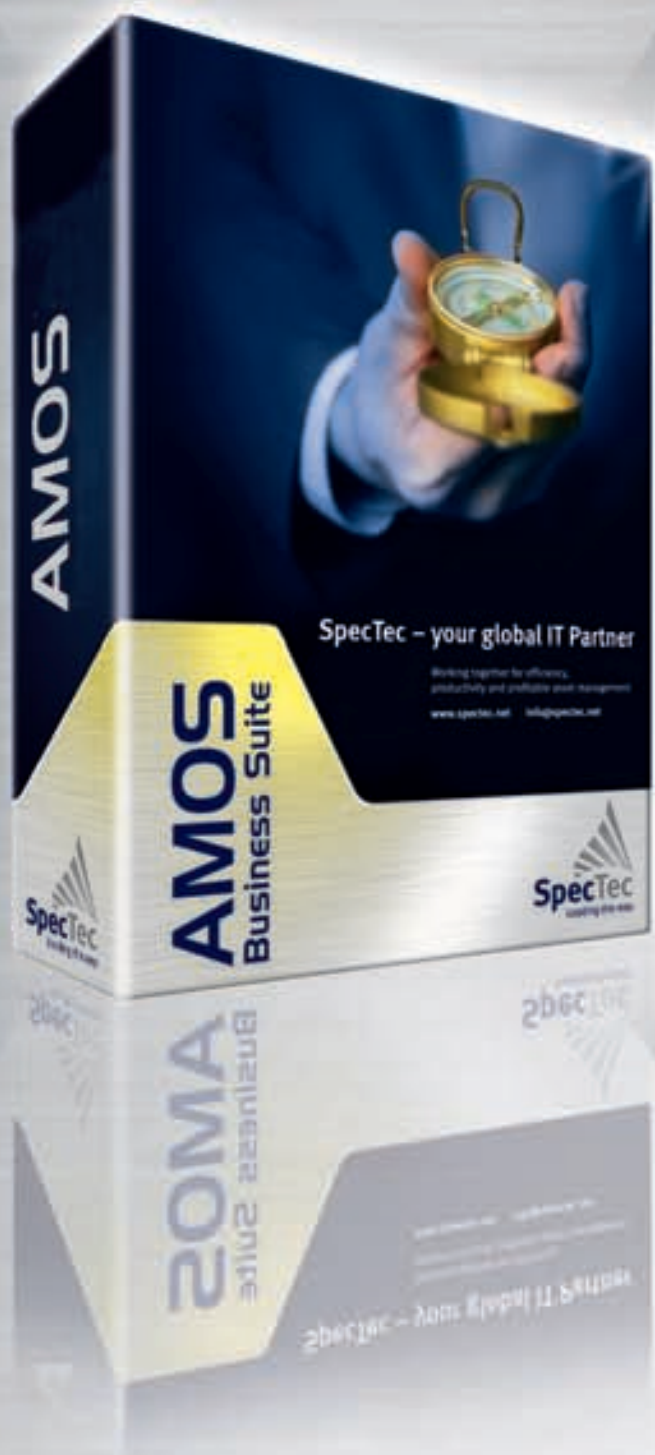

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Vizada and Inmarsat agree renewed distribution deal

www.vizada.com
www.inmarsat.com

Vizada and Inmarsat have announced the conclusion of final negotiations on Vizada's distribution for Inmarsat services over the next five years.

These include 'existing and evolved' services such as the Fleet family, new generation IP-based broadband services including FleetBroadband, as well as leased services.

The new agreement is a continuation of a long-standing relationship that Vizada (in its previous incarnation as the separate companies France Telecom Mobile Satellite Communications and Telenor Satellite Services) and Inmarsat have shared as partners for over three decades.

The deal comes at a time when Inmarsat has just taken control of its own largest distribution partner by completing the acquisition of communications company Stratos (see page 1).

"Inmarsat services represent the core of Vizada's product offering, and the renewal of our distribution agreement marks an important step for us and our service provider partners," said Erik Ceuppens, CEO of Vizada EMEA and Asia.

"The complementary strength of Inmarsat and Vizada has allowed us to grow and innovate the mobile satellite industry globally and we look forward to continuing our successful partnership with Inmarsat now and in the future."

Perry Melton, COO of Inmarsat, added: "Vizada is a long-standing and highly-valued partner to Inmarsat, and one of our two largest distributors."

"They have been instrumental in delivering our services to a broad range of industry sectors around the world, and have shown real leadership in the market through their competitive value-added capabilities for service providers and end users. We look forward to building on this strong relationship in the coming years."

Vizada's Inmarsat mobile satellite activities now represent close to 40 per cent of Inmarsat wholesale revenues.

Three new maritime broadband systems from SingTel

www.singtel.com

Singapore Telecommunications Limited (SingTel) has launched three new broadband-based satcom solutions for the maritime industry, for varied applications such as asset tracking, remote maintenance and network management.

SingTel AITrac is a satellite tracking solution that allows companies to monitor the real time location and status of ships, cargo containers, equipment and other fixed and mobile assets, using Global Positioning System (GPS) technology.

The system can be configured to trigger SMS and e-mail alerts whenever the satellite tracking devices are moved out of a user-defined 'safe zone', serving notice of a possible security breach.

The tracking devices are also equipped with motion sensors to warn users of other security breaches, such as an open cargo container door.

SingTel AITrac is supported by the Maritime and Port Authority of Singapore's (MPA) Maritime Innovation and Technology (MINT) fund programme, and uses Globalstar's low earth orbit satellite network for the transmission of telemetry data.

The next new system, SingTel's Collaborative Networking solution, is used to remotely monitor and troubleshoot shipboard ICT equipment such as routers, servers and computers, via satellite broadband connections.

Users on shore can diagnose and rectify faults remotely via a secure web portal. The solution also serves as a multimedia online collaboration tool that supports multi-party video and voice conference calls, file sharing and instant messaging.

The third newly-launched product is the iMonitor network management system for maritime VSAT services, a web-based system used to monitor the performance of satellite communications links.

Network performance parameters such as throughput and latency can be viewed and analysed via the web portal, to allow companies to keep track of how their systems are operating.

Titus Yong, SingTel's vice president of satellite, commented: "Increasingly, maritime companies are turning to next generation satellite services, such as SingTel's global maritime VSAT solution, to enjoy faster unlimited broadband connectivity at sea."

"SingTel is committed to helping our customers do more with their maritime broadband connections through innovative ICT solutions that extend land-based applications to the ship. Our solutions will allow maritime companies to reduce costs, improve productivity and enhance the lives of their employees."

AIDA Cruises to install MCP GSM

www.mcp.com

Maritime Communications Partner (MCP) has announced a new five-year contract with German cruise provider AIDA Cruises, for the supply of wireless mobile services and systems to three passenger new builds.

The contract for three consecutive new builds in 2010, 2011 and 2012, follows the successful completion of a number of similar installations of wireless cellular systems onboard Princess Cruises, Cunard Lines and P&O Australia ships.

The contract covers GSM, GPRS and SMS, and complete turnkey installation including the delivery of network equipment and services, engineering and product management, network design, operation, and system integration.

"Everything we do should work and meet the needs of our passengers," said Capt Burkhard Mueller, vice president fleet services with AIDA Cruises.

"The cruise business is about delivery, fulfilling expectations and offering great sailing experiences. Passengers on AIDA ships in the Mediterranean, Canaries, North and Baltic Sea, the Caribbean and Middle America demand first-class, reliable onboard communications."

Bernt Fanghol, MCP's CMO and vice president of business relations, added: "Deployment of a wireless network requires careful planning. They can be designed to be extremely simple or complex. In the upcoming months, we, together with AIDA Cruises, will analyse key business requirements and objectives to determine the best wireless solutions for their future ships."

Ship Equip launches Ku-band beam switching

www.shipequip.no

Norwegian VSAT provider Ship Equip has launched its new 'SEVSAT Global' system, which aims to assist Ku-band VSAT users by handling satellite beam switching between different Ku-band coverage areas around the world.

The spot switching is not limited to spot beams originating from the same satellite but can also operate for spots beamed from different satellites and different operators.

The new unit can additionally work as a message mediator between the ship and the NOC (network operations centre), making it easier for the VSAT provider to send messages and early warnings to the vessel with advice on how to best maintain its broadband connection.

"We are confident that the introduction of SEVSAT Global will greatly simplify the use of (our VSAT system) and is a big step towards making the SEVSAT Ku-band solution a truly global broadband service," said Ship Equip CEO, Ivar Nesset.

In other news, Ship Equip has also recently released its first quarter results for 2009, and has reported an increase in revenue of 48 per cent compared with the same period last year.

Revenues for Q1 2009 were NOK 66.3 million (approximately US$10 million), up from NOK 44.6 million (approximately US$6.85 million) for the first quarter of 2008.

"We are happy with the way things have developed, especially in this financially demanding climate," said Mr Nesset.

"Our markets are affected by the credit crunch as is everyone else, but the fact is that our SEVSAT solution helps customers during this period for two reasons."

"We lease systems to our clients, and thus there is no need to finance any purchase of hardware, and our customers can reduce their communications costs by installing our SEVSAT systems, while increasing communication volume by 10 or 100 while keeping the price fixed."

Ship Equip noted that the reported growth has been relatively evenly spread across all its business segments, in shipping, offshore oil and gas, and fisheries.

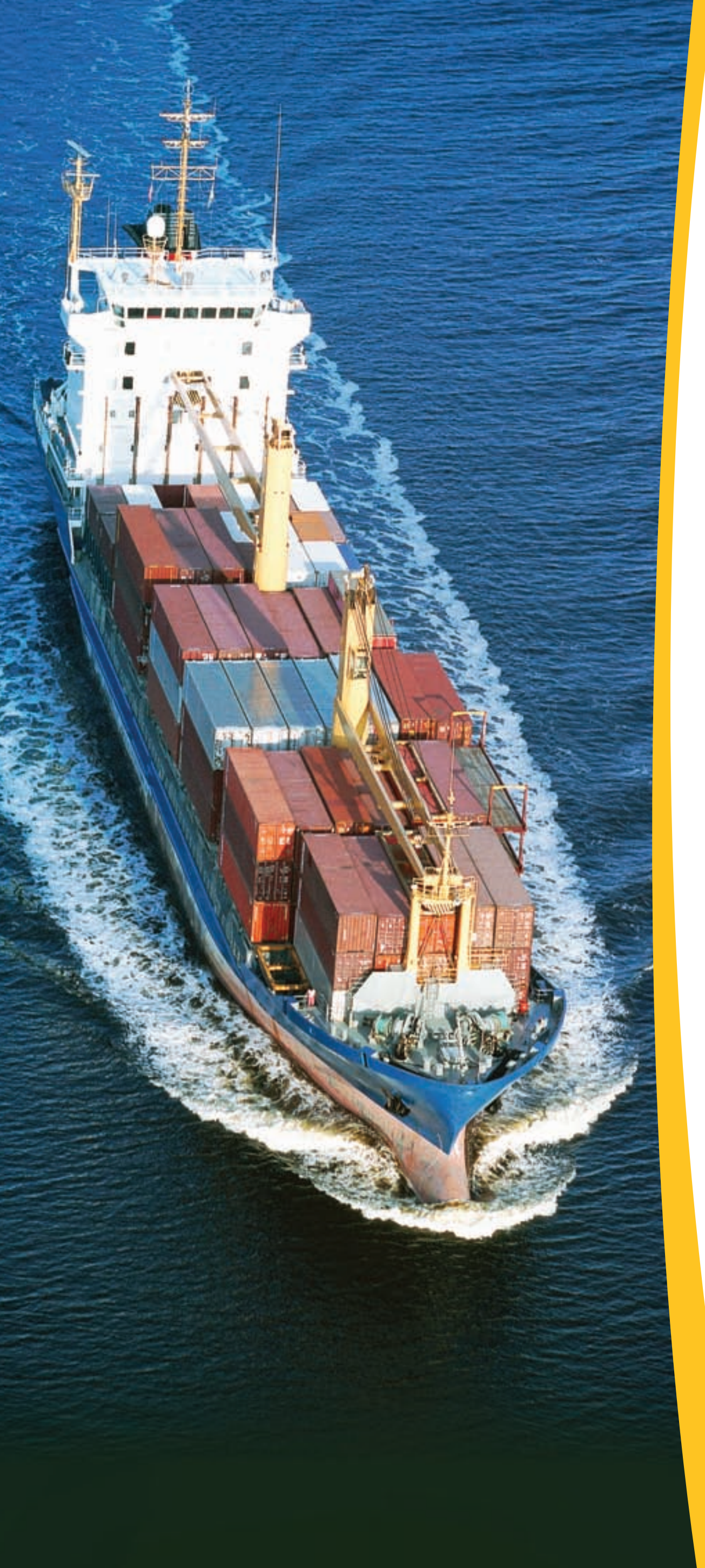
SEVSAT Global will allow the **Havila Phoenix** *to better manage beam-switching on its 1 Mbit/s capacity connection*

SatCom Global has been awarded full Distribution Partner (DP) status by Inmarsat for FleetBroadband services, joining 12 FleetBroadband Distribution Partners worldwide. SatCom Global was already a DP for **Inmarsat's** land-based BGAN (Broadband Global Area Network) and SPS (Satellite Phone Services) systems.

SeaMobile has named Jonathan Weintraub as chief executive officer. Previous to his appointment as CEO, Mr Weintraub has served as the company's chief financial officer and acting chief executive, and was formerly a partner in Lake Washington Capital in Seattle.

Iridium has formed a new subsidiary called 'Iridium Communications Russia, OOO' to pursue a license to provide mobile satellite services in Russia. The company hopes to be able to offer services in Russia's northern sea routes and Arctic regions.

www.satcomglobal.net
www.inmarsat.com
www.seamobile.com
www.iridium.com



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Low data rate satellite terminal released

www.satamatics.com

EMS Satamatics reports that it has launched its latest low-data-rate satellite terminal, the SAT-202, and announced the expansion of its coverage to include the Inmarsat Pacific Central (PAC-C) ocean region.

This is EMS Satamatics' third-generation system, and can be used for functions such as tracking, rapid alerting and mobile asset management.

The system will be manufactured in three variants, with the advanced unit including a 50-channel 3D GPS receiver manufactured by u-blox, a Swiss-based company.

The SAT-202 unit now provides three inputs for sensor monitoring and one low-voltage digital output suitable for driving relays and indicators. Users can individually configure all of the inputs and outputs, while the expanded data-logging functions include GPS positions, transmissions and data for more than 6,500 entries.

The SAT-202 terminal will continue to operate over the Inmarsat IsatM2M global network, including enhanced coverage on the Pacific Central (PAC-C) satellite located at 142 degrees West.

"We have listened to our customers, and made changes so that our terminal functions and design fit market requirements. Now that Satamatics is part of EMS Technologies Inc., we are seeing many new business opportunities that the SAT-202 product will be ideal to fulfil," says Ken Cheong, EMS Satamatics' business development director.

Frequentis to supply communications to Indian MRCCs

www.frequentis.com

The Indian Coast Guard has awarded a contract for the supply of maritime voice and data communication for its three MRCCs in Mumbai, Chennai and Port Blair, to Austrian-based communications and information systems company Frequentis.

The system is expected to be established within the next nine months, in association with Indian company Elcome Marine.

The MRCCs in Mumbai, Chennai and Port Blair are responsible for providing maritime rescue and coordination services for India, along the whole shoreline and in its designated waters, maintaining radio contact with individual vessels in traffic at all times.

Beginning in October 2009, the new voice communication system and GMDSS equipment will support the operators at the MRCCs in this task.

The system will include functionality such as pre-recorded messages for frequently broadcast navigational warnings, as well as cross connections on MF between ships and shore. The technology will enable the Coast Guard to simultaneously operate all available functions.

"This project marks another big success for Frequentis Maritime business, as it is the entry to the challenging market of India," commented Johann Schweiger, director of the maritime division at Frequentis.

Sea Tel releases new antenna for HDTV at sea

www.cobham.com/seatel

Sea Tel Cobham has released its new DTV04 HD TVRO antenna system, with the new equipment incorporating an auto skew feature to manage beam switching.

Sea Tel says that the DTV04 HD is the only 3-Axis marine stabilised antenna system that is compatible with DIRECTV's Ka-Band satellites, and the only such system that can that can deliver 3 Ku-Band satellites (101W, 110W, and 119W) and 2 Ka-Band satellites (99W and 103W) simultaneously with one antenna.

To receive all 5 satellites simultaneously the antenna and feed assembly are required to be 'skewed' to a specific angle for the operating area.

The Auto Skew function adjusts the skew angle automatically, which enables the system to move seamlessly from region to region without having to manually adjust the skew angle on the antenna and feed assembly.

The DTV04 HD Antenna System is compatible with DIRECTV service in the United States only, and requires an H20 or H21 receiver to receive High Definition programming from the Ka-Band satellites.

The system comes in a 50 inch, or 127 cm, radome assembly.

Sea Tel's antenna can receive 5 simultaneous satellite signals

FleetBroadband passes 2,000 installations

www.inmarsat.com

Inmarsat reports that it has passed 2,000 activations of FleetBroadband systems with the installation of the voice and broadband data service on the newbuild *Samur River.*

The installation of this terminal comes just under 18 months since the service was launched, making FleetBroadband Inmarsat's fastest growing maritime service, the company says.

Currently under construction at the Krasnoye Sormovo shipyard, *Samur River* will be the sixth in the New Armada series of tankers owned by the Palmali Shipping group.

The 140-metre 7,000 dwt oil tanker has been fitted with a FleetBroadband 250 terminal, with service provided by Inmarsat distribution partner MVS.

"FleetBroadband delivers essential communications to support (our) corporate objectives, and provides enhanced connectivity to help us improve our operational efficiency," said Yuri Isupov, vice president at Palmali Shipping.

"This is the sixth FleetBroadband terminal we have installed. We selected the service because of the size of the equipment, the data speeds achievable, and because it is highly cost-effective."

Piers Cunningham, maritime business director at Inmarsat, said: "The installation of the 2,000th FleetBroadband on Palmali's *Samur River* is an excellent example of how the service is being used by the maritime industry."

"We were much more conservative with our expectations (than with previous terminals) because of the fact that the third satellite (in the three-satellite network) was not operational at the time of the launch."

"But the market took up the terminals with a vigour that you could only surmise wasn't dampened by the fact that the third satellite was in the process of being launched, or that the users that want it were in areas that were under existing coverage."

Mr Cunningham also says that he expects the take up of FleetBroadband services to increase further following the confirmation of full global coverage in February 2009, and with the recent launch of the latest antenna in the line, the FB150 (see page 1).

"Since we have launched the third satellite the level of activation has increased, we're now consistently activating in excess of 8 terminals a day," he told us. "FB150 will add to this."

"Most of the business to date, we believe, has been fundamentally retrofit activity. We are now starting to see newbuilds come out of the yards with FleetBroadbands, but due to the cycle of 18 months to 2 years to get the yards really switched over to the new technology, it's really been at the discretion of the owner as to whether they change the yard spec."

"What we have seen is newbuilds come out with an existing Fleet terminal on, and then being retrofitted with a FleetBroadband, or even having the Fleet stay on and have a FleetBroadband on as well."

The 2,000th FleetBroadband terminal was activated on Palmali Shipping's **Samur River**

Thuraya in Greece and Cyprus maritime satcom deal

www.thuraya.com

Thuraya has signed an agreement with Advanced Communications Solutions to distribute Thuraya voice and data services to the Greek and Cypriot maritime sector.

Under the agreement, Advanced Communications Solutions will distribute ThurayaIP and ThurayaMarine within the Greek and Cypriot maritime market, with voice communications available through ThurayaMarine and data services provided through ThurayaIP.

The ThurayaIP satellite system offers data speeds up to 444 kbps and a video streaming capability of up to 384 kbps, over a specially designed maritime antenna, while the ThurayaMarine service provides voice, data, fax and GmPRS (Geo Mobile Packet Radio Service).

"Greece has long been seen as home to the world's maritime sector, and represents a significant potential customer base for Thuraya's voice and data communications solutions," said Thuraya COO, Dr Sven Rohte.

"Our partnership with Advanced Communication Solutions, which has deep connections with key players in the Greek and Cypriot maritime communities, enables us to deliver our advanced technology, hardware and services to a significant portion of seabound vessels and fleets."

"This is a critical strategic step forward for the company as we continue to gain a foothold in the maritime sector."

Satellite coverage areas for Thuraya, under the Thuraya-2 and Thuraya-3 satellites, cover European waters and parts of Asia-Pacific, as well as sectors of the Indian Ocean.

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Globe launches Inmarsat to OpenPort swap scheme

www.globewireless.com

Globe Wireless has announced a new programme whereby customers deactivating Inmarsat-B, Mini-M or Fleet 33 terminals by September 30, 2009 will be eligible to receive a free Iridium OpenPort terminal.

As part of these deals Globe says that it is also offering an Unlimited E-mail Option, which will allow users to send as many e-mails as they wish for a fixed monthly fee over the terminal, combining the Iridium OpenPort capabilities with Globe's worldwide Digital HF network.

"Iridium OpenPort can dramatically reduce costs and improve performance for data connectivity," said Frank Coles, president and CEO of Globe Wireless.

"To put it in perspective, data on Iridium OpenPort is one tenth the cost of Mini-M. Voice calling is nearly half of Mini-M rates. The cost of data on Fleet 33 using both MPDS and the 9.6Kbps data channel is very expensive. Iridium OpenPort voice is half the cost, and data can be up to one fifth the cost of Fleet 33."

"For crew calling users, the (programme) makes perfect sense. Iridium OpenPort crew calling is much cheaper than Inmarsat, with these rates available 24 hours a day, 365 days a year. Further, since Iridium OpenPort also allows three simultaneous phone calls, the crew does not have to queue to use the phone."

Mr Coles also says that ship operators could save thousands of dollars per year by switching from Inmarsat-B terminals to the Iridium system, and notes that the company will make provisions for those who rely on the systems for GMDSS.

"The voice and data rates on B are high, even if the customer is using High Speed Data connections," he said.

"Combining the savings on repair costs and airtime, we believe owners can save between $5,000 to $10,000 per year. If customers use the Inmarsat-B for the ship's GMDSS compliance, Globe Wireless can bundle an Inmarsat-C GMDSS terminal into the package."

Mr Coles says that Inmarsat's satellite repositioning programme, completed at the end of February, has also influenced the decision to offer this deal to Fleet 33 users.

"Inmarsat has changed the direction of Fleet 33 with the adjustments to the satellite systems," he said. "The original plans to provide a global service for Fleet 33 changed, and the system will remain spot beam."

"Fleet 33 terminals are relatively new, however, the ongoing operating costs of these terminals will result in continuous high monthly communications costs, with severe functional limitations."

The launch of these offers follows on from Globe's recent completion of its testing programme for Iridium OpenPort. The company had delayed in providing OpenPort terminals to customers since its launch, saying that it needed to complete an extensive evaluation programme before bringing it to market.

"We have given the Iridium OpenPort system a vigorous shakedown," said Mr Coles. "Globe Wireless ran Iridium OpenPort through a full battery of performance and environmental tests to confirm Iridium OpenPort ruggedness for the harsh marine environment, including stress testing to verify the robustness during high traffic loading conditions."

"We did this testing to ensure that any equipment we install aboard our customer's ships would be reliable – we are aware of how difficult it is to re-visit ships to fix defective equipment. As a result, we believe we are able to provide our customers with a reliable, fully tested product."

"The Iridium engineering team has successfully resolved all beta testing and production ramp-up issues. We are now moving forward with deliveries of Iridium OpenPort through our direct channels to fulfil the large backlog of orders from our customers around the world."

The terminal will also be available with a new GlobeSecure firewall system, developed to operate with OpenPort.

NSSL and Telemar extend VSAT coverage

www.satcom-solutions.com
www.telemar.se

NSSL and Telemar Scandinavia have expanded the Ku-band coverage area of their Cruise-IP and Seacall VSAT services, to include the Atlantic and Southern African coastal regions.

The coverage extension is possible thanks to the addition of transponder capacity from the new Telstar T11 satellite that was launched in late February 2009.

After testing was completed on the 26th April 2009, NSSL and Telemar say that they became the first service providers to have commercial services over the satellite available in the Atlantic ocean specifically aimed at the commercial maritime market, though a number of other maritime VSAT providers have also contracted transponder capacity on the T11 for future use.

The extension of the coverage zone forms part of an investment programme by NSSL into its DVBS2 network, and strengthens an ongoing partnership with Telemar Scandinavia.

In September 2008 NSSL and Telemar announced a joint partnership for their Maritime Broadband Services, with NSSL's Cruise IP and Telemar's Seacall services now both using the same DVBS2-RCS broadband platform.

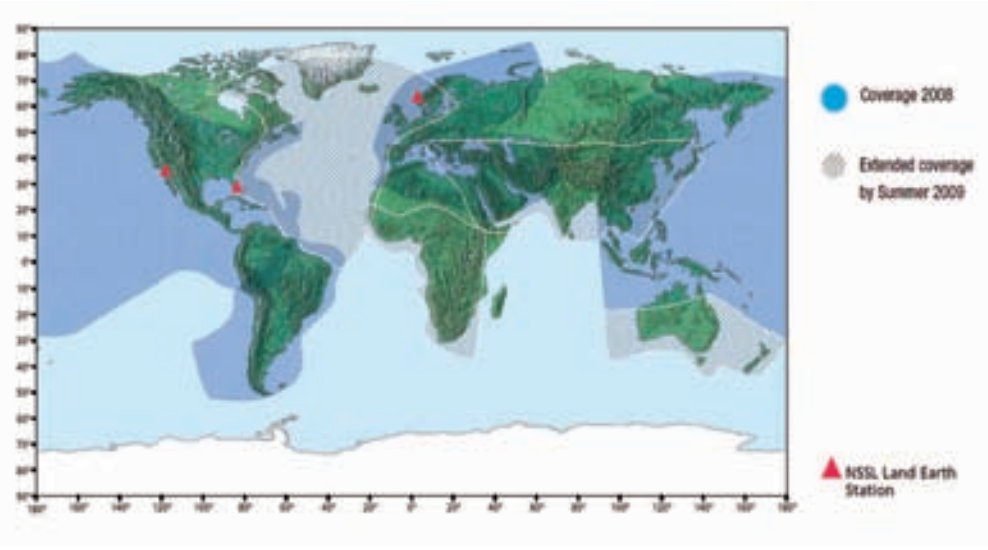
The two companies have also jointly launched a new DVBS2-RCS hub at Nittedal Land Earth Station (LES) in Norway, and integrated it into their existing DVBS2 networks, extending coverage for users of the satellite system.

"We are committed to extending the reach of our CruiseIP service for the simple reason that it is what our customers demand," said Sally-Anne Ray, sales director, NSSL.

"We are constantly investing in new service enhancements and coverage areas so that we can exceed our customers' high expectations. We are thrilled to be able to announce future extensions over the next few years."

Kristian Ryberg, director business development, Telemar Scandinavia, added: "These new Ku-band coverage areas, where NSSL and Telemar have taken the lead, are exciting additions to our growing world-wide network of Telemar SeaCall services."

"The possibility for Transatlantic crossings with uninterrupted Ku-broadband services, through one metre antennas, has been a requirement by the international shipping industry for some years and will most likely result in an even stronger demand for maritime broadband services world wide."



Coverage has been extended to cater for commercial maritime customers in the Atlantic

Parallel and Uplogix in VSAT management partnership

www.parallelglobal.com
www.uplogix.com

Uplogix has joined Parallel's Satellite Technology Partner programme, which will allow users of Parallel's SatManage system to integrate the Uplogix remote management technology for VSAT communications into their networks.

The Uplogix system is deployed remotely to monitor and automate routine administration of both satellite and IP network devices. In the event of a network outage it connects to a network operations centre (NOC) to transfer device information to SatManage and provide a channel for remote troubleshooting.

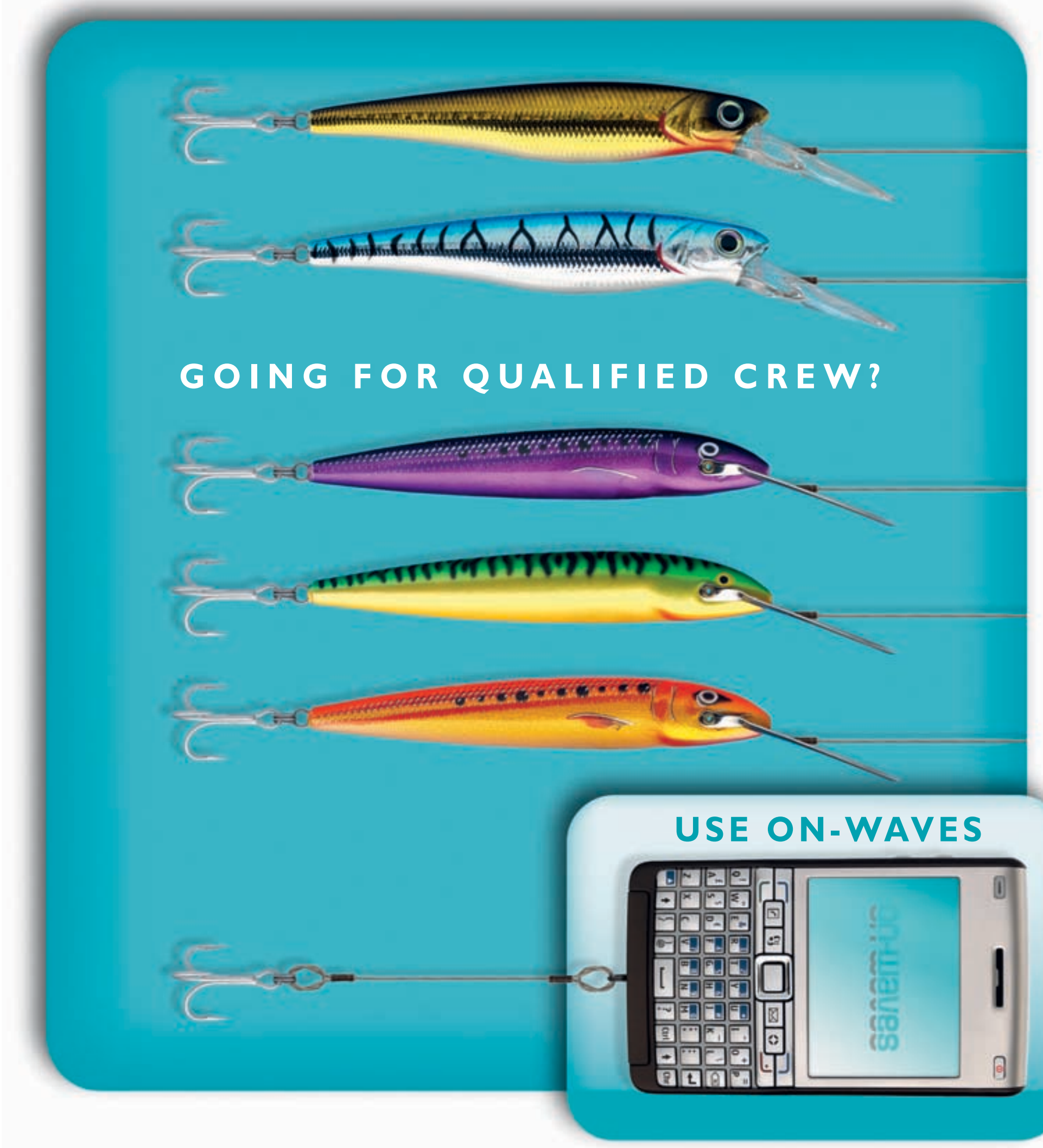
SatManage is integrated with a number of maritime VSAT vendors' networks, such as Stratos, Ship Equip and MTN.

If these networks are connected to the Uplogix SRM system, SatManage can take the data feeds and use visual correlation to anticipate network problems, highlighting events on the network and allowing analysis of network performance.

This can show problems developing over time and even highlight wasted bandwidth and resources, allowing pre-emptive action to be taken onsite

"Access to the most comprehensive data makes it possible to make earlier predictions, better decisions, and more effective automation," said James Dell, CEO and managing director of Parallel.

"Pairing SatManage in the NOC with Uplogix at the network's edge increases uptime, improves SLAs (service level agreements), and reduces support costs to hybrid networks."



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Maersk - 100 FleetBroadband installations in 150 days

FleetBroadband, in all of its forms, is small and light enough to be carried onboard a vessel and installed the same day. However, the situation complicates a little when management expects dozens to be installed, in double quick time. Peter Faurhøj, Maersk, told *Digital Ship* about how the company managed 100 installations in 150 days

In 2008, shipping heavyweight AP Møller Maersk concluded the biggest satellite communications terminal retrofit deal in maritime history with its decision to equip its fleet with Inmarsat's flagship product, FleetBroadband.

The first part of the deal included an agreement to fit 150 vessels across the Maersk Supply Service and Maersk Tankers fleets with Thrane & Thrane Sailor 500 terminals, capable of running at FleetBroadband's maximum connectivity speed of 432kbps.

Peter Faurhøj, head of navigation and communication systems at Maersk Supply Service and one of the key figures in the communications upgrade project, was glad that years of hard work in evaluating different communications options had finally paid off – until he was informed of the implementation schedule.

"We had to do 100 installations in 150 days because the management of Maersk Tankers and Maersk Supply Service happily informed the vessels that internet would be installed before the new year of 2009," he told us.

"That gave us six months to order, deliver and install the equipment onboard 100 to 150 vessels."

"Thankfully, six months after sending out the first set of installation kits the last one was installed on the 31st December, 2008 – 6 hours before the deadline!"

This new year broadband bonus to the vessel crews marked the end of a lengthy communications evaluation project, which Maersk had first begun more than three years previously as it looked to increase the satcom capabilities of its vessels.

"Back in 2005 we started our onboard internet project," Mr Faurhøj explained. We wanted to find a solution where we could give our crews internet so they could stay in touch with their families and surf the web."

"The initial ideas were to connect all parts of the company together in one big network – vessels, oil rigs, production sites and offices. But finding a solution that suited all of our business areas was almost impossible."

The company began by starting discussions with a wide range of vendors of different types of systems, to get a feel for the options available. Some of these, however, were less than satisfactory.

"When you ask twenty companies what they can give you, you'll get twenty different answers," said Mr Faurhøj. "One supplier tried to persuade us to go for their 'almost ready' C-band solution on a 1.2 metre antenna, and some came with solutions covering the North Sea and nothing else."

"I was surprised that many companies did not have a 'fully ready' product at that time, or had not even thought about what would happen if we decided to go for their solution."

"Would they be able to supply the antennas? Did they have someone who could take care of the installations and the after sales support? Several times I said to myself 'are the suppliers ready for this kind of project?', and, sadly, sometimes I had to think that the answer was 'no'."

As these discussions continued, the list of potential partners was slowly whittled down as Maersk tried to find a solution that could meet a broad range of its needs. The realisation was eventually reached, however, that an all-encompassing solution might be beyond reach.

"We ended up talking seriously with two companies, and strangely enough they were non-maritime companies that had the most interesting systems, but we decided to go for a more simple project that would only cover our fleet of vessels," said Mr Faurhøj.

"I had, at that time, some terrible nightmares thinking about finding, installing and running 250 VSAT C-band solutions, and finding $40 billion to pay for the gear! So we decided that finding one solution for all business units was too big a task, both for us and the suppliers."

"I must admit that I thought several times that going back to basics might be easier, and that we should have a bunch of carrier pigeons onboard – I actually heard of this happening when pigeons were delivered by a Maersk vessel to a Chinese oil rig last year for communications in case of emergencies."

Terminal decisions

Once the decision was made to look at vessel communications differently from those of the rest of the business, Mr Faurhøj began to look seriously at whether VSAT would be a viable solution for Maersk's fleet.

"We have, of course, a number of Ku-band installations, normally it's a charter demand on some of our large supply vessels and construction vessels," he told us.

"Regional Ku-band VSAT is an ideal solution for these vessels as long as they stay in the same area, but then when they go to another area it brings some challenges. We have been testing a seamless changeover solution together with our Danish VSAT supplier Seasat and Eutelsat."

"We have been asking for worldwide coverage for a number of years on Ku-band, and in the beginning the suppliers were almost laughing at us and replied that it would never happen, so it's great to see that it is getting closer now and that suppliers are talking to each other and satellite owners are talking to each other. It's a step forward."

Steps forward in worldwide coverage were not enough for Mr Faurhøj, however, as he was looking for a system that would offer broadband internet on a global scale to today's Maersk crews. This led him to closer inspection of the newly launched, at that time, FleetBroadband

'The record installation took three hours' – Peter Faurhøj, AP Møller Maersk

"In 2007 we took part in Inmarsat and Thrane & Thrane's alpha and beta testing of FleetBroadband on board the supply vessel Maersk Frontier and the container vessel Cornelius Maersk," he said.

"Some of the very dedicated crew members helped them with various tests in order to adjust the system for commercial launch. The field evaluation took place together with JRC, onboard the LNG tanker the Maersk Ras Laffan, with great success. So, in 2008 we decided to install FleetBroadband."

"Our vessels trade worldwide, and we needed the internet for the crew members. The management of Maersk Tankers and Maersk Supply Service approved the installation of about 150 vessels as a pilot project for the crew. The contract was signed with the Danish Thrane & Thrane supplier Polaris Electronics as a package supplier, with Marlink as airtime provider."

Installation

With the decision to fit FleetBroadband on the vessels taken and the management proudly announcing its target of 100 installations by the new year, there was no time to lose to come up with an implementation schedule to get the roll-out under way.

"With assistance from Danish consulting firm Devoteam, we created a delivery plan," said Mr Faurhøj.

"All equipment was sent to Polaris, they opened all of the packages and put the SIM cards into the terminals and tested the systems, then they were shipped to the vessels."

The long term roll-out envisioned by the team comprised three phases, with the initial phase of the project being the speedy installation of the antennas and equipment aboard the company's ships.

"Phase one was the sending of the equipment to the vessels, a laptop computer, installation kit for the FleetBroadband terminal, a mast, and the system itself, of course," said Mr Faurhøj. "The installation kit included all of the gaskets and cables and everything needed for the installation."

"Only a few vessels had to ask for external assistance for the installations. In fact, when they heard that installations had been done on the rest of the fleet by the crew themselves they decided that they'd give it a try."

"The record installation took three hours, from when they received the equipment to when they started to surf the internet."

Following the success of these installations the company has decided that further upgrades to the system, such as the creation of networks and other infrastructure development, will also be largely left to be completed by those onboard themselves.

"The ships have all received a 19-inch rack with a patch panel and routers and installation kits for an extended LAN," said Mr Faurhøj.

"For phase two we are planning to do something more with our internet onboard, it will involve creating a wireless network throughout the vessel, with wireless access points on every deck. We have found some very good access points where people are able to surf on their own computers in their cabins even if the door is closed."

"They will receive a box with the rack and access points for all decks, cables and the switch for connecting the access points. This, together with an easy installation manual, is really 'Wireless LAN installation for Dummies'. We've already tried it on a number of vessels and they think it's an excellent idea."

While the crews have now been able to take responsibility for a lot of the direct installation work on the vessels, Mr Faurhøj notes that this has only been possible as a result of the hard work done on the shore side by the company's partners in its broadband project.

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The supply vessel Maersk Frontier performed early tests of the system

"If you are alone in this process and are planning to put internet onboard your vessels, it is an extremely good idea to seek external assistance," he said.

"It can be a big challenge to be on your own doing this, especially if you have other daily tasks to take care of. There are some very dedicated and dependable consultants out there that can assist you in the process, the money is a good investment."

"I've seen, over the years, some hopeless projects where ship owners have been persuaded to sign contracts where the supplier was the only winner, so if you're planning to go online, be careful out there."

Further development

With broadband now set to become a standard on Maersk vessels, the company has had to develop a range of new IT policies and infrastructure, both now and for the future, to better manage the changing onboard environment.

"Today we have a very simple set-up onboard our vessels, we have one server running RAID 1 (Redundant Array of Independent Disks), meaning we have a reliable back-up system and the same hardware set-up on all vessels," said Mr Faurhøj.

"A strict and well-documented IT policy allows us to outsource the daily IT support to the vessels, we never go onboard the vessels for IT support, only when we change out the server which is done every four or five years. For the daily work the crew take care of all the service and the installation of new equipment onboard the vessel."

"We supplied one computer for each vessel for internet access, and that has security and is updated. All employees of the company are allowed to use it, and having the vessel network going through the Maersk Data Centre in Copenhagen will help to make sure we have good security on the ships. We haven't seen e-mail viruses or internet viruses on the vessel yet."

Eventually the company hopes to extend its network infrastructure to include a variety of sectors that will carry the various types of specific communications between the vessel and shore.

"We want to extend our current (administrative) network with a crew network, with the wireless access, a charter network where the charterer can set up their own system, and a technician's network for external technicians to be able to monitor the systems and guide the crew," said Mr Faurhøj.

"This has already been done for fault finding on our DP systems and generators with great success, and we have already saved a lot of money being able to fault-find and do remote diagnostics on our systems."

"Once we have the internet and have the wireless LAN and extended LANs for the charterer and technicians, then we'll need to have some kind of router solution for content, proxy facilities, and so on – this will be phase three. For this we might need to have real IT guys onboard to assist the vessel."

Bandwidth optimisation, caching and other value-add broadband services will also be part of this third phase of the satcom deployment.

"We are going to optimise the bandwidth on our terminals, of course, in order to have a smoother running system," said Mr Faurhøj. "There is no need to download the same newspaper four or five times every day, and there's no need to download all of the advertising on the web pages."

"The vessel will receive a router and when it's all installed it should complete the picture of our new IT set-up. The idea is to connect all the vessels to the Maersk network at Maersk Drilling in Stavanger, (Norway), via a Telenor EIK station. Then it will travel over a leased line to the Maersk Data Centre in Copenhagen. We could go directly from Telenor to Copenhagen though, we have not completely decided this yet."

"With this set-up we will move the vessels behind the already well established firewalls in Copenhagen and we'll be able to make the security guys happy. We will, of course, also introduce policies for internet surfing, we need to do that to that to stay in keeping with our IT policies."

Crew welfare

With the 150-day dash to install 100 vessels now firmly behind him, and roll-out of the terminals and upgraded IT infrastructure continuing apace, Mr Faurhøj believes that the company has got a step closer to achieving its aim of improving the living conditions of those onboard its ships.

"This was a pure crew retention project, it was our managers' wish for us to do something for the crews in order to keep them onboard," he told us.

"It is expensive to lose these young people when you have educated them, especially in our industry with things like DP certificates, anchor handling certificates, all of these things cost a lot of money. If you can keep the young people on board with this relatively small investment then the money will get paid back several times over."

"That was part of our calculations in choosing this, and that was part of why we chose something that could be installed quickly and easily."

The company has decided to provide internet access over the system to the crews free of charge, within certain limits.

"The internet access is free for the crew, they pay for the phone when they use that over the FleetBroadband but the internet is free," said Mr Faurhøj.

"We also have Iridium telephones aboard the vessel with crew calling cards, so they have several ways of communicating with home."

"We have a policy, of course, that they're not allowed to download movies or music or large files. It's internet surfing only. A couple of vessels started to use it to listen to local radio stations and we had to close that down because it slowed down the system when this stuff was streaming."

The reaction of the crews to having these new systems available has been one of the most pleasing aspects of the whole project, Mr Faurhøj notes.

"We have received some feedback from some of our vessels, and they are very happy about the system," he said.

"It's a good step forward, it's not as fast as home but it's a good and reliable system and we have very few problems with it."

"Of course, some of the younger people complain that the internet is not like it is at home, and that's right, it's not rocket-speed, but it's internet where the crew members can access things like Facebook, chatting with friends, or check if their salary has been paid into their bank account."

If these new communications options and links to their lives at home can help the company to maintain a happy and motivated crew then Mr Faurhøj believes that the results of the project will have been well worth the years of effort. DS

Inmarsat releases Q1 results

www.inmarsat.com

Inmarsat has released its financial results for the first quarter of 2009, showing a significant increase in revenues and profit compared with the same period in 2008 for the group, though with smaller gains in maritime data and a small drop in maritime voice.

Profit after tax for the period was up 35.3 per cent to $39.1m, compared with $28.9m in 2008, while revenue increased from $147.9m to $163.4m, a jump of 10.5 per cent.

Growth in the maritime sector was not quite as strong as the figures for the group overall however, with revenue up 3.6 per cent on data services but down 0.8 per cent on voice.

The company said that maritime revenue was adversely impacted by higher volume discounts year over year, primarily as a result of "a more even phasing of volume discounts expected for the full year."

Inmarsat says that, adjusted for the impact of volume discounts, the underlying growth in the maritime sector for all services was 7.7 per cent for the first quarter.

Total maritime active terminals grew by 11.5 per cent, mostly fuelled by demand for Fleet and FleetBroadband services, but the company also noted strong interest in its Inmarsat-C terminals.

The number of active Fleet and FleetBroadband terminals was up 34 per cent year over year.

"Our first quarter results deliver yet another quarter of strong growth and underline the resilience of our markets thus far to the wider economic climate," said Andrew Sukawaty, Inmarsat chairman and CEO.

'VSAT to mini-VSAT' incentives from KVH

www.kvh.com

KVH has launched a new promotion designed to entice vessel owners to move from what the company calls "big dish" VSAT systems to KVH's 60cm mini-VSAT Broadband service and TracPhone V7 hardware.

The 'Move Down to mini-VSAT Broadband' promotion will offer current VSAT users hardware and airtime discounts, with the option of receiving 3 months of free airtime and almost 40 per cent off hardware costs when purchasing the system outright, or a 10 per cent airtime discount and nearly 30 per cent off the monthly hardware charge if they choose a leasing option.

The mini-VSAT dish is approximately 75 per cent lighter and 85 per cent smaller by volume than a traditional 1.2-metre VSAT antenna, and offers 512 Kbps (upload) and 2 Mbps (download) bandwidth speeds.

"With this promotion, vessel owners can now enjoy lower airtime costs, smaller equipment, and lower hardware and installation costs, even as they upgrade their maritime satellite communications," says Brent Bruun, KVH's vice president of sales and business development.

"We're offering our customers an outstanding, very affordable opportunity to take the next step in communications at sea - a step that can dramatically improve efficiency, and make a fundamental change in the way they do business."

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Polar connectivity - vessel comms in Antarctica

Iridium boasts that its satellite communications network is the only option for ships that need connectivity in the polar regions – that claim was put to the test when the Argentinean Navy recently conducted sea trials of its OpenPort 128 kbps system in the Antarctic. *Digital Ship* spoke to the ARA Suboficial Castillo about polar connectivity

Following the introduction of the Iridium OpenPort satellite communication service last year, offering voice and data connectivity up to 128 kbps, sea trials of beta units have taken place on a number of different platforms.

One of them was the Argentinean navy ship ARA Suboficial Castillo, which used the service during a recent three-month deployment into Antarctic waters. ARA Suboficial Castillo is a 205-ft. ocean-going fleet tug, which provides a variety of support services for the Argentinean navy fleet and bases.

Tesacom, Iridium's distributor in South America and mobile satellite provider for the Argentinean Navy, installed an Iridium OpenPort terminal on the ship at Ushuaia harbour, near the extreme southern tip of Argentina on Tierra del Fuego Island, in November 2008.

The ship deployed from Ushuaia in November to conduct a variety of missions in support of the Antarctic community during the austral summer season.

The ship's itinerary extended as far south as the Brown Antarctic Base at 64° 35.5' latitude – areas in which geostationary satellite coverage can be unreliable due to the low elevation angles above the horizon.

The ocean area between the tip of South America and the Antarctic Peninsula is the home of some of the worst weather in the world.

The combination of cold temperatures, steep seas, strong currents and frequent storms provides a harsh test bed for ships, crews and equipment – unforgiving environmental conditions that provide the ideal test for a maritime communications system.

Rodrigo Martin Arrigues, commanding officer of ARA Suboficial Castillo, says that the Iridium OpenPort unit played a vital part in allowing the crew to exchange information with colleagues onshore.

"Iridium OpenPort was used as a new interface for our Link ARA satellite system with excellent results, allowing the real-time transmission of critical information to the navy High Command, including images and documents relating to the mission," he explained.

"We also relied on the Iridium OpenPort for vital weather information. For instance, when sailing through the Drake Passage, we maintained an open satellite link with the navy Operations Command, which supported us with the latest weather information on storms that could affect the mission."

"When compared to other communication options, Iridium OpenPort gives us much more data speed, a reliable communication system and a much more complete solution."

The system proved particularly useful when ARA Suboficial Castillo came to the assistance of a cruise ship that suffered damage when it ran aground near Cape Anna on the Antarctic Peninsula.

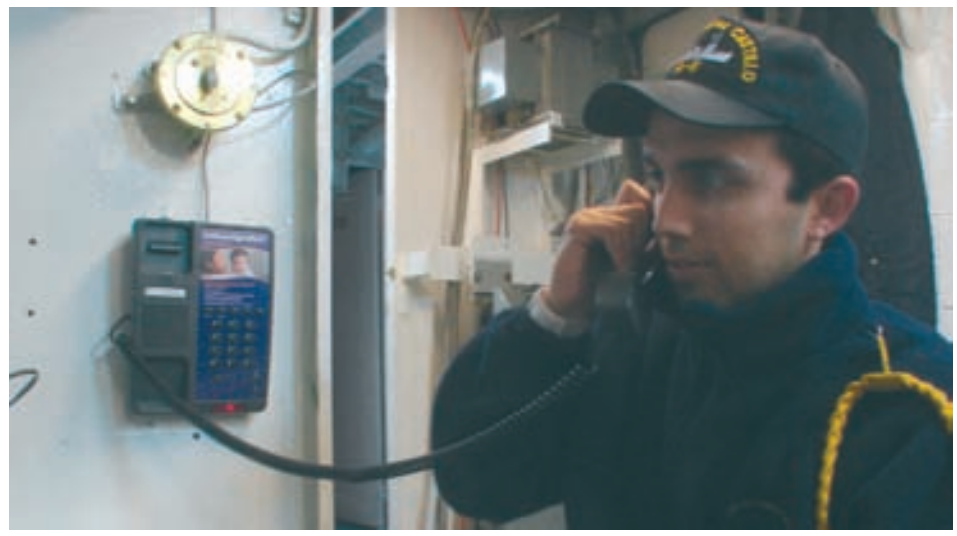
"We used the voice channels to maintain a constant link with the ship's captain and communicate with other ships participating in the rescue operation," said Mr Arrigues.

"In another incident, we came to the assistance of kayakers who were on an expedition to the Antarctic. We used the service to advise them that we were near to help, and we followed their progress via the internet."

Crew calling

Prior to the installation of the Iridium system, the ship's crew had been using high-frequency (HF) radio links for telephone calls, using a phone patch to the PSTN through the Support Radio Communications station in Ushuaia.

Mr Arrigues says that the difference of having the OpenPort available to make voice calls over satellite made a tremendous impact on crew morale on the ship.



The crew phone, connected to the OpenPort system, allowed those onboard to talk to their families while working near the Antarctic Peninsula

For the first time, crew members could easily call and email loved ones at home, surf the Internet and participate in online social media.

"During Christmas and the New Year holiday, we assigned all the voice channels to the crew, and obviously the traffic was very high," he told us.

The ship also established an onboard 'Internet Café', where the crew could have access to voice and internet connections. Many of the crew enjoyed using social networks like Facebook, where they could share their Antarctic experience with their families and friends.

"We created an Antarctica social network with the bases at Jubany and Esperanza, where we shared a lot of information," said Mr Arrigues.

With the trials of the system now finished, Mr Arrigues notes that the combined operational and social advantages of the system have been a very welcome addition to life onboard.

"We can say that the Iridium OpenPort played an important role in the successful completion of the ship's mission to support the bases in Antarctica during the brief austral summer months," he said

"We were very impressed with the ruggedness of the hardware and the quality of the phone and data service, and we are very grateful to Iridium and Tesacom for the outstanding technical support they provided."

The **ARA Suboficial Castillo** *had to brave extremely harsh conditions during its three month deployment*

Further trials

As well as operating in the harsh conditions of the Antarctic, Iridium OpenPort has also recently concluded a range of sea trials on vessels operating in other regions around the world, which have concluded a vital part of the commercial roll-out schedule for the system.

Zodiac Shipping Agencies Ltd., one of the first shipping companies to sign up for Iridium OpenPort, conducted sea trials on two ships in collaboration with Iridium Service Provider, AND Group.

The vessels are currently using AND Group's Rapidomail for crew and ship's e-mail, and will upgrade to AND's IPSignature package shortly.

Zodiac says that it now expects to move forward with more installations of the satcom system across its 125-ship fleet in the coming year.

Peter Döhle Schiffahrts-KG also conducted sea trials with an Iridium OpenPort unit on a 1600 teu containership under a service agreement with Vizada.

Michael Dittmer, fleet IT and communication coordinator for Peter Döhle, said that the trials have been successful and that his company also expects to continue with a wider roll-out across the fleet.

"Before implementing this plan fully we need to wait for the full results from the tests, but this is definitely the direction we want to head in, because we completely trust the service," he said.

Iridium says that it has now signed up 15 service partners to distribute Iridium OpenPort worldwide, with these companies integrating the system into their own hardware and software packages in many cases.

"The feedback from beta test platforms has been overwhelmingly positive, and we have a strong backlog of orders from shipowners who recognise the unique value proposition of Iridium OpenPort," said Don Thoma, executive vice president, marketing, Iridium.

"In the current economic climate, shipowners are looking for ways to trim operating costs for ships at sea, and Iridium OpenPort offers a very cost-effective alternative to other broadband satellite systems in terms of hardware, installation and monthly usage costs." DS

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Cutting costs with mini-VSAT

While fully global Ku-band connectivity may still be some way off, for vessels operating in regions of good coverage the possibility of having an 'always-on' satellite link can be appealing. Runar Gaarder, Mowinckel Ship Management, told *Digital Ship* about how his company cut costs by switching to VSAT

Bergen-based independent ship management company Mowinckel Ship Management AS manages ships for J. Ludwig Mowinckels Rederi and Mowinckel Tankers International, with a fleet mainly composed of chemical tankers that travel throughout Northern Europe and the North Sea as well as the Mediterranean.

In the course of its operations the company had begun to notice that the amount of data being transmitted over its communications systems was beginning to rise, leading to a subsequent rise in its monthly costs.

The Mowinckel fleet was using Inmarsat Fleet for satellite communications, as well as GSM/GPRS when it was within range of shore, which were both charged on a 'pay per usage' basis.

As the company was operating mainly within the European region, the possibility of using Ku-band VSAT was an option the company felt it ought to explore, and it began to look at some of the different products available.

"The major driver was cost, and fixed price data transfers from ship to shore," explains Runar Gaarder, ICT manager for Mowinckel Ship Management. "We also wanted to provide internet access to crew, as well for a higher bandwidth for ship operation."

"(We wanted) fixed line, fixed price, remote access for IT equipment and the possibility to serve a higher service level through remote access."

"This helps to keep our business operations efficient, and allows the crew to use the services to stay in touch with their loved ones. This is especially important, because in our industry retaining quality crew and officers is essential."

Trials

After examining some of the available systems, Mowinckel decided to trial a mini-VSAT system from KVH on board one of its vessels, to see how it would cope with its data transfer rates and how it would fit with the company cost structure.

Working with KVH distributor Polaris Electronics in Norway, Mowinckel arranged a trial period with one TracPhone V7 installed, a 70cm dish weighing approximately 27kg, considerably smaller than traditional 1.2m Ku-band antennas.

The company wanted to make sure that the system would provide adequate data and voice access while staying within the monthly airtime budget of $2,500 per vessel, while also allowing the use of its existing systems as backup.

The 'mini-VSAT Broadband F3' rate plan that KVH offered with the system was able to meet these budgetary constraints, offering data services at 256 kbps and two lines of Voice over IP (VoIP) telephone service.

"We started by installing the VSAT on (the vessel) Ionian in late summer 2008, and tested the system for a few months," said Mr Gaarder.

"Our operations with these systems are mainly in Europe, and the coverage is good, (and we've kept) our backup system, (which) is Fleet."

Mr Gaarder says that this initial trial period produced positive results in terms of meeting Mowinckel's criteria, and prompted the company to extend the system to other vessels in the fleet.

"Today we have 6 antennas installed, and one more to be installed this summer," he told us.

"Has monthly spend been significantly reduced? Yes it has. We are moving data traffic and telephone cost over to the VSAT from Fleet and GSM/GPRS."

New applications

Having the new system onboard has allowed the company to increase its use of the satellite communications system, and transmit data to run new and different types of applications.

"Before we installed the VSAT system we mostly used e-mail and data replication," said Mr Gaarder. "So the data usage was more limited before."

"Now we have internet access for crew and business, with a fixed price. I think we have an average of about 10 GB at the moment, though we are constantly working on keeping it low."

"KVH does not allow continuous streaming on their system at the moment, so this will be up to the provider what they can offer in the future. But we don't see a huge demand for this at the moment."

The company has installed some protection measures as a result of this increase in data, to secure against abuse of the system or the unintentional download of potential malware applications.

"The VSAT has demanded a higher level of security because the data system is exposed to the internet," said Mr Gaarder.

"We were able to install a very important feature, a firewall with an access list, which allows us to limit use of bandwidth-consuming applications such as streaming video and downloading music. This is very helpful in managing monthly costs."

"We have installed a firewall onboard with a content filter, and the possibility to control the usage."

The system has now been integrated with some of Mowinckel's different software packages, including Dualog Communicator, Lotus Notes, Domino and Microsoft Outlook, as well as providing access to the company's maintenance, purchasing, and quality assurance systems.

"We use direct replication in Domino between ship and shore," Mr Gaarder explained.

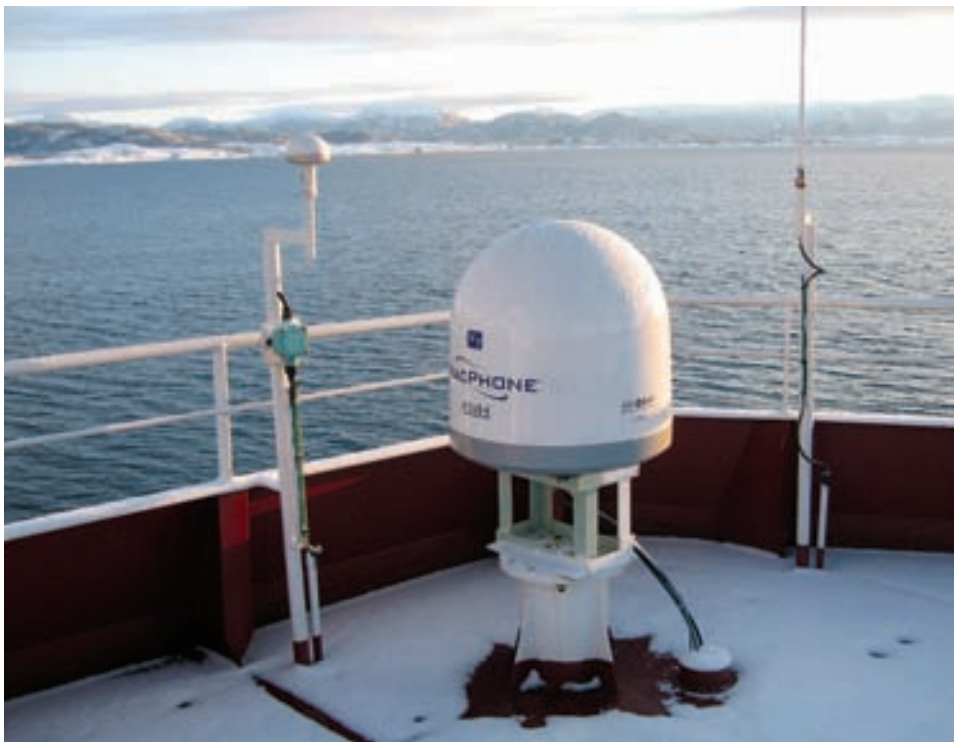
"Dualog offers mail transmits through TCP/IP, and dialup via Fleet as a secondary /backup method for mail transfer."

"We can offer a higher service level by having a system like this on board by offering remote access."

Installation of the mini-VSAT systems has proven reasonably straightforward with the small size and weight of the antenna. The antenna domes are installed on pole mounts or pedestal mounts, and the below decks equipment integrated into the areas where crew members use the computers.

"All the system components delivered the performance they promised, and the activation process only took about 3-4 hours per system," said Mr Gaarder.

"We didn't have any challenges with installation. Installation and logistics have worked out properly. The systems are performing very well." DS



The 70cm dish is currently carrying about 10GB of data per month

Six ships in the Mowinckel fleet are now installed with mini-VSAT

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Eco-friendly newbuild to install Autoload

www.autoship.com

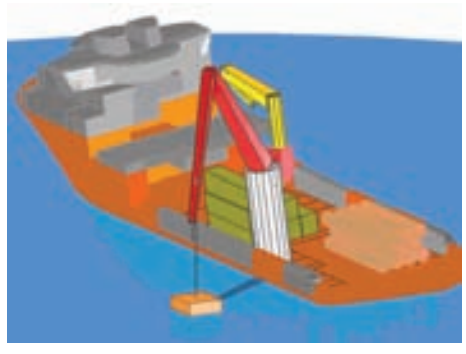
Olympic Shipping has agreed a deal with Autoship Systems Corporation of Canada for the supply of Autoload onboard stability software to the 'environmentally friendly' new-build, Olympic Zeus.

Olympic Zeus is an anchor handling tug supply construction vessel designed by Ulstein Design, and one of the biggest vessels of this type built by Ulstein Verft.

Developed for advanced operations in deep sea conditions, Olympic Zeus operates with a new type of optimum fuel saving hybrid propulsion machinery which was developed by Ulstein Design.

The Autoload Stability and Load Planning software system is used to display key hydrostatic values for safe vessel loading. The program also provides an overview of the vessel's current stability status, loads and important margins.

Autoship says that the system has now been installed on more than 500 vessels.



The new software system will make it easier to manage vessel loading safely

Hav Ship Management to install Teomaki software system

www.teomaki.com

Hav Ship Management has agreed a deal with Teomaki AS for the supply of ship management software systems for both its offices and fleet of vessels.

HAV Ship Management specialises in technical management and crewing of general dry bulk vessels and feeder containerships, providing fully integrated management services for 5 vessels owned by HAV Shipping AS and 8 vessels for external owners.

The contract includes the installation of the Teomaki.SM system on this full fleet of 13 ships and at the Hav Ship Management Bergen office, as well as the creation of interfaces with the company's Visma and Compello systems.

Training and general consultancy services will also be provided by Teomaki under the terms of the agreement.

Caterpillar Marine launches online forum

www.marine.cat.com

Caterpillar Marine Power Systems (CMPS) has launched a new online forum designed to allow users to share their experiences and exchange opinions, questions and solutions related to Caterpillar marine products, as well as other topics.

Initially, Caterpillar has set up nine different channels within the forum: Cat Product, MaK Product, Engine Selection, Technologies, Sustainability, Regulations & Standards, Financial Services, Engine Room Discussions and General Topics.

Experts from CMPS will monitor the discussions and provide additional support and advice if necessary.

Caterpillar says that the forum, at www.Marine.Cat.com, is meant to fuel "open and honest communication within the maritime community" and to share the application know-how which has been gathered by users of the thousands of Cat and MaK marine engines operating on the seven seas.

CMPS is the second division within Caterpillar to launch such an initiative, following the online community debut of Caterpillar's Electric Power Generation division in late 2008.

The company says that the new forum does not replace any existing customer service platforms, but will provide an additional opportunity to network online.

MESPAS reports that version 5.12 of its R5 software system will be available from June, with four new modules: TMSA II, Crew Management, Noon Report and Form Manager. The company has also extended its partnership with **Valad Business Solutions** of India, with Valad now authorised to install R5 directly and to conduct training for users.

Zamil Offshore Services has entered into an agreement with the Spanish company **Sener Ingeniería y Sistemas** for a permanent licence to use Sener's FORAN CAD/CAM System in its shipbuilding activities. Zamil has also taken steps to establish a ship design centre at its shipyard in Damman, Saudi Arabia, that will utilise the computer aided design systems.

Eletson Corporation has been successfully using **Seagull** products since 2004 on all of its ships and in its offices in Greece, Philippines, and Georgia. The company will now upgrade to the newest release of the Seagull Training System, which uses both computer based training modules and a Competence Evaluation System (CES) to educate and test new recruits.

www.mespas.com
www.foransystem.com
www.seagull.no

Hawaii Superferry installs maintenance software

www.marinesoftware.co.uk

Hawaii Superferry's new vessel *Huakai*, a 113 metre high speed aluminium catamaran and passenger ferry built at Austal's Mobile Alabama shipyard, has been fitted with a Marine Planned Maintenance system by UK-based Marine Software.

Marine Software had previously equipped the *Huakai's* sister vessel *Alakai* with a similar Marine Planned Maintenance system, including the provision of an integrated planned maintenance database.

The setup, which was carried out both at Marine Software's headquarters in the UK and on site at the yard, included work to fine tune the database for differences in outfit, such as a heavy duty stern ramp designed for austere ports without shore side loading facilities and capable of unloading 42 tonne trucks, an additional hydraulic power pack and a secondary ramp recovery system.

As there was to be a delay between the delivery of *Huakai* and its entering service, the Planned Maintenance (PM) system included a new Lay-Up module, enabling the scheduled PM database to be hibernated whilst activating a secondary set of out-of-service jobs.

Once the vessel enters service, the hibernated PM system will be reactivated and the PM schedule moved forward to start at the reactivation date. All class and statutory jobs are unaffected by the hibernation.

The maintenance system on the **Huakai** *was set in hibernation mode before entering service*

Shipdex training course set for June

www.shipdex.com

The founders of the Shipdex project, to create a standard protocol for the electronic exchange of data from technical manuals, have announced that they are to run a training course covering the use of the system and outlining the latest developments in the technology during the summer of 2009.

The training course will be held from the 17 to 19 June at Spectec's premises in La Spezia, Italy, and will include an introduction to S1000D (the aviation data exchange protocol on which Shipdex is based) and the Shipdex protocol itself.

The organisers say that the course should provide valuable information to managers who wish to become S1000D and/or Shipdex compliant, managers who wish to organise their technical publication department to produce and supply datasets in the standard formats, or to companies who are considering the preparation or signing of contracts requiring S1000D or Shipdex datasets

To obtain more information or to register for the course, contact Marco Vatteroni at: marco.vatteroni@spectec.net.

Neste Oil to install Veson Trading module

www.veson.com

Neste Oil Corporation has purchased Veson Nautical's Integrated Maritime Operations System (IMOS) Trading module for its Shipping Division, to be used for monitoring and managing physical and Forward Freight Agreement (FFA) positions and risk.

Neste's Shipping Division already currently uses Veson Nautical's IMOS Chartering, Operations and Financials modules to manage all commercial shipping activities for its 30-vessel fleet. The company transports about 40 million tons of crude oil, oil products and chemicals annually in the Baltic, the North Sea and the North Atlantic Region.

"Our IMOS implementation last year was quite successful – in fact we received company-wide recognition for it – so we knew when it was time to select a Trading system, Veson Nautical would be our vendor of choice," said Joakim Kärkkäinen, vice president of Neste Oil Corporation's Shipping, Finance and IT Department.

"Veson Nautical IMOS will enable us to automate the full range of trading activities; in addition, the benefits of having all four modules link together to create a completely integrated system handling chartering, operations, financials and trading is a major advantage."

John Veson, president of Veson Nautical, commented: "Our software gives Neste visibility to quickly understand their exposure so their team can hedge against risk that may impact their profitability. We are pleased to team with Neste Oil again and look forward to yet another successful implementation."

Maritime and non-maritime software - creating an interface

Running an organisation that encompasses different data centres in locations throughout the world can be difficult, made even more challenging when vessels and offices are running different software systems. *Digital Ship* spoke to Saikat Basu, Helix ESG, about how he solved this problem by integrating maritime software and terrestrial ERP systems

Helix Energy Solutions Group is a provider of services to offshore energy producers worldwide, operating a number of varied vessel types through a range of business units, including Helix Subsea Construction, Cal Dive International and Well Ops' Subsea Well Intervention.

These different vessels and organisational units use an array of different IT applications and systems, however, they all must report to the centralised shore-based company offices, where data and information is constantly received and transmitted to help operations to run as efficiently as possible.

Communicating this information is not a great issue for Helix, as most vessels are fitted with C-band or Ku-band VSAT offering 256 kbps always-on connections to push data over and back between shore and ship.

The problems lie in compatibility – when data from one software system collides with another software system, the result is most likely to be confusion and additional work for those involved in running the IT infrastructure.

This problem can be exacerbated when the systems in question involve a mix of maritime-specific software systems on one side and terrestrial ERP applications on the other. In the case of Helix, this meant bringing together its Oracle enterprise software with its ABS Nautical Systems fleet management application, NS5.

Saikat Basu, manager marine systems at Helix ESG and head of the project team responsible for creating the integration between the two systems, recalls how the idea of creating an interface seemed to be a distant goal when the fleet management software was first introduced.

"I joined Helix a little bit over one year ago, and Oracle had already been implemented in the main offices, shore side," he told us. "The E-Business suite includes supply chain management, an accounting and financial package, and HR and personnel records management functionalities."

"At that time a decision was made to use a software system onboard the ships as well. Previous to that it had been pretty much all manual, vessel personnel were using Excel spreadsheets and e-mail combined with phone calls, and things like that, to make purchase orders and so on."

"Some vessels had legacy maintenance programs that did not meet all requirements and were not really very stable. To improve on that the management made the decision to go ahead and implement NS5 on the ships."

The implementation of the software system required a significant amount of planning, organisation and consultation, and work on both the vessels and in shore offices.

"It is one thing to have reached agreement with a software vendor and install a blank software and quite another to make it all really happen, in other words, put a complete solution in place," said Mr Basu.

"You need to have all groups and users buy-in and make sure that it meets the business needs. So when I came on board with Helix my first call of duty was to get NS5 up and running."

"We had to start with configuring the shore side set-up, with the servers etc. and setting up users' authorisations, and so on. Then the next step of the set-up was implementing the application on the vessels, which, from a technical perspective, was actually an easier task."

Helix implemented NS5 in two phases, the first phase being the introduction of the Maintenance module, with the Procurement module to follow.

"Helix owns a controlling interest in the world's largest diving contractor, Cal Dive International, and Cal Dive had about 10 to 15 vessel and SAT (saturation) sites that already had NS5 running, but they were using it for the Maintenance part," Mr Basu explained.

"So NS5 was already known in-house somewhat, rather than having to expend time and resources bringing in something new or different."

With the Maintenance module in place the implementation of the Purchasing module could begin, with information now available to flow between the two modules themselves though not connecting with the Oracle ERP system at that time.

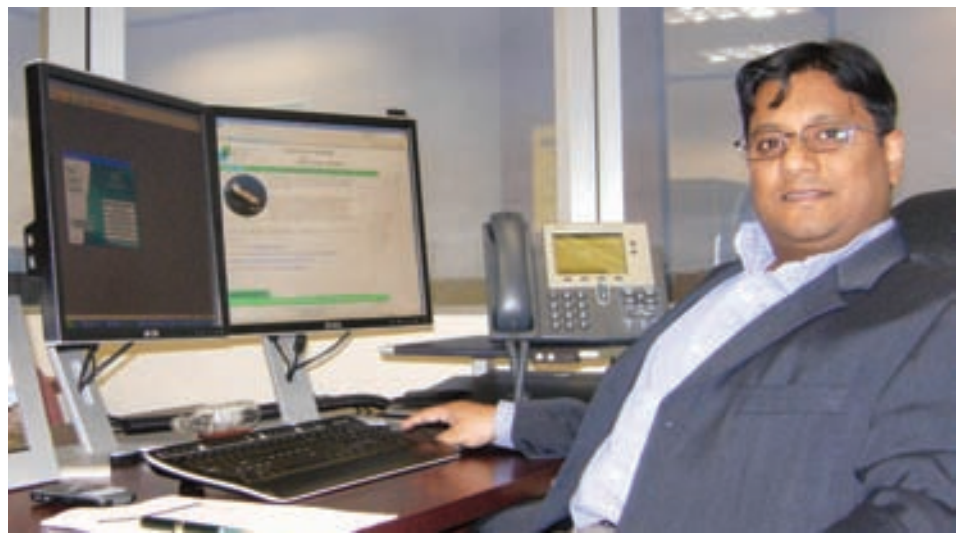
"Purchasing is not just limited to materials; it spreads over to the maintenance in the form of services as well," said Mr Basu.

"In our Planned Maintenance we have some standard jobs or routines that are performed by outside contractors, those items are procurement of services."

The introduction of this new purchasing system marked a major change in how procurement was managed by the company, and helped to sow the first seeds of a potential interface with the shore based systems.

"From the shipboard perspective, the way of working actually underwent a big change for the NS5 implementation, because before all they were doing was sending in templates of requisitions that were e-mailed, updates on the status of the order would not be automatic, there would be quite a bit of back and forth communication involved and historical information would be difficult to track," said Mr Basu.

"With NS5 we wanted to streamline the business process so that record keeping would become centralised. Now on the ships they can click on a status button on the requisitions and see where in the process their particular order is. This has received a big welcome from those onboard, it's made their lives much easier."



'Once we had a picture of how we wanted the data to flow, that gave rise to the requirement to have a multi-phased interface' – Saikat Basu, Helix ESG

"However, the objective to integrate the (Oracle and NS5) systems was really theory more than anything else when NS5 was procured, because it didn't really have all the tools we needed built-in, off the shelf."

Defining the process

With the potential benefits of having an integrated system, that could allow purchasing data to seamlessly flow from the ship right through into the company's enterprise software and back again, now becoming clearer, Helix began to explore how such an interface might actually be achieved.

One of the first steps, and one of the most challenging according to Mr Basu, was creating a thoroughly defined map of what the company was trying to achieve, defining and documenting company processes and procedures.

"The application, NS5 or Oracle, can literally do anything that we ask it to do or configure it to do," he said. "The more important thing for us was to design the most optimum and streamlined processes, saying 'this is what we want and this is how we want to do business'."

"That involved various groups, or representatives from key groups, coming together to sit and brainstorm about what our process flow was going to be like, who would do what, and what the touch points are in each system."

This group of key representatives included Sundar Kumaraswamy of the Helix Oracle team, John Stanfa from the Helix IT department, and Jason Casper and Eric Vega from the company's Supply Chain team.

"Once that was done we had kind of a high level picture of how we wanted the data to flow, and that kind of gave rise to the requirement to have a multi-phased interface between the systems," said Mr Basu

A key idea in managing this data flow was to bring in as much automation as possible, to try and improve efficiency by removing as much human effort as possible from the system.

"We wanted to automate it as much as possible so that our objective of increasing efficiency would be obtained, because we don't want to have somebody type in something in NS5 and then turn around and have somebody else in the office add the same information in Oracle, and vice versa," said Mr Basu.

With the process goals mapped out and the company clear on what it wanted to achieve, Helix set up a project team to manage specific tasks for different groups, with Mr Basu as project leader.

"That included data gathering, loading data into the systems, data cleaning, and so on," he said.

"On the surface it looks like a huge project, building a hierarchy of information for everything on the vessels, and on the shore side building this interface to Oracle, but when it was broken up into various phases and sub projects each task followed on from another one in the grand scheme of things, and it was easier to manage."

"Once we had that picture of where we were going we could make a few revisions along the way, it was a proactive kind of thing. Although we didn't make any wholesale changes we were able to learn some lessons as we went along and tweak it a little bit, and it helped in the sense that we didn't have to come 'back to the drawing board' and re-do the project."

Interface design

As the project team began to get a better idea of what it needed to achieve, the design of the interface became somewhat straightforward. It was decided to build-in a mix of three different purchasing scenarios that could potentially be generated by NS5 – materials, services, or a combination of both.

"All three scenarios are passed over to the Oracle system, and it also feeds back into NS5 once the Purchase Order (PO) has been generated," Mr Basu explained. "This way everyone involved is in the loop, be it shore-side or onboard vessels."

"We took that information back to the drawing board in the design of the interface and noted that there had to be some key data elements that need to match in the two systems so that it will work as a translator."

These key data elements included the particular item identifiers used in each system, which would need to be aligned and translated in such a way as to make the two systems compatible through the interface.

"We use equipment codes, Part Identification Numbers, departments and account numbers to translate something coming in from NS5 into something that Oracle would recognise," said Mr Basu.

"That was a semi-automatic process, as some of the vessels are quite old, maybe 10 or 15 years, so we had data in the form of e-mails and drawings and spreadsheets lying around, and that had to be combined into a system recognised loadable format."

"In other words, some items we could programmatically load while others had to be manually addressed. These needed to be vetted multiple times and then loaded into the system."

While creating a common language for the two systems was a major step in the design of the interface, aligning the processes of the different applications to allow them to work in harmony was also an important task. Data replication, for example, was one of the major areas where this needed to be addressed.

"Initially we had it set up just as it came out of the box, which was an overnight replication process that synchronises data between ship and shore in NS5," said Mr Basu.

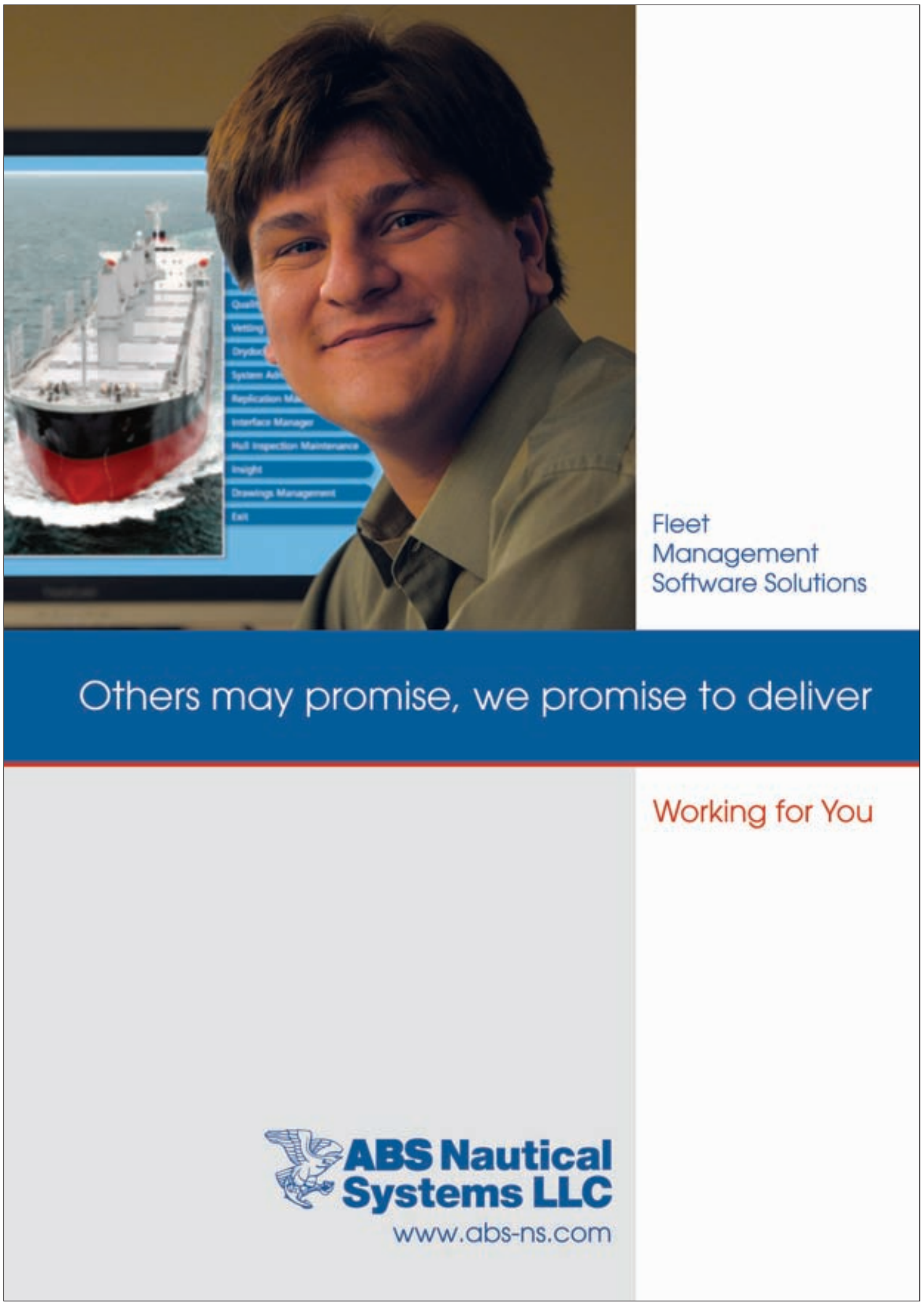
"However, with the interface going live there was a need to do more real-time data exchange for efficient procurement, so we increased the data exchange cycle to about 6 times a day. This brings all new requisitions or new service requests ashore for processing quickly."

"Then, at the back end, we also have a two-phased run of the interface. The interface part itself is a little bit complicated, the first module is the data export from NS5, which is basically approved requisitions going out from the ship. The second module gets approved purchase orders back in NS5, to facilitate ships taking delivery of goods and/or services."

Essentially, this replication is done by both software systems individually, with the interface in the middle between Oracle and NS5 providing the final link to carry any new data between the two.

"The NS5 data gets synchronised between the ships and the office, and at the back end the Oracle and NS5 systems ashore do a handshake and get updated information passed over," Mr Basu explained.

"It's not the complete database that is transferred, it's just the incremental transactions based on specific triggers, reducing the amount of data transmitted. All of



this is automated, based on a schedule on the server, both on the vessel and in the office, though we also have a procedure where, if there is an urgent requirement, it can be run manually on demand as well."

"There are two components, NS5 and the interface, which is the 'middleware' between the information on the vessels and the Oracle system on the shore side."

This 'middleware' that Helix created was based around a reporting software tool by Management Systems Consulting, with the project team adapting the technology to suit its own demands.

"From a cost control perspective, we were looking to get the best 'bang for our buck', but also wanted to avoid totally engineering something from scratch," said Mr Basu.

"So we used a MySQL-based reporting tool from Management Systems Consulting as a transporter, as well as pre-check validator, for the data. We built the business rules into that so that the data is translated correctly between NS5 and Oracle."

"Before this replication of data takes place the service is run on the server, on the interface module, that goes through a set of pre-defined rules and, based on those results, the transaction generates a file recognised by Oracle that is loaded into the system."

The system is designed to run all of these processes automatically, with manual intervention only required if there is an anomaly detected in the data as it is processed by the software.

"If the transaction does not 'pass' based on the business rules then it sends an automatic e-mail to specific groups to correct the issue," said Mr Basu. "It might be a simple thing like somebody not entering one of the required fields, or a data mapping problem, so this reporting tool does that up front."

"These notification e-mails, if there is a technical issue it goes to IT or to myself, and with things like equipment codes or new equipment needing to be loaded into the system, that goes to the supply chain or business group responsible."

"When a file is coming the other way, from Oracle, it again goes through a series of tests, and once it passes everything it is loaded into NS5."

Lessons learned

Over the course of this process, from the installation of the fleet management software through to the design and implementation of the interface between NS5 and Oracle, Mr Basu notes that the company has learned a lot of important lessons which have helped the team to modify and adapt its plans to suit the particular circumstances.

"When we were doing the data mapping, for example, there were numerous different types of units (such as kg, kilogram, box of 10, etc) that were loaded in Oracle," he said. "Not all of them were valid in NS5, but we had learned some lessons about having cleaner data loading into the interface."

"There have been challenges with this, but they haven't been too difficult to fix, because, rather than going into the system and changing complete tables, all that's required is to update the mapping interface to say 'kg' in NS5 equals 'kilograms' in Oracle, or vice versa."

Data is replicated between Helix vessels and the shore offices six times per day

"We wanted to allow users to continue with what they were comfortable with, so if users on the ship were used to looking at 'kg' in NS5, for example, the thought process was 'what can we do to keep that unit as it is for the shipboard user, but at the same time translate it to what is needed for Oracle?'. We didn't want to change either of them, so it was a matter of updating our middleware and keeping both sides satisfied."

Another lesson learned from the implementation process was that, despite the best intentions and any amount of technical wizardry, complete automation of the purchasing function is a very difficult aim to achieve.

"From a human intervention perspective we tried to eliminate as much typing as possible, to reduce the time required but also the possibility of typos and errors in data entry," said Mr Basu.

"We set up to try and get as many spare parts into the system at the outset as possible, so the person generating the requisition just has to pick from a pre-populated list."

"However, that's nearly an impossible dream to complete, because on an almost daily basis the spare parts are being changed by vendors, new things come in and some old ones are no longer available, so it's a huge task. We can pick up the bulk of orders from the existing list though."

There were also a small number of steps in the process where it was deemed necessary to maintain a human influence rather than leaving everything to the computers.

"The human touch is needed in the order approval stage," said Mr Basu. "The first approval is in taking the decision to go ahead and procure the services and materials, that's done by the vessel managers ashore and they have to click 'yes' or 'no' to trigger the transaction."

"The second touch point is when they get back the prices and terms and conditions from the vendor, they have to say if they agree to it and that it fits with the budget, and so on. The last touch point is at the vessel, when it comes to taking delivery, but that will then automatically update the inventory on board when that is entered."

"We are trying to reduce manual intervention as much as possible, but I don't think there'll be a time when it completely goes away."

Maritime challenges

As well as the numerous technical challenges involved with integrating two distinctly different software systems, Mr Basu and his project team also encountered a number of other practical challenges when it came to merging a maritime software with a land-based counterpart.

"The biggest challenge I'd say, from an applications perspective, was technical language," he told us. "By that I mean the times when we would talk to Oracle experts, it's a very different type of conversation compared to discussions on board the ship."

"With IT personnel, we discussed file formats, field definitions, data mapping etc, and with users we had to be careful not to throw out technical jargon but instead use terms they would be familiar and comfortable with."

When differences in language are not just confined to the two software systems but also include the humans operating them, it adds to the complexity of creating a smoothly functioning interface.

"For example, for the vessel a requisition is just a request to get spares and services, whereas the same item, technically speaking, can also be treated as a transaction with record IDs and specific data field characteristics," said Mr Basu.

"Also, the 'Materials Master' in Oracle is kind of like a table which has maybe tens of thousands of items in it, but from a marine software perspective it's not that straightforward as there are relationships between parts, equipments and systems, that may have embedded properties like criticality, quantities, min-max etc. In other words it's a multi-level relationship that actually makes sense to the person onboard the ship."

"As a line item in the 'Materials Master' that's in Oracle it's much more straightforward, it's almost like having a big spreadsheet with things you can pick up on a requisition, then order it, then that's it. From a marine perspective there are many more considerations, we have the whole vessel grouped into different systems and there is common equipment between systems or components that share spare parts. So there's a cross-reference relationship between them. Trying to map these into Oracle and translate them into Oracle's language was one of the biggest challenges."

Another aspect of the implementation that was a uniquely maritime problem was the fact that the remote offices aiming to interface with the Oracle ERP are actually constantly moving around the world.

"The first vessel that went live was involved in a project in India, so it was not very easy to travel to the vessel frequently from the US, especially with the objective to complete the project in the most cost effective manner possible," said Mr Basu.

"What helped us was that, since we have a broadband (256 kbps) connection to the vessels, it's easy to call them to talk things out, as well as offer support and training, and if things were going slower than we wanted we could dedicate more resource to it."

"The VoIP phone is on all the time and internet users have unlimited access, so we can have real-time data transfer. We can just dial in to talk to the vessel without any problems, just like we are talking to another extension in the office."

Success

Incredibly, with a new system and work process to design and all of these challenges to overcome, Helix managed to complete the software interface project in

Pilot scheme for integrated Class report system launched

www.spectec.net

SpecTec has announced the launch of a pilot scheme, in association with Lloyd's Register, Carnival UK and James Fisher Mimic, that will explore new ways of presenting traditional Classification Survey Reports.

The companies say that the new reporting system will increase the efficiency of Class surveys by presenting the machinery information required in a quick and cost effective manner, by extracting data from systems that are already in place and delivering it to the right person, in the correct format.

The Mimic Classification Survey Report merges information from the Mimic Condition Monitoring software system and AMOS M&P (Maintenance & Procurement), to provide a detailed report for CM Notated machinery audits, showing all of the information that a Class Surveyor requires in order to satisfy the Class requirement, as stipulated by Lloyd's Register.

By joining the condition monitoring and M&P systems together all relevant maintenance history and condition monitoring information can be gathered from the two sources into one report in a matter of seconds.

The pilot trial of the system will aim to see if this system integration method, combining condition monitoring data together with information from ships' computerised maintenance management systems, could be extended to become a standard way of collecting survey data.

approximately 8 months, including the gathering of shipboard information, data loads, system design and training.

Mr Basu says that the company has since seen big gains in efficiency across the organisation through the use of the newly integrated system, which has in turn led to cost savings through the elimination of errors and duplicated effort.

"The manpower resources needed for manual typing and things like that have been reduced quite a bit," he said.

"On the spares side, the incorrect ordering of spare parts has decreased, resulting in cost and time saving. The supply chain now has more information on the name plate data of the equipment, so they get the correct items quickly and do not have to go back and forth with the vessels with questions on the items."

While embarking on a project of this kind and looking to integrate maritime systems with their terrestrial counterparts is certainly a challenge, Mr Basu has a few words of advice that he would suggest to anyone considering such a move.

"Before joining Helix, I worked with major marine and energy companies, and there also we set up interfaces between a non-maritime ERP like SAP, JDE, etc, and marine applications," he said.

"I would say that lots of new project teams get bogged down in the technical details in these kinds of things. For me, the key is to map out what it is that the company is looking to achieve. When I say it like that it sounds very simple, but when you put it down on paper it will start to answer a lot of questions that might come up down the road."

"The biggest challenge is to define and, more importantly, document in-house processes that are most efficient. Once that is done, to make the software do its tricks is the easy stuff."

To do this Mr Basu suggests that as many organisational stakeholders as possible should be involved in the process, to get a realistic picture of how the company works, rather than just the IT department's view of how it ought to work.

"One of the critical things was to get the people from the ships involved, the chief engineers and captains and so on," he said.

"Apart from the traditional deck, engine steward department, we also have a pipelay or project department. To get key individuals involved at the onset, to understand what they are looking for with a requisition or when they do their planned maintenance order, from a data perspective, was very helpful."

"I've seen so many projects get unduly bogged down saying 'we have to develop this script', or 'this is a routine we have to run', or 'we need this architecture', that the overall picture gets missed. Why you are trying to do this is the real question, if that is well understood and documented between all team members, then it makes things easier."

Helix now has 3 vessels online and connected to the interface, with 4 more in the process of being connected, to add to about 15 Cal Dive vessels and systems already implemented with NS5 maintenance.

The company is now looking to extend that further to other vessels and business units within the group. Mr Basu is hoping that the next phase of implementations will be able to build on the success of this first project and create even greater efficiencies for Helix ESG. DS

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Shipdex grows to 27 members

The Shipdex protocol for electronic technical data, which aims to remove the need for paper-based technical manuals through the use of an electronic standard, recently celebrated its one year anniversary and expansion to include 27 members at a conference in Hamburg hosted by *Digital Ship*. Discussions on the latest developments with the initiative suggested 'cautious optimism' in the growth of the technology

Shipdex, the organisation which has developed a standard for maritime technical data to enable the end of paper manuals, reports that it now has 27 members (not including companies which are a subsidiary of another one), who have all shown their support by agreeing to pay a €2,500 registration fee.

Recent companies joining include United Arab Shipping Company (UASC), shipowner Rederi AB Transatlantic, shipyard TKMS Blohm – Voss, Minoan Lines (Greece), Germanischer Lloyd, KJ Radio Co Ltd (South Korea), Elomatic and Kongsberg Maritime.

Giancarlo Coletta, purchasing director of Grimaldi Naples, one of the two shipowners (along with Intership) that started the initiative, says that his company has included Shipdex documentation in a specification for a vessel newbuild – in other words, it is requiring that the shipyard supplies all technical documentation for the vessel in accordance with Shipdex, rather than on paper. The shipyard is currently evaluating this, he said.

The requirement will include documentation for all of the equipment included on the vessel provided by sub-suppliers to the shipyard.

The first version of Shipdex, Version 1.1, is now finished; the first full trial will be held in La Spezia, Italy, on 23rd June, validating and importing data sets from MAN Diesel and MacGREGOR onboard new Intership vessels, using SpecTec's AMOS software.

The Shipdex Protocol Maintenance Group, which manages updates of the protocol (and includes all of the founder members) is keen to expand to include representation from a shipyard and a classification society, and will be doing this shortly.

Shipdex currently has over 100 subscriptions to its e-mail newsletter, and gets 380 visits per month on its website.

Geographically the biggest interest is in Scandinavia, Germany, the Mediterranean, and also Canada and the US, with a recent growth in interest from India, South Korea and China.

Maritime software company SpecTec has already completed its first Shipdex software modules, which can be used to create, verify, view and import / export Shipdex data.

The first Shipdex training courses, provided by SpecTec and its partner company Corena, a specialist on S1000D, will be held in June this year at SpecTec's offices in La Spezia, Italy, (see page 19) in conjunction with the first full trial of the system.

There is one course on June 17-18, titled 'Introduction to S1000D', with a second, 'Introduction to Shipdex', on June 19.

Shipdex is a simplified version of the S1000D electronic technical data standard developed for the aviation and navy industry, modified into a format suitable for the maritime industry. It was formally launched at *Digital Ship Cyprus* in February 2008, and at that time had just 7 members – Grimaldi, Intership, SpecTec, and four equipment suppliers; MacGREGOR, Alfa Laval, MAN Diesel and Yanmar.

Shipdex was launched as an open standard, which could be used by everybody and would be fully expandable in future.

'When it is so easy to get electronic data, why are we still dealing with a huge amount of paper?' – Giancarlo Coletta, Grimaldi Naples

Problems with paper

Giancarlo Coletta explained to the conference how efforts to establish Shipdex grew from a deepening frustration with paper manuals.

"A new ship comes with half a ton of manuals," he said.

"It's very difficult for us to understand how, when it is so easy to get electronic data, we are still dealing with a huge amount of paper which is difficult to manage and store. We have 95 vessels – we don't know where to put all this technical library."

With paper data, it takes a long time to retrieve information and there's a big risk involved in not having the latest information.

Shipowners are given manuals which come from many different manufacturers, all on paper or in different electronic formats such as PDF, Word, or HTML - but not with retrievable or manageable data. Mr Grimaldi notes that sometimes Grimaldi only has 1 copy of the documents – and they are needed both onboard and in the office.

It is very difficult to integrate the systems with maintenance management or enterprise resource planning systems. It is also hard to archive and manage the original manuals, let alone the updates and service letters; there is no easy way to send comments back to manufacturers, he said.

This ultimately means it takes a long time to do vessel maintenance tasks, a long time to purchase the right spare parts, and it results in high management costs.

Meanwhile the shipowner has various different requirements to comply with – from customers, class, port authorities and vetting, to name but a few – all wanting to see evidence that the ship has the most up to date manuals all readily available.

"How can you manage all these tasks without having an electronic system?" asked Mr Coletta.

More than a PDF

A common misunderstanding about Shipdex is that it is like a PDF.

Certainly electronic documents (such as PDFs) have many advantages over paper, in being easier to communicate, store and update. But Shipdex data sets can do much more than that – because the data can easily be imported or used in different ways, by the supplier, shipowner, and anyone else who is working with it.

'Forget the concept of manuals – we are exchanging only information' – Marco Vatteroni, Shipdex technical director

For example, you can import the data from the equipment manufacturer automatically into your maintenance or purchasing software – which means you no longer have to send manuals to some far-away land to be typed into a computer.

The seafarer can automatically be given a list of parts which need maintenance, according to the manufacturer's recommended schedule. The software system can automatically provide instructions about how to do the maintenance, and update the purchasing system to ensure that the exact spare parts are ordered. If the spare part numbers change, the software system can be updated automatically, with no effort from the seafarer at all.

Many shipping companies have made big investments in their purchasing and maintenance software, but are let down by the quality of data within, which is very expensive and tedious to improve. Being able to do this automatically would be of great benefit.

From the suppliers' side, if they produce Shipdex data, they don't have to think about structuring, formatting or organising the manuals at all – because it is all handled by the shipowner's software.

As the products change, they don't need to put together a completely new manual – they can still re-use data for the components which haven't changed.

Falk Aupers, consultant and leader of training courses with S1000D specialist Corena, spoke at the conference about one manufacturer of defence systems the company had worked with, which had been

creating documentation with Adobe FrameMaker for many years, but was finding it hard to control all of the different configurations, and re-use pieces of information in different documents.

After moving to creating data in S1000D, it found it could focus much more on creating the content (rather than its presentation); and re-use different information units. It managed to reduce costs by 48 per cent, reduce its revision cycles from 6 weeks to 4 days, and improve quality, he said.

"Forget the concept of manuals – we are exchanging only information," said Shipdex technical director Marco Vatteroni.

Big plans

There are plenty of big ideas about how Shipdex could be expanded – such as for the exchange of data about ship operations, hydrographic data and hull condition.

It could be used to improve communications between equipment suppliers and the vessel, to monitor how the equipment is performing and receive direct feedback from the people using it, something suppliers have always found it very hard to achieve.

"We should see Shipdex as a new methodology to improve the quality of relationships among all shipping actors," said Mr Vatteroni.

However, Till Braun, head of sales projects with Germanischer Lloyd and chairman of the conference, suggested that it might be sensible to keep ambitions limited and achievable for the moment.

"I believe it might be wise to start with little things like parts manuals," he said. "Let's slowly establish the standard – we will all see in a few years."

Class

Mr Coletta says he believes that classification societies will gain a lot from Shipdex – if it makes it easier for them to control and check the vessel and its equipment. "Acceptance from class has been good," he said.

So far, Shipdex conferences have been attended by ABS, DNV, RINA, Bureau Veritas and Germanischer Lloyd.

Christian Cabos, head of department - computer aided engineering with Germanischer Lloyd, said that his company is happy to receive electronic information today. "We have a large project in our company to enable electronic drawings approval and we encourage XML data transfer," he said.

Eva-Lisa Martinsson of MacGREGOR said that the company has not yet informed its class society that it would like to submit data in Shipdex format, "but we will do."

Mr Vatteroni said he held a 4 hour meeting at DNV's offices in Oslo talking about technical aspects of Shipdex, and that DNV is evaluating its interest and ability to contribute to the development of the protocol.

Seafarers

The question was raised about whether companies should involve their seafarers in these discussions, since they will be using the electronic data at the end of the day.

"My thoughts are – yes you should. They are the real users," said Steve Mulvaney of Rolls Royce.

Mr Vatteroni suggested that seafarers might not notice any difference – they will still use the same software – but the data quality will be much better. "They'll be

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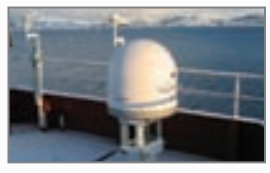

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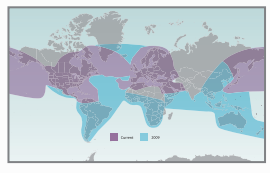

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able to find the information always in the same place, with the same layout," he said.

Giancarlo Coletta pointed out that seafarers might appreciate the consistency. "Everything will be the same from one vessel to the next," he said.

Yards

The biggest weakness so far seems to be shipyards. "Shipyards have not yet understood the potentiality of the protocol," Mr Coletta said.

"But we have more interest from the small ones than the big ones. They are looking at the protocol as a real advantage."

Shipowners might be successful in persuading shipyards to provide Shipdex documentation for ship orders they are placing at the moment – they are in a stronger position than they were last year, suggested conference chairman Mr Braun.

"One year back, shipowners went to the yards like beggars – now there's lot of yards and few shipowners placing orders," he said.

Mr Mulvaney pointed out that a lot of the benefit of electronic documentation is the ease of managing the updates. If shipyards do not update the documentation they provide with a new ship, then their interest will be limited.

"Why would shipyards get involved if they don't help with updating data?" he said.

IMO

Jan Spilleth of electronic charts company Jeppesen suggested that the Shipdex group might like to approach the International Hydrographic Office (IHO) or International Maritime Organization to try to start a discussion about whether Shipdex could be used to manage nautical publications, or included as part of regulations.

Electronic chart data is very closely regulated, and the rules about data are very strictly defined – who can create it, how it makes its way to the vessel, and what format it is in – sensibly so, as the consequences of incorrect data in electronic charts can be much more severe than incorrect data in a purchasing system.

Shipdex can be used to support all kinds of data types and files – so it could be used to manage the delivery of chart files and updates to the vessel, and ensure seafarers always had the right charts, without interfering in the actual chart data itself.

Other delegates said it should not be necessary to involve regulators in Shipdex – since they usually only decide what data should be on a vessel and how updates should be made or recorded, but don't get involved in the actual format of it.

"Authorities have only a need to state which technical information should be onboard," Mr Coletta said. "So the best is for the user to comply with the requirements and respond in the most economic way."

It is far better to quietly convince the industry of the benefits of Shipdex rather than encourage regulators to force people to adopt it, he said. "The revolution from the base is much more effective than the revolution coming from the top."

While regulators could make the point that paper documentation is required for safety reasons, this issue has already been thoroughly thrashed through for documentation for submarines, said John Nicholson, manager, support engineering, information, training and service solutions with Rolls Royce Naval.

"We produce documents for submarines that's electronic only," he said. "There is only a very minimal requirement for paper documents driven by the safety case."

Shipdex developments continue at Rolls Royce

Rolls Royce's civil aviation engine business has itself been involved in moves to transition from paper manuals to electronic technical data in line with the Shipdex protocol – and is now starting work on a project to facilitate Rolls Royce's marine engine business to move in the same direction.

Its aviation technical data is issued in S1000D format, which is now an international standard used in the civil and defence aviation industries, which Shipdex is based on.

Steve Mulvaney, customer support specialist with civil large engines technical data, Rolls Royce, has been heavily involved in this process, and says that S1000D should prove to be very helpful to the company in harmonising the data standards everybody used or expected to receive.

"Now the marine industry is looking at it, that's extremely good news for us," he said. "It has the potential to save us a lot of work."

Mr Mulvaney and John Nicholson, manager, support engineering, information, training and service solutions with Rolls Royce Naval, are currently working to commonise technical data production and delivery processes across the marine and civil aerospace sectors, and adoption of the Shipdex standard for marine data will help facilitate this.

They are looking to make a formal proposal in the 4th quarter of this year, according to Mr Mulvaney.

"I shall certainly make a recommendation that Rolls Royce marine support Shipdex," he said.

Cutting out paper

It took Rolls Royce from 1998 to 2007 to progressively remove paper documentation from its civil (non military) aviation engine business, but in doing so, it reduced the amount of money it spends on internal documents production by a staggering 92 per cent, and increased revenue from the sale of technical data by 800 per cent.

Meanwhile, the number of printed pages decreased from 11 million in 2001 to 500,000 in 2006, and was down to zero in 2007. If you can create 80,000 sheets of paper from a tree, this means that the 22 million paper impressions in 2001 equates to 136 trees every year which the company has saved.

Rolls Royce started sending documentation out on CDs in 1996, and the number of CDs being distributed rose from 24,000 per year in 2000 to a peak of 96,400 in 2006.

Since then, CD production has also declined – due to customers increasingly hosting documentation on intranets which are accessible from multiple PCs (rather than having individual users with their own CDs) – and some users choosing to download documentation directly from the Rolls Royce website whenever they need it.

The initial decline in requests for CDs "was driven more by the customers than us," said Mr Mulvaney.

"In corporate jets – often you have 1-2 people maintaining the jets. They said 'don't send me CDs, I just get it by Wi-Fi from your website'. These were the kind of people who got mobile phones and wireless before everyone else, and they can be more reactive to changes in technology."

Rolls Royce currently provides documentation for 13 engines in civil aviation, the earliest of which went into service in 1953. It supports over 520 different publications, supplied on 70 different CDs, which are revised at intervals of between 30 days and a year.

The documentation is used by customers and also internally by Rolls Royce's large Aero-Repair and Overhaul (AR&O) network.

In the paper world, a typical suite of publications included over 30 manuals, each 3 inches thick, with each customer holding multiple suites.

When updates were issued, it could take a library up to 2 weeks to update all of the copies – and during those 2 weeks, there were two separate versions of the manuals in use. Also, with so many changes over time and pages being lost, "the chance of a suite of manuals being perfect is remote," said Mr Mulvaney.

Changing culture

As people get more used to electronic documentation and computers in general, the expectations customers have and the relationships they have with suppliers evolve.

"In the past it was OK to take 15 minutes to find a manual," said Mr Mulvaney. "Now people want a hyperlink to work in 3 seconds."

"Customers are starting to ask about the level of technical data support they will get from Rolls Royce. For the Dreamliner (new Boeing aircraft), every single customer has asked questions about it during the marketing campaign."

"We are pleased about that – it shows that the importance of technical data along with good delivery and support methodologies is being recognised and gaining momentum within the customer base."

Rolls Royce is starting to look at its technical data support differently, seeing it as a service opportunity, not a necessary evil.

"We are pleased to see it is now part of the support services we offer and has become more integrated in our customers' operations," said Mr Mulvaney.

Online

At one time, Rolls Royce considered making the data only available online. Whilst it would be an easy way to ensure that only fully updated data was being used, customers had many legitimate concerns about it.

Not all users have internet accounts (such as in countries where companies have to pay a tax for every internet user in the company, or in the Middle East, where companies are worried about what employees might find there). Also, companies can't back-up or archive data from a website very easily, and they might need paper copies in certain offices to comply with local rules.

The solution reached was that Rolls Royce will always supply documentation for a new engine on a CD or data stick. It will provide updates over the web, but customers can always request a CD with the latest documentation on it any time they want.

The website documentation updates are very small, so they can be easily downloaded with people using dial-up modems.

This gives customers the flexibility to save a copy of all the data on their intranets if they want (so individual employees don't have to access it from the internet) – and if they have to have paper copies in different locations, they can just print it out themselves.

The system enables Rolls Royce to make sure that all its updates have been received and incorporated into the copies of the documentation stored on different computers – much better than it could before.

"Before, we'd just get a signature of someone in the gatehouse," said Mr Mulvaney.

"All customers get the new data at the same time. We can take a workload off our customers by helping them manage their vendor data."

Advice

Mr Mulvaney ended with a few words of advice for the shipping industry based on his experience with electronic documentation.

"Please use industry standards – do not get driven to a bespoke solution," he urged. "Work with your [software] supplier, and always send back suggested improvements."

"It is important that the project is driven by people who are going to use the system, not manufacturers or – even worse – software companies. It's good that the 2 people driving Shipdex are users."

"You should also make sure that the system is designed for the number of people who will need to use it. It is easy to forget that a 30 manual library can be used by 30 people at once – but a single computer can only be used by one person." ■

'Now the marine industry is looking at it, that's extremely good news for us' – Steve Mulvaney, Rolls Royce

MacGREGOR

Eva-Lisa Martinsson, manager, technical documentations services, competence centre cranes, MacGREGOR, said that her company believes that Shipdex will help reduce the costs of creating new documentation, if it has all of its data in Shipdex format.

MacGREGOR expects to be able re-use information developed for one manual in another one quite easily.

It also likes the improved connection it will have with its end users due to this system. "A big problem for us has been to update the information [we have on ships]," she said.

However, one of the biggest reasons for choosing Shipdex was that "we wish to contribute to the development within shipping and to have an influence on the new standard," she said. "We want to be in the frontline of developing the technical documentation."

As it moves to Shipdex, MacGREGOR is restructuring all of its manuals from scratch.

It is also connecting the data system to other internal software applications, including its product lifecycle management (PLM) system for its cranes. The documentation system will also connect directly with its 2D and 3D drawing software and imaging tools. "This is really powerful," she said.

Additionally, MacGREGOR's service organisation will have access to the system, with service staff able to retrieve the information via a web browser to help answer spare parts enquiries and provide technical support.

Shipdex technical structure

Shipdex is a simplified version of S1000D, an international standard system for technical data in the aviation and navy industry, reducing its thousands of pages down to just 170. The work was done by Marco Vatteroni, now technical director of Shipdex and ILS manager of SpecTec.

There are 5 different types of information which can be carried in Shipdex: (i) Item description and operation instructions (ii) maintenance procedures (iii) troubleshooting advice (iv) parts data and (v) service bulletins (updates).

For each one of these, an XML schema has been devised, which shows exactly what format the data should be in so it can be easily passed from one piece of software to another.

The 'dataset' can include any kind of document or multimedia with it – including text files, drawings, illustrations, or even 3D models – and the XML data will indicate how that item should be displayed or accessed.

Every Shipdex data module has an issue number, an issue date (when the manufacturer finished work on it), and when it was verified – first by the manufacturer (to say that the data is ready to be issued) and secondly by the customer (to say it has been accepted and can be imported into the customer's system).

Shipdex data will follow the same structure no matter which manufacturer it comes from – and the way it is displayed by the customer depends on the software the customer is using. In this way, data from different manufacturers will all look the same in the user's system, displayed as specified by the customer

DS

Mikael Andersson, UpTime Solutions, and Eva-Lisa Martinsson, MacGREGOR, discuss the potential benefits of Shipdex

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Maritime IT at Nor-Shipping – Preview

When the summer comes, the great and the good of the shipping industry gather together in some of the world's major maritime centres to catch up with old friends and see who's doing what and with whom. This year Norway is the host for the biennial Nor-Shipping event - for those looking to catch up on the latest in technology, *Digital Ship* has a guide to find some of the maritime IT exhibits on show

Alfa Laval

At Nor-Shipping 2009, Alfa Laval will display its 'PureThinking' solutions, PureBallast and PureVent, its new AQUA fresh water generator, as well as tank cleaning equipment and IMO pumps.

Focus will also be on Integrated Ship Support, which combines spare parts procurement with other value-added services. Similar to Alfa Laval's focus on preventive maintenance, it provides ways to streamline and safeguard the supply chain, enabling faster and smoother communication.

Alfa Laval will also premiere its new PureBilge technology, which it says is the only system on the market that provides a cleaning performance in real life conditions of 0-5 ppm oil content in the water without chemicals, adsorption filter or membranes.

Visit Alfa Laval in Hall E, Stand 02-17.

Conrac

At this year's Nor-Shipping show CONRAC showcases its latest 22 and 26 inch wideECDIS MultiTask Monitors. In addition, a 46" display from its large screen Naval display programme, will also be demonstrated.

CONRAC's Ship Display series is specially designed to meet the requirements of display systems for shipborne applications, such as ECDIS, radar and ship control. The displays feature a robust design for reliable and durable operation in extreme conditions, like high and low temperatures, vibration and shock.

Laminated safety glass with anti-glare treatment protects the display and the wide dimming range allows for optimal display brightness for day and night-time operation. The widescreen format is ideally suited to display the significant increased amount of information in systems like radar/Arpa, AIS and electronic charts.

Visit CONRAC in Hall C, Stand 03-02g.

Globe Wireless

Globe Wireless will be showcasing its latest offering, GlobeMobile, at this year's Nor-Shipping. The system provides a GSM interface on ship to offer crews cost effective access to SMS and voice services.

Globe Wireless is a provider of total solutions in the field of communications, operational and IT solutions, and says that it will also be showing its full suite of applications, including GCC, Globe i4, GlobeRydex, GlobeAlert, Globe AntiVirus, and GlobeLocator Gold.

Visitors to the Globe exhibit will be able to discuss with representatives how partnering with Globe Wireless can meet the company's communication and IT needs. Globe Wireless currently serves over 550 ship operators with over 9,300 ships using its products and services.

Visit the company in Hall D, Stand 01-02g.

Hatteland Display

Hatteland Display returns to Nor-Shipping 2009 with a dedicated 'showroom' at the Felix Conference Centre (room Titania), located in the Aker Brygge district. The showroom will be open on 10th - 11th June in order to demonstrate the latest developments in its technology and product portfolio, which includes the launch of new widescreen displays and a new standalone computer solution.

The HT C01 standalone computer will be shown to the marine industry for the first time. It is based on computer technology designed specifically for the marine environment, resistant to overheating and vibration and having already passed the vibration test for Type Approvals at DNV.

Hatteland Display will also unveil its new widescreen display models, including a 22" model, which are available straight from the factory as ECDIS compliant and include DVI-I in, RGB out, RGB in, IEC inlet, IEC outlet and USB I/O connections.

Visit Hatteland Display at its showroom on Aker Brygge.

Hatteland Display will run a showroom at Aker Brygge during Nor-Shipping

JRC

Visit the JRC – ProNav stand at Nor-Shipping this year to discover the company's newest-generation products, showcasing what it calls a 'beautiful and harmonised design'.

See JRC's navigation and communications equipment in Hall B, Stand 04-08

The company says that the latest JRC products feature simplified menu structures and intuitive usage design, with products exhibited including its new MF/HF radio equipment, featuring a built-in 6-channel DSC as standard and advanced digital audio amplifier.

The modular design of this system aims to allow users greater flexibility in their installations.

JRC will also show its new (D)GPS navigator, which includes a 3D highway display mode for the Great Circle and Rhumb line in the same route. It also integrates four configurable NMEA ports and has a LAN connection to facilitate interswitching.

Visit JRC in Hall B, Stand 04-08.

Kelvin Hughes

This year at Nor-Shipping Kelvin Hughes will be emphasising its services in the design, manufacture and supply of marine navigation systems and products to the marine sector, particularly as the industry moves closer toward electronic chart mandation.

Notable successes for the company over the last year have included refitting the bridge of Cunard's flagship the QM2 with SharpEye solid state radar, and the introduction of MantaDigital, Kelvin Hughes' widescreen radar system.

New services being launched at the show will include ChartCo's AVCS package which adds AVCS data from the UK Hydrographic Office to its oceanXpress data delivery service. A new crew entertainment service will also be on show from Kelvin Hughes in conjunction with Walport International.

Visit Kelvin Hughes in Hall B, Stand 01-24.

Maris

Maritime Information Systems AS (Maris), a Grieg Group Company, will exhibit its ECDIS systems, radar data processing and display systems and Voyage data Recorders at Nor-Shipping.

The company introduced the world's first LCD based ECDIS system and more recently the world's first fully type approved S-VDR with optional ECDIS. Stolt-Nielsen Transportation Group, Reederei Bluestar, Leif Høegh, BW Gas ASA, MSC Ship Management and Grieg Shipping Group are among the companies who have installed the MARIS S-VDR with optional ECDIS.

As a service to ECDIS users the company has also introduced update services for ENC and ARCS via e-mail with the approval of the UKHO and Primar, under its Maritime Digital Services (MDS) offering.

Visit Maris in Hall B, Stand 05-07.

Marlink

Marlink will show its Sealink and WaveCall solutions at this year's Nor-Shipping.

Sealink is Marlink's maritime VSAT communications solution, providing global and regional coverage in the C- and Ku-band space segment. The core focus is to provide company internal telephony and public PSTN telephone and GSM carrier services, administrative ship-shore LAN-LAN services, as well as e-mail and internet.

Using the Sea Tel Ku-band VSAT 4006 antenna, WaveCall has been specifically designed for regional and multi-regional vessels. The service is suitable for private corporation networks with requirements for a variety of applications including file and image transfer, video conferencing, e-mail, Virtual Private Networks (VPNs) and database backup.

Marlink's WaveCall Ku-band VSAT system will be on show in Hall B, Stand 02-14

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On-demand services such as Inmarsat, Iridium and Thuraya are also available from the company.

Visit Marlink in Hall B, Stand 02-14.

McMurdo

McMurdo will once again be showing its range of safety products at Nor-shipping. The latest example of the company's development is the new FAST FIND personal locator beacon (PLB) which will be making its first appearance.

The FAST FIND is the smallest PLB on the market, is fully compliant with EU and US legislation, and operates on the global COSPAS SARSAT 406MHz satellite communication system, supported by government search and rescue authorities around the world. FAST FIND is subscription free.

Both the standard FAST FIND 200 and the GPS-equipped FAST FIND 210 transmit on the global 406 MHz frequency with a 121.5MHz homing signal and operate in temperatures down to -20°c.

McMurdo will also be showing the Smartfind EPIRB, GMDSS NAVTEX information systems and its range of emergency VHF radios.

Visit McMurdo in Hall C, Stand 05-21D.

Raytheon Anschütz

At Nor-Shipping 2009, Raytheon Anschütz will demonstrate its latest Integrated Bridge System (IBS), including multifunctional workstations with chart radar, wide-screen displays and gyro compass heading sensors, as well as steering control systems.

The new offshore survey vessel BOA GALATEA is one example of a ship that has recently been equipped with a Raytheon Anschütz IBS, complying with DNV NAUT-OSV notation.

The system allows for a standardised user interface, logic data management and centralised alert handling by having core functions like radar and ECDIS as part of an integrated solution.

Raytheon Anschütz works with its exclusive distributor Syberg AS and its network of 20 local service stations.

Visit Raytheon Anschütz in Hall B, Stand 03-12.

SAM Electronics

SAM Electronics of Hamburg and its associate L-3 companies, Valmarine, Lyngsø Marine and APSS, will feature its series of automation, navigation, safety, security and infotainment systems at Nor-Shipping.

Test out SAM Electronics' Chart Radar system in Hall C, Stand 30B

One major exhibit will be L-3 Valmarine's IAS Damatic DNA automation system for crew and maintenance personnel, which will be shown together with its latest Information Management System (IMS).

Other exhibits include sub-assemblies of the NACOS range of integrated bridge systems comprising Series 1100 Multipilot and Conningpilot units, Chartradar and Trackpilot consoles and a new Integrated Navigation Data Display (INDD) assembly for presentation of conning data at selective locations.

Lyngsø Marine's MCS 2200 automated monitoring and control system will be shown, together with diesel-electric propulsion developments and the Infotainment Compact facility for crews from SAM Electronics, as well as displays of ship sensor systems from APSS of Italy.

Visit SAM Electronics in Hall C, Stand 30B.

ShipDecision

ShipDecision will exhibit its software for controlling the business of cargo voyage management and communicating with key business partners at Nor-Shipping.

The secure, web-based system integrates the information and documents needed to manage cargo movement. With modules for operators, charterers, brokers, surveyors, agents, insurers and registries, ShipDecision improves the speed and efficiency of everyday processes.

Password authorised users can log in from anywhere in the world, with information captured as structured data, allowing rapid exchange and retrieval. Data is time-stamped and locked against tampering to create an audit trail of critical reports, notices, and communications. The system automatically identifies and classifies incoming event notices and emails, and extracts status information regarding active voyages.

Surveys are captured electronically to ensure immediate access, and dashboard views, such as the Voyage Command Center and the Cargo Damage Matrix, provide status overviews and indicate items requiring immediate attention.

Visit ShipDecision in Hall B, Stand 01-11.

SpecTec

SpecTec will be displaying some of the new functionality in version 9.0 of its AMOS Business Suite at this year's Nor-Shipping.

This will include a number of changes which have been made to update the user interface, including a 'Themes' concept allowing users to tailor the appearance of certain aspects of the system. Additionally, the toolbar menu style, task bar, and group boxes have been enhanced and the Dashboard has received both visual and functional updates.

Several changes have also been made to the database to allow this version of the software to support the ShipDex protocol for technical data, while the maintenance and purchasing modules have been enhanced with a number of new user options.

Visit SpecTec in Hall B, Stand 01-20.

Stratos

Stratos officials will provide briefings on the company's Stratos Advantage value-added services at Nor-Shipping.

This software is used to improve performance and support from satellite broadband connections (such as FleetBroadband, Iridium OpenPort and VSAT), at the lowest possible cost, and provide users with cost and traffic control, firewall management, data optimisation, high security options, easy VPN access, messaging services and a full IP range.

Stratos will also demonstrate its latest crew communications solutions, including AmosConnect from Stratos and AmosConnect Crew.

AmosConnect from Stratos integrates e-mail, fax, GSM text, interoffice communication and access for mobile personnel into a single messaging system. AmosConnect Crew features a single prepaid card for internet, voice and SMS; a vessel-independent personal mailbox; and access to global news services.

Visit Stratos in Hall B, Stand 02-24.

Transas

At Nor-Shipping Transas will exhibit its range of onboard, training and vessel monitoring equipment and services.

This year's stand will feature the Navi-Sailor 4000 ECDIS Multi-function Display (MFD) based on the company's new compact hardware platform. All data in the system is synchronised throughout the workstations which are equipped with an identical hardware set.

Transas, in partnership with the United Kingdom Hydrographic Office, pre-fills all new ECDIS systems with the Transas Admiralty Data Service (TADS) in SENC format to speed up chart delivery.

Transas will also showcase the new generation of its Navi-Trainer Professional navigational simulator NTPRO 5000 and NAUT OSV bridge simulator. This system features NTPro integration with real onboard equipment: a type approved ECDIS MFD which gives the mariner the ability to switch between applications (ECDIS, Radar, Conning) at the touch of a button.

Visit Transas in Hall B, Stand 02-22.

Virtek

The Virtek CommBox will be on display at the company's exhibit at this year's Nor-Shipping exhibition.

Virtek describes the CommBox as a 'robust, user friendly, state of the art data communication solution' which can be customised depending on the particular needs of the user.

New features are continuously being added to the system, the company says, with roaming crew e-mails and prepaid web surfing among some of the latest functions.

Visit Virtek in Hall C, Stand 01-30e. DS

Raytheon's latest IBS will be displayed in Hall B, Stand 03-12

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- Full conversation history and archive
- File and document transfer facility
- Interface with shore based PDA / Blackberry devices

FAX

- Sends and receives faxes as e.mail
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SMS

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- Receive SMS replies
- Long text function allows you to type long messages - which are split and sent in sequence
- SMS Delivery notification - be alerted when a message you send has not been received

INTERNET ACCESS

- User profiled secure internet access
- User authentication defines which websites or web pages can be accessed by the user on the post paid account and which on their personal pre paid account
- Caching and pre-fetching
- Content filtering
- Content security
- Full log reporting

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- Web based access
  - File sharing
  - Web links
  - Active directory synchronisation
  - Data import
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- Input information directly to shore side servers
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  - Custom designed form templates
- Automatic creation of back up onboard vessel for future reference
- Easy to update – information can be added or removed instantly

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- Real-time updates of session cost
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- Point of failure restart
- Automated file transfer protocol to interface with existing applications
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- News and weather reporting service

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EMS Satamatics reports that its Satamatics Long Range Identification & Tracking (LRIT) systems have been integrated within the Absolute LRIT Data Centre. **Absolute Maritime Tracking Services** was selected by the **Panama Maritime Authority** to provide its LRIT Data Centre and related Application Service Provider services.

Jeppesen Marine has opened a dedicated sales office in Singapore that will also serve markets in Malaysia, Indonesia and Thailand. Appointed as regional sales manager for this new office was Dr Haw L Wong, who has already worked with Jeppesen products in the region as a distributor, under the C-MAP brand.

Dr Haw L Wong, Jeppesen's man in Singapore

The **OceanSaver** ballast water management system has received full Type Approval from **DNV**, issued on behalf of the **Norwegian Maritime Administration.** The certification confirms compliance with **IMO's** International Convention for the Control and Management of Ship's Ballast Water and Sediments.

FarSounder has received two new FS-3DT sonar orders from **CG Telemar** in Italy for a series of passenger vessels being built by **Fincantieri**. The 140m passenger cruise ships are due for delivery in 2010.

SRT Marine Technology Limited has delivered an order for AIS Class B units worth US$650,000 from TCB in China. China is currently involved in a project to improve coastal safety and security as part of a national programme involving over 200,000 vessels.

AIRSIS has signed a global Automatic Identification Service (AIS) distribution agreement with **ORBCOMM**, to add satellite-based AIS to AirSis' PortVision service. PortVision provides subscribers with vessel tracking, arrival/departure alerts, and historical reporting and analysis of vessel and terminal activities, with the addition of satellite-based AIS information expected to expand the system's capabilities.

Kelvin Hughes reports that it has been appointed as an official distributor for all Japanese W Series paper charts, Sailing Directions and special publications issued by the Japan Coast Guard. The company says that it plans to place additional stocks of Japanese charts and publications in its Singapore depot later in the year, to benefit its pan Pacific based customers.

ESL GmbH of Germany reports that it has completed 1,000 Long Range Identification and Tracking (LRIT) tests using the **Pole Star** LRIT conformance testing system. The companies have been working together for five years providing a number of different solutions.

Raytheon Anschütz has announced the establishment of a new subsidiary, Raytheon Anschuetz Singapore Pte Ltd. With the new company, Raytheon Anschütz intends to expand its sales and service activities in Southeast Asia. Jan-Christoph Lötzsch will act as managing director of the new office.

www.satamatics.com
www.oceansaver.com
www.farsounder.com
www.srt-marine.com
www.portvision.com
www.orbcomm.com
www.kelvinhughes.com
www.eurosatlink.com
www.polestarglobal.com
www.raytheon-anschuetz.com
www.jeppesen.com

EMS and CLS in LRIT agreement

www.satamatics.com
www.cls.fr

EMS Satamatics has announced that its Satamatics Long Range Identification and Tracking (LRIT) systems will now be integrated and supported within the CLS (Collecte Localisation Satellites) ASP platform.

The European Maritime Safety Agency (EMSA) had previously contracted with CLS to provide the LRIT Data Centre and associated Application Service Provider (ASP) services on behalf of all EU member states, plus Iceland and Norway.

CLS is the largest LRIT Data Centre with approximately 10,000 registered vessels, and also supplies services for several other SOLAS contracting governments.

CLS notes that it successfully completed testing on EMS's Ocean Alert LRIT and SAT-201i-LRIT systems prior to their acceptance into its LRIT ASP setup.

"As one of the world's major ASPs, it is important for CLS to work with partners offering compliant and reliable solutions," said Gaetan Fabritius, LRIT sales manager of CLS.

"This is why we are pleased to endorse Satamatics' LRIT solutions within our ASP system for Flag Administrators who already entrust their ship-tracking needs to CLS."

DNV approval for PC Maritime ECDIS

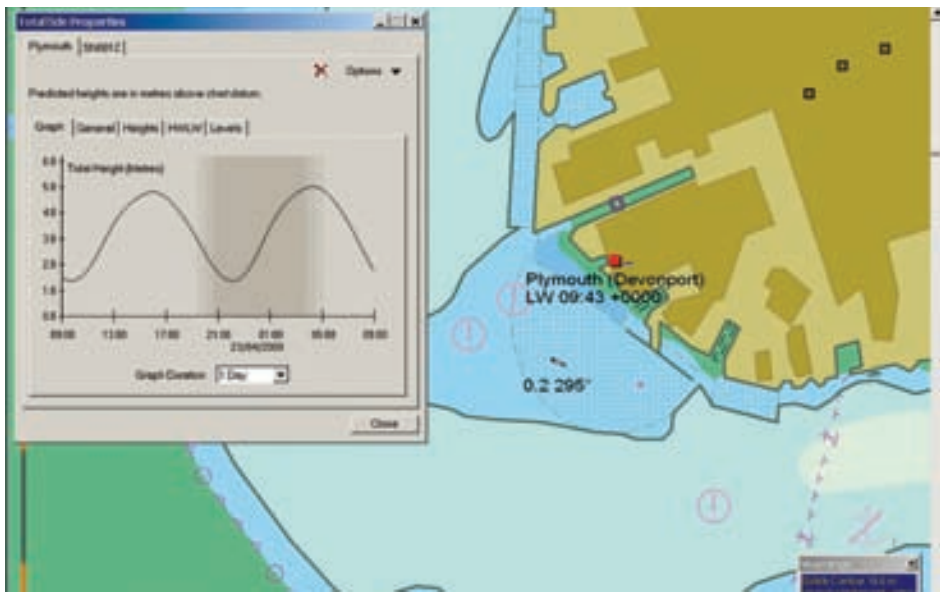
www.pcmaritime.co.uk

PC Maritime reports that its Navmaster ECDIS has completed Det Norske Veritas (DNV) Type Approval for compliance with the latest ECDIS regulations.

New standards and test specifications are applicable to all ECDIS installed from 1st January 2009. These new regulations include:

- IMO Resolution MSC.232(82) 2009 – Revised ECDIS performance standard;
- IMO Resolution MSC.191(79) 2006 – Performance standards for the presentation of navigation related information on shipborne navigational displays;
- EC Standard 61174 (2008/2009) – Operational and performance requirements, methods of testing and required results for ECDIS;
- IEC Standard 62288 (2008) – Presentation of navigation-related information on shipborne navigational displays – General requirements, methods of testing and required test results.

PC Maritime's managing director, David Edmonds, says that he believes that the company is among the first suppliers of ECDIS systems to complete this legal requirement, and notes that existing customers will be able to upgrade their systems to the new standard with a software release.



New ECDIS specification standards came into force on January 1, 2009

Sperry ECDIS gets latest type approval

www.sperrymarine.northropgrumman.com

Sperry Marine has been awarded type approval for its VisionMaster FT electronic chart display and information systems (ECDIS) by the UK certification authority, QinetiQ.

The type-approval certificate was granted following tests to ensure conformance with the new International Electrotechnical Commission (IEC) performance standards IEC 61174 Edition 3 and IEC 62288 (see news item, left).

The new performance standards came into effect January 1, 2009 in accordance with IMO recommendation MSC.232(82).

"The QinetiQ type approval assures our customers they are navigating with state-of-the-art equipment meeting the latest IMO and IEC specifications with our VisionMaster FT ECDIS products," said J Nolasco DaCunha, vice president of Sperry Marine.

The Sperry Marine VisionMaster FT series was introduced in 2007, and features networking technology with an open-ended architecture, to integrate the ship's radars, ECDIS and other navigation and ship control sensors for control and display at multi-function workstations.

Crew entertainment from Kelvin Hughes

www.entertainment-at-sea.com

Kelvin Hughes is to enter the field of crew entertainment following a new deal with Headland Media to distribute its Walport Entertainment On-Board package.

The exclusive agreement allows Kelvin Hughes to sell the package of films, books, music, sports and games alongside its existing navigational products.

Walport Entertainment On-Board comprises a mix of new international film releases and classics, TV shows from the UK and US, DVD coverage of major sporting events, CDs and pop videos covering a wide range of music, books and magazines, and popular video games, including PS2, PS3, Xbox and Wii.

DVDs, books and video games can be shipped out directly with Kelvin Hughes' own regular delivery of charts and maps.

"We feel that this service will greatly enhance our offering to the merchant shipping sector and we think it is a service that our customers will be keen to introduce fleet-wide," said Terry King, manager of charts and maritime services at Kelvin Hughes.

"The service has excellent morale-boosting qualities for crew and will help crew feel like a valued part of the wider organisation. Additionally, the service is fully licensed so this removes any doubt for the shipping companies that their crew are viewing illegal content."

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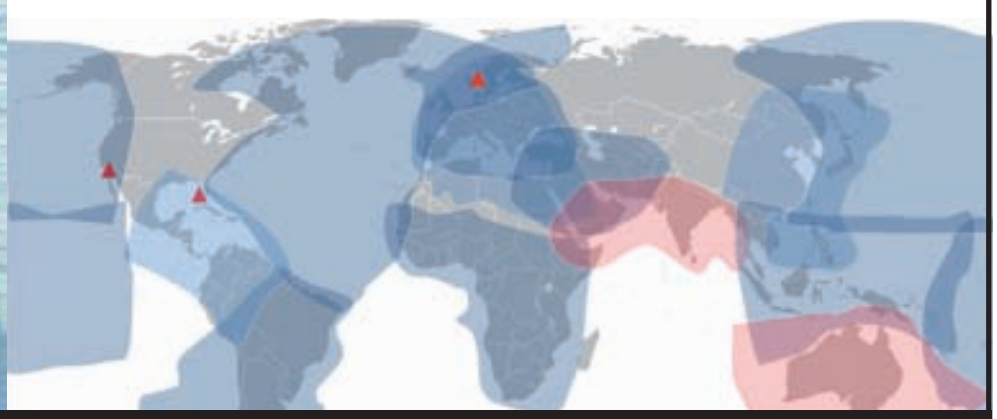

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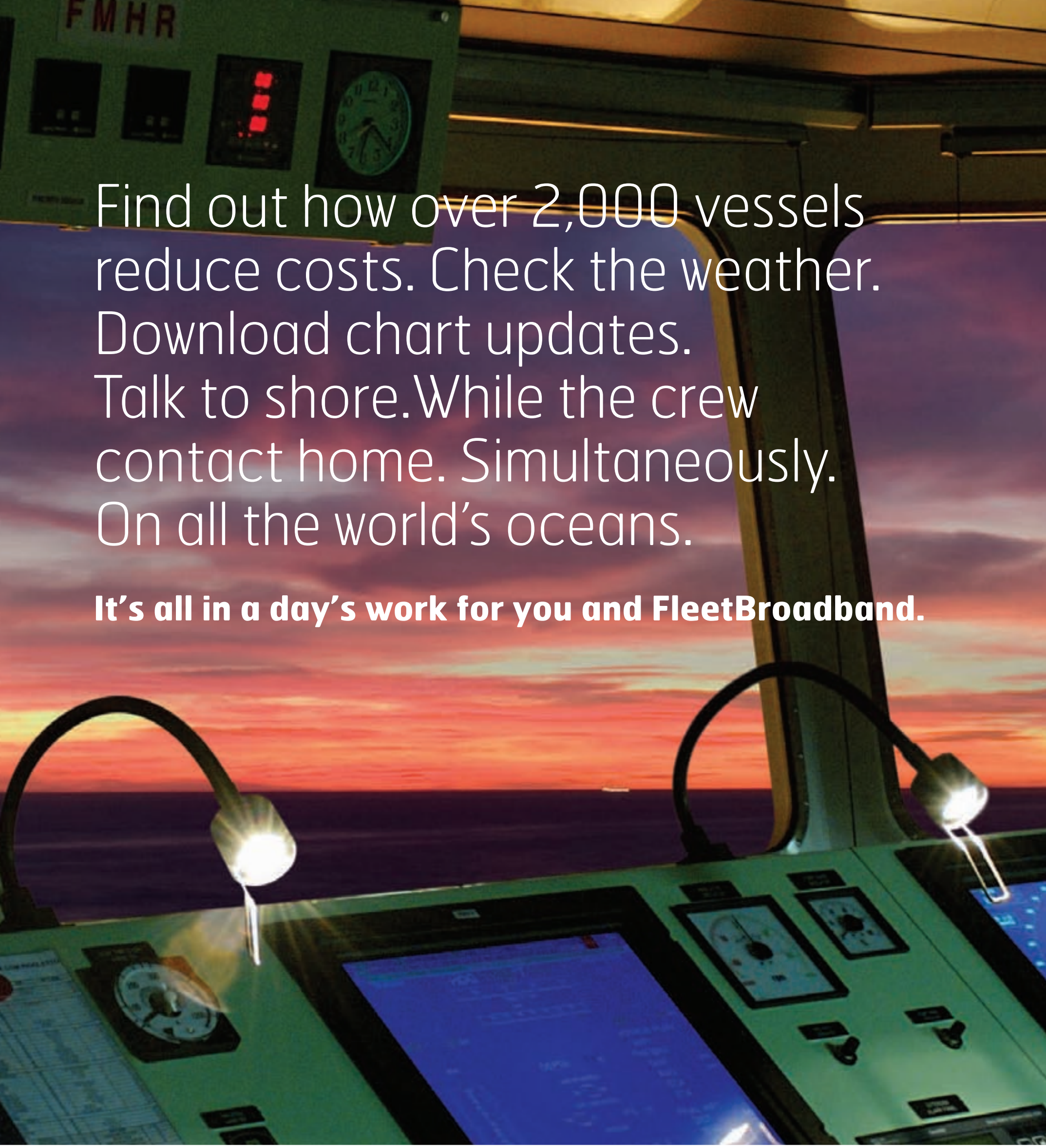

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One year anniversary for space-based AIS system

www.comdevintl.com

COM DEV International has announced that its first experimental satellite carrying its space-based AIS (Automatic Identification System) technology, NTS, has successfully completed one year in orbit.

This technology enables the tracking and monitoring of maritime traffic from pole to pole and across the globe.

Launched on April 28, 2008, NTS has now mapped global shipping traffic many times over and has provided the technical foundation for an operational system which is currently under construction.

The first phase of this complete operational system is expected to be launched in early 2010.

"Our demonstration satellite has shown that our proprietary technology is uniquely capable of reliably detecting and de-colliding large numbers of AIS signals in the antenna field of view," said John Keating, CEO of COM DEV.

"The result is an ability to secure a high level of vessel detection on a global scale with the minimum number of spacecraft. This is an important performance characteristic as AIS transmissions are being sent simultaneously from literally thousands of ships that could be in the field of view of a passing satellite at any one time."

"We believe this capability and vessel data will be of great interest to maritime authorities around the globe. For a country like Canada with a vast coastline and an increasing interest in monitoring maritime activity in the Arctic, this technology would make it possible for the first time to keep track of ships within or approaching territorial waters."

The NTS mission represents the culmination of more than five years of system and technology development.

NTS, an eight kilogram nanosatellite orbiting every 90 minutes at an altitude of 630 km in a polar sun-synchronous orbit, was launched to test COM DEV's space-based AIS detection technology as a precursor to the deployment of a constellation of full-performance AIS satellites.

This operational system hopes to provide a global AIS monitoring capability to maritime authorities around the world. The constellation will provide near real-time information on the identity, location and movements of marine vessels.

All ocean-going vessels, and vessels larger than 300 tons, are required by the International Maritime Organisation to transmit AIS signals. That data has usually primarily been collected by shore-based and ship-borne receivers, where range is limited to approximately 50 nautical miles.

However, using data collected by the space-based NTS system, COM DEV has now been able to generate a complete map of the distribution of worldwide AIS ship traffic.

COM DEV says that it is currently evaluating alternatives for commercialising its AIS solution.

Höegh turns its back on ENCs

www.jeppesen.com

Höegh Fleet Services has taken the decision to stop using Electronic Navigation Charts (ENCs) on more than 20 Höegh Autoliners car carriers and instead rely on paper charts, with the company to use Jeppesen Marine's C-MAP Professional+ database of private chart data as an additional aid.

The shipowner took the decision earlier this year to switch from navigating by ENCs, and has formalised an agreement with its ECDIS supplier, MARIS, to supply the Jeppesen Marine range of electronic charts, private data which cannot be used as a primary source for STCW compliant navigation.

"We see this as an excellent way to decrease our operating costs while maintaining the high quality of our navigation tools," said Magnar Høijord, a marine superintendent with Höegh Fleet Services responsible for navigation systems and services.

"We had been using ENCs, but they were very expensive, and we were frustrated by the lack of global coverage. Many areas off of Africa, Australia, South America and the United States west coast are still not well covered."

Mr Høijord said that the switch from ENC supply to the C-MAP chart database will cut chart supply costs dramatically.

"We will use updated paper charts onboard as our primary navigational source, as required by STCW," he said.

"Then, with a C-MAP Professional+ world chart folio onboard our vessels as a support tool for navigators, we feel that we will have a good safety margin. If and when we need to meet mandatory ECDIS rules in five to ten years, we will have no problems making the transition back to ENCs."

Jeppesen Marine marketing manager, Willy Zeiler, also commented: "We want to provide navigators with accurate, easy-to-use navigational solutions that contribute to greater safety."

"This includes paper charts, ENCs, or the high-quality C-MAP Professional+ vector chart data that we will supply to Höegh Autoliners, or a well-managed combination, like our Jeppesen PRIMAR ENC Service."

"Either way, we are leading the way with the functionality, including online updating and dynamic licensing, that will add value to shipowners as they prepare for mandatory ECDIS."

Höegh has been frustrated by the lack of global coverage of ENCs

LRIT system approved for use over Iridium

www.bluetraker.com
www.iridium.com

Iridium has certified the EMA Group's BlueTraker Long-Range Identification and Tracking (LRIT) ship terminal as being approved to provide LRIT services over the Iridium satellite network.

The Iridium certification parallels current flag state approvals, to ensure that the system adheres to International Maritime Organization (IMO) Resolution MSC.263(84), which establishes performance standards for LRIT shipboard systems.

BlueTraker LRIT terminals are provided by Pole Star Space Applications, as well as other EMA distributors worldwide. BlueTraker was also recently awarded type approval by the German classification society, Germanischer Lloyd.

"The BlueTraker system leverages our unique value proposition of truly global coverage, high network quality and low-latency two-way data links to provide a robust and reliable LRIT solution for ship owners to meet the new IMO carriage requirements," said Greg Ewert, executive vice president, global distribution channels, Iridium.

"It's significant that Iridium is the only LRIT Communication Service Provider with coverage over all the world's navigable waters, including IMO Sea Area A4, which encompasses Polar waters above 70 degrees latitude. This means vessels sailing in those regions can only meet the IMO carriage requirement with an Iridium-approved LRIT device."

As part of a Canadian coast guard-funded project, Pole Star is currently installing tracking equipment utilising different terminals and satellite services aboard three Canadian coast guard vessels, including the BlueTraker LRIT terminal.

The three vessels will be navigating Arctic waters, and, as part of the project, the performance of each terminal will be analysed and mapped. Upon completion, the Canadian coast guard will officially report the project results to the IMO.

MOL installs container monitoring technology

www.mol.co.jp

Mitsui O.S.K. Lines has installed an automatic monitoring system for reefer containers at the Tokyo International Container Terminal (TICT), which automatically monitors the temperature in each reefer container.

MOL and Wilco Inc. had jointly demonstrated the system, and, based on the results of the demonstration, MOL has decided to introduce the system at TICT, the first full-scale system installed at any Tokyo Bay container terminal.

The system uses existing electrical power lines to automatically transmit information at high frequencies from modems on containers to monitors in the terminal office. The signals travel over the same power lines that supply electricity to the reefer containers.

Previous to the introduction of the new technology the temperature in the reefer container was controlled by connecting a special cable for monitoring, or by periodic visual checks.

The new monitoring system ensures control of temperature in the reefer container by automatic monitoring over a 24-hour period. The data is also stored after being collected, so terminal personnel can track time-oriented changes in temperature.

MOL says that previous attempts to create monitoring systems using power lines were subject to interference from the surrounding environment, but that the demonstration test proved that the new system is not affected by interference, and provides accurate, real-time information.

MOL now plans to install the reefer container auto monitoring system at its other operated container terminals, in Japan and overseas.

German integrated systems contract for Transas

www.transas.com

Transas has completed the supply of a full set of navigational and communication systems to a newbuild RoRo vessel constructed for Wulf Seetransporte, Cuxhaven.

The 80m RoRo vessel has been named as MV Kugelbake, and was constructed at the BVT Bremen shipyard.

The contract includes dual Navi-Sailor 4000 MFD ECDIS, two Navi-Radar 4000 MFD X-band, all navigation sensors, Gyro and steering systems and GMDSS A2 equipment.

In other news, Transas has also been awarded two contracts to supply navigation training systems in Germany and Singapore.

The company recently agreed an upgrade contract to supply an ECDIS Trainer system to the German Waterpolice Academy, based on the Navi-Trainer Professional 4000 system originally delivered to the Academy in 2002.

The new extended system comprises one instructor station and three trainee stations, each with Navi-Sailor 4000 ECDIS, a combined Conning and ARPA Station, a real AIS Transponder Minimum-Keyboard, a reduced set of ship controls to manoeuvre own ship, and one visualisation channel to provide IMO Model Course 1.27 ECDIS training.

In addition to this, the Singapore Maritime Academy, Singapore Polytechnic (SMA) has begun the installation of a 4-Bridge Dynamic Positioning simulator with one instructor station at its training facilities.

Each bridge consists of a DP2 workstation, ARPA/Radar, ECDIS, conning and one visualisation channel on a 65 inch plasma screen. The bridges can be operated independently or integrated via a common interface on a unified simulator network.

The **MV Kugelbake** *has taken delivery of an integrated navigation and communications system*

Web based LRIT conformance test launched

www.polestarglobal.com

A new web-based LRIT Conformance Test for the SkyWave DMR-800LRIT satellite terminal has been launched by Pole Star, allowing any ship operator who has installed such a terminal to test the system for regulatory compliance.

The Pole Star LRIT testing system manages all aspects of the LRIT test, including, where authorised, issuing an LRIT Conformance Test Report (certificate) on behalf of the Flag State of the vessel.

“Ship owners are responsible for ensuring their ships and equipment are LRIT compliant,” says Paul Morter, head of commercial marine products at Pole Star.

“For vessels where existing terminals are not suitable, adopting our solution with a SkyWave DMR-800LRIT terminal can save them time and money. SkyWave DMR terminals are low cost and easy to install, and a free Conformance Test is included with each hardware package."

Pole Star also reports that European Satellite Link (ESL) has recently completed 1,000 LRIT tests using Pole Star conformance testing systems.

“We have been working with Pole Star for over five years and have been delighted to supply our clients with their web-based Fleet Management and Ship Security Alert systems," said Henrik Christensen, CEO of ESL.

"Now joining our unique hardware offering with Pole Star’s LRIT testing service, we can provide our customers with a complete LRIT solution. We are pleased to be working with them to make a major contribution to marine safety.”

SAM Electronics to outfit Chinese newbuilds

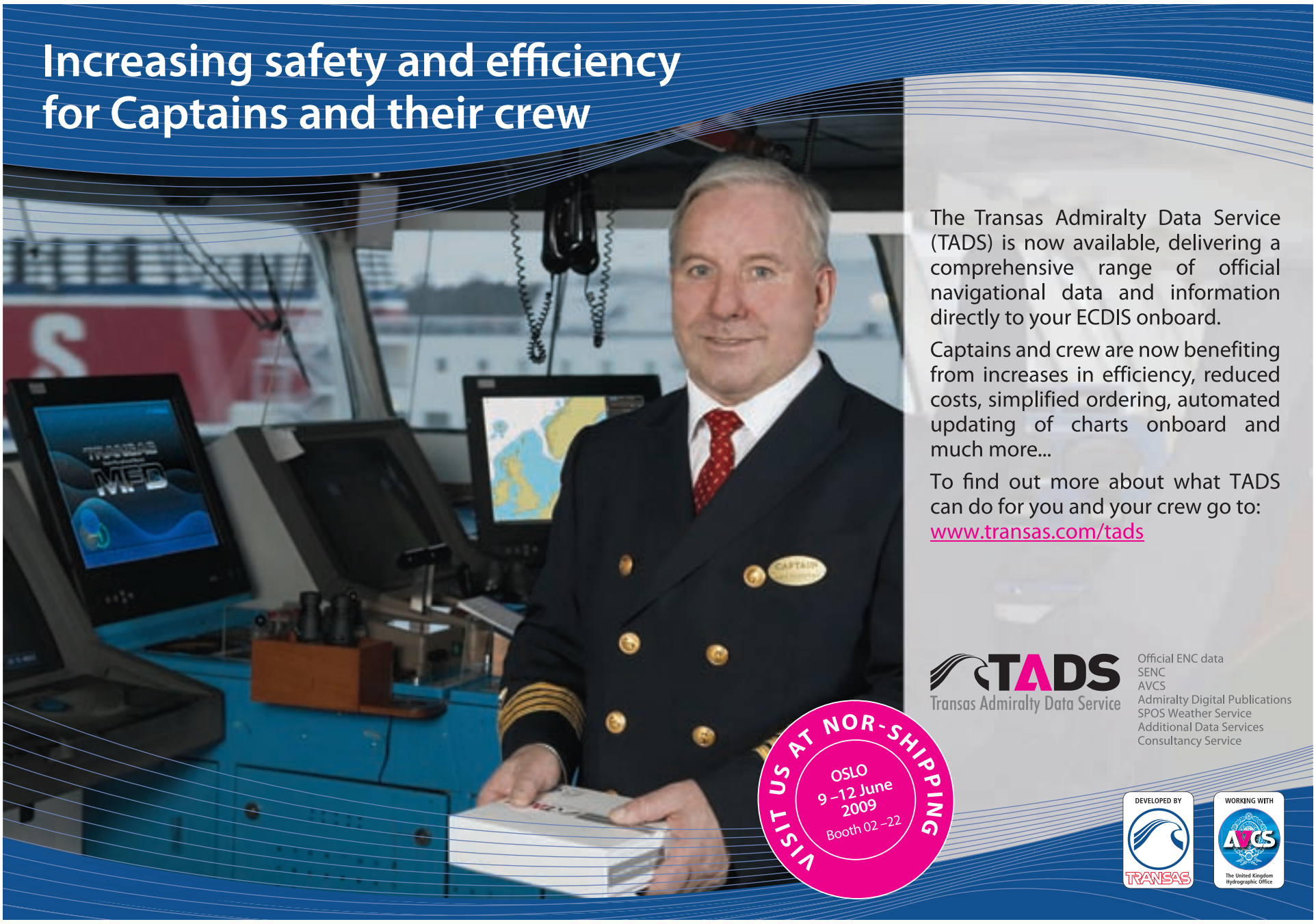
www.sam-electronics.de

SAM Electronics, in association with its Chinese subsidiary SAM Taihang Electronics, has been awarded a contract to supply and install integrated navigation command systems for ten new vessels being built in China by Columbia Shipmanagement.

The ten 31,000-dwt multi-purpose heavy lift vessels are currently under construction at Huanghai Shipbuilding of Rongcheng, for delivery to Columbia Shipmanagement between 2009 and 2012.

The NACOS 54-5 integrated systems to be supplied feature radar-controlled track-pilots, ECDIS and other sensors.

The ships, which will be operated by Austral Asia Line (AAL) on its South East Asia and Australasian routes, will additionally be supplied with compass systems, GMDSS and satellite communications equipment, together with associated consoles.



Going paperless at Tarntank Ship Management

While the mandatory carriage requirement for ECDIS (electronic chart display information system) technology is still some way in the future for most vessel operators, the prospect of potentially improving navigational safety has encouraged some to move early and begin their installations. Claes Möller, Tarntank Ship Management, told *Digital Ship* about why his company chose to sail paperless

The mandatory ECDIS requirement is still a number of years away, with the phased implementation schedule proposed at IMO not set to be completed until well into 2018.

However, some companies are getting in ahead of the game and have decided that sailing electronically creates a wide enough range of benefits to justify an early start in their ECDIS installation schedule.

One such vessel operator is Tarntank Ship Management of Sweden, which has recently completed a project to install dual ECDIS systems from Transas onboard a number of its ships, with the aim of sailing paperless and taking advantage of some of the benefits that this can allow.

Claes Möller, fleet manager with Tarntank Ship Management, believes that this move to ECDIS was a logical eventual step for the company in the navigation of its vessels, as it has embraced the evolution of bridge technology over the past two decades.

"Since the beginning of 1990 our vessels had been equipped with electronic plotters / charts, and our company has always been interested in using technical solutions to reduce the workload for crewmembers and improve the safety of navigation or other operations onboard," he told us.

"From 1992 to 2000 all of our vessels were equipped with one Transas electronic chart display. This was used as an aid to manual paper based navigation."

Mr Möller notes that the early experiences with these electronic onboard systems were positive and some of the benefits of operating with the technology began to emerge, including the possibility of integrating with other information sources.

"During this period our officers became very familiar with this equipment, and started creating homemade waypoint programs which made the route planning in the electronic chart very easy, safe and effective," he said.

"We also connected the electronic charts to the radar, so that when you made a plot on the radar this was also shown on the electronic chart. This gave us the ability to easily verify fixed targets relative to other moving targets."

When the vessel Tarnbris was delivered, **Tarntank** *decided to move to full paperless navigation*

Encouraged by this early progress, Tarntank decided to make electronic navigation a feature of all of its new vessels.

"At the beginning of 2000 we decided that we should install dual ECDIS in our newbuildings," said Mr Möller.

"We didn't need to test the equipment much at that stage, because we thought that we, and especially our crewmembers, were quite familiar with electronic charts. So our focus was that we should choose a supplier with a good radar system which could also supply a dual ECDIS system."

Paperless navigation

Despite having taken the decision to install dual ECDIS, Tarntank was still not ready to jump headfirst into full paperless navigation, instead preferring to adopt a more gradual approach that would allow the crews to develop a relationship with the equipment over time.

"When the (first) vessel was delivered in 2001 we decided that we should sail with paper charts until our officers became familiar with everything, such as ECDIS passage planning and ECDIS chart corrections," said Mr Möller.

"At that time it was not so easy to sail paperless, even if you had an approved dual ECDIS system onboard. The reason for this was that the equipment was not as user-friendly as the electronic charts that we were already used to, and the passage planning took a long time to perform."

"The charts also took a very long time to update, and the equipment was type approved and it was not possible to make improvements. ENC coverage was not so good at that time either, so it was not possible to complete 'paperless navigation' voyages."

Mr Möller also notes that the move to the new equipment initially meant an increase in the workload for the bridge team, as a mix of paper and electronic charts was necessary for navigation and switching between the two sources meant added effort.

"The operation of these systems was performed in addition to the manual paper navigation procedures," he said.

"This continued until 2007, so this means that we had installed equipment which gave our officers a greater workload – this should not be the case."

"If we look back, even if we have learned a lot during this period and gained some advantages from having the dual ECDIS installed onboard, it was too early to start sailing paperless in our company due to the fact that the ENC coverage was not good enough."

Crew workload

However, despite these early setbacks Tarntank continued to try and use its electronic navigation systems in the most effective way possible.

With further developments in ECDIS technology and the increase in ENC coverage over the years since that first installation, that perseverance began to pay off as the company saw its dreams of paperless navigation become a reality.

"In 2007, when our latest vessel Tarnbris was delivered, we decided that we should start to have a meeting with the supplier and explain our way of making passage plans with our paper charts, our way of making records in the charts during the voyage, our way of making chart corrections, our officers' requirements, our required ENC coverage, our Flag State requirements and our customer requirements," Mr Möller told us.

"With this as a base, we sat down together and discussed how to implement the basic ECDIS procedures that we were looking for. These were later implemented on the vessel before it sailed."

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Simulator training is a key factor in improving competence in the use of ECDIS

"When this vessel was up and running paperless, and it was verified that we complied with Flag State and customer requirements, we decided that we would create a management of change procedure and install the same type of dual ECDIS system on all vessels."

Training is a key factor when introducing ECDIS onboard, and Mr Möller was keen to make sure that Tarntank's crews would partake in a thorough familiarisation process with the equipment they were to use onboard, using a variety of methods.

"We have been focusing on the IMO ECDIS course, and then offering onboard training and familiarisation with our specific ECDIS equipment and procedures," he said.

"I consider that the IMO ECDIS course is good as a base, and then the focus should be on a CBT (computer based training) course supplied by the manufacturer of the ECDIS to allow for familiarisation with company specific procedures."

Mr Möller also notes that the coverage of ENCs in the company's trading areas has now improved to a level that makes paperless navigation a much more attractive proposition.

"In our trading area the coverage is good and proceeding quickly enough," he said. "For our vessels trading in Northern Europe the coverage is almost 100 per cent."

"We are using the Transas SENC service, which meets SOLAS chart requirements. We only have annual licences, I don't know if the company are using dynamic licences, but it would be preferable to use this."

Jonas Piskorowski, area sales manager onboard systems with Transas Scandinavia, was project manager for the Tarnbris installation, and recalls how the needs of the crew were considered as the most important factor in the implementation of the paperless system.

"Before installation took place in Tusla ship yard in Turkey, we discussed with the ship owner how our ECDIS could assist officers on watch onboard the vessel Tarnbris with voyage planning and update of ENC official charts," he told us.

"One very important factor when it comes to paperless navigation is that the crew onboard had to be certified on the system and also well prepared for any future vetting inspections."

"The passage plan created by Tarntank became a useful tool in order to verify ECDIS performance with ship's safety and voyage plan. After commissioning, and once training was completed, Tarnbris successfully left the yard in Tusla and made history due to the fact that no remarks had been made by vetting inspections onboard regarding the ECDIS system and procedures."

Mandatory reaction

While a mandatory carriage requirement for ECDIS was being heavily debated in the corridors of power at IMO at the time of these installations, Mr Möller says that the company's decision to implement the technology was not affected by any potential future ruling.

"Our decision to install ECDIS was not influenced at all by the IMO requirement," he said. "Our focus has always been to reduce the workload of those onboard and improve safety with technical solutions."

"When I am talking about reducing workload this is especially relevant to chart corrections and passage planning work, which is almost the same with the ECDIS as on a paper chart."

Project leader Mr Piskorowski, from Transas, also reflects on the fact that the key consideration at that time was finding ways to make life onboard easier for the seafarers when engaged in navigation.

"I think they realised that ECDIS would play a significant role in the future of navigation and to lead this change would be beneficial not only for the company itself, but also for the Captain and crew onboard their vessels," he said.

"Taking into account the possible cost savings paperless would allow in terms of officers' 'time on the bridge' preparing chart corrections, it represents a huge difference compared to traditional corrections."

"To keep the crew within the company is also important, and by investing in the latest technologies employee retention is improved."

Having experienced how the use of ECDIS was able to improve the workload of crews onboard Tarntank's vessels, Mr Möller is hopeful that other vessel operators will explore the potential of the technology, even before they may be required to do so by IMO, so that the entire community can benefit.

"I think it will become easier if it ECDIS is standard on all vessels and if the supplier and shipping companies are creating supporting systems together," he said.

"Hopefully (companies will install the system before the mandatory deadline) because I consider that this reduces the workload and improves safety with technical solutions."

"I hope that every shipping company will try to use new technology to reduce the crew's workload and to make the job more attractive for people who would like to work at sea."

With that in mind, Mr Möller has a few words of advice to share with any other ship operators tempted to examine ECDIS technology.

"Before starting to sail paperless, perform a full management of change procedure, taking into account all requirements such as those of the Flag State, customer and officers, as a base for the procedures," he said.

Wider industry trends

Transas, which performed the dual ECDIS installations for Tarntank Ship Management, says that the company has seen interest in paperless navigation among vessel operators in the industry steadily increasing over the last few years, and that the looming mandatory carriage requirement is not the only driver for potential users.

"We have also witnessed a strong will and determination within the industry to implement new technology onboard and a wish to see some operational benefit from this process, not just a cost and a logistical obligation," explained Anders Rydlinger, business director onboard systems, Transas.

ENC coverage has been a stumbling block for many people in any ECDIS decision, as there are still areas of the world where official electronic charts are not available, though Mr Rydlinger says that this has not been the biggest discussion item seen among his company's customers.

"(Coverage is an issue) to a degree, yes, especially on the retrofit front, but concerns are more related to other issues like overall cost and a lack of willingness to invest in new technologies and improved safety," he said.

"Great improvements (have been made in coverage), especially after the UKHO launch of AVCS, that is utilised in Transas Admiralty Data Service (TADS). There is still a misunderstanding (of) supply channels and use of official and unofficial charts, as well as ordering optimisation and associated cost impact."

"With the possibility to 'buy-as-you-go', and flexible licence options starting from three months subscription, it has been proven that moving to ENC and paperless navigation can actually lower the cost for charts and publications."

Mr Rydlinger suggests that the actual costs of navigation with both paper and ENCs are perhaps not widely understood, with some operators not fully aware of what they would pay to sail paperless.

"During the recent launch of the TADS we ran some local seminars together with the UKHO which revealed there to be some misunderstanding amongst customers as to the real cost of ENCs vs Paper," he said.

"However, with wise management of electronic chart folios and flexible timeframes for chart licensing, operators are now finding that they may even reduce their costs with ENCs."

"Of course in the meantime, with dual chart solutions, there is some additional cost. In due course, this should reduce the cost impact of the transition ahead."

Mr Rydlinger would also encourage vessel operators to pay close attention to the training requirements that installing an ECDIS will introduce, as the benefits of the technology will only be fully felt by crews who are adept in its use.

"ECDIS simulation is really the best and only way forward in terms of highlighting the benefits and limitations of such technology," he told us.

"It is essential that this relatively massive (mandatory) implementation of ECDIS be accompanied by the enhancing of ECDIS simulators within maritime training institutions to the latest standards, with the full integration of targets, including AIS, faults etc."

"Avoiding 'ECDIS assisted collisions' (see page 42) is an absolute priority."

With the mandatory carriage of ECDIS now a reality, if still some years away, the presence of integrated navigation technology on most vessel bridges should open up opportunities for vendors to introduce further innovations to try and extend the potential benefits of installation.

Mr Rydlinger believes that there are a number of enhancements that could come online in the imminent future to help make ships even safer.

"ECDIS and VTS data exchange could enhance safety and situation awareness giving VTS and onboard operators alike a unique perspective on an unfolding risk situation, offering a higher level of situation awareness," he said.

"ECDIS could also in turn prove to be a valuable search and rescue aid if data is exchanged between participating entities in a SAR scenario. ECDIS and VDR/SVDR synchronisation would be an excellent incident debrief tool, providing VHF, Radar, AIS, chart data etc."

"ECDIS is essential for getting the whole picture."

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ECDIS-assisted grounding raises training concerns

The effectiveness of ECDIS is, like any navigational system, a product of the expertise of those using it and their continued situational awareness. If competence in the use of the system is lacking then the results can be unfortunate, to say the least. A recent MAIB report highlighted the potential for ECDIS-assisted accidents

It is widely agreed that the carriage and use of ECDIS can benefit ship navigators in the performance of their duty.

Official studies presented to IMO, particularly the comprehensive research carried out by DNV on the potential effects of ECDIS carriage on a number of major international trade routes, point to significant reductions in groundings when the system is installed.

However, like any technology, the potential benefits of using ECDIS are dependent on its proper usage. If those onboard are unsure as to how to utilise the equipment or, even worse, are confused by the navigation system, then the ECDIS can become more of a hindrance than a help.

With a mandatory ECDIS carriage requirement to be phased in from 2012, the concern remains that, as things currently stand, training and familiarisation with the equipment is not at the required level to improve industry-wide safety levels.

The importance of proper competence in the use of ECDIS was highlighted in the recent UK Marine Accident Investigation Board (MAIB) report (number 21/2008) into the grounding of the CFL Performer on passage from Paramaribo, Suriname.

At 1619 on 12 May 2008, the Netherlands registered dry cargo ship ran aground off the east coast of England. Thankfully no injuries or damage were reported and the vessel was refloated a mere 15 minutes after the incident.

However, one interesting and concerning aspect of the case was that the investigation concluded that the accident was caused by the improper use of the ECDIS.

This is how the incident unfolded, as reported by MAIB:

"At 1615 the second officer contacted the chief officer, who had not arrived on the bridge at 1600 as expected. Shortly afterwards, the master, who was in his cabin, felt a change in the vessel's vibrations."

"He called the second officer and instructed him to check the depth of water. The second officer looked at the ECDIS display and reported to the master that there was no cause for concern. The depth sounder was not switched on."

"The vibrations increased and the vessel began to slow down. At 1617 the vessel speed was 6.9 knots, and by 1619 it had reduced to 1.1 knots. The second officer realised that something was wrong and put the propeller pitch to zero."

"He then changed the ECDIS display to a 1:50,000 scale and saw that the charted water depth was less than the vessel's draught. He realised that the vessel was aground on the Haisborough Sand. This was confirmed when the depth sounder was switched on."

The MAIB investigation noted that the day previous to the accident the chief officer had been instructed by the master to amend the existing passage plan, using the ECDIS, to allow the ship to arrive at its destination one hour earlier than originally intended.

The report states: "The chief officer created a new passage plan in the ECDIS using the scale of 1:100,000. The master assisted in the selection of the revised waypoints, and the chief officer visually checked each leg of the new plan to ensure they were clear of hazards."

"In doing so, he noticed that the vessel would leave a green conical buoy to port in the vicinity of Haisborough Sand, but did not investigate further."

"The new voyage plan took about 5 minutes to complete, and was in use when the second officer took over the bridge watch."

"The route was planned and executed on the vessel's ECDIS, which had numerous in-built safeguards intended to prevent an accident of this nature. However, it is evident that on this occasion these safeguards were not utilised, and system warnings were not acted upon, either when the route was planned or when it was monitored."

"In particular: the system's check page was not used to check each leg of the route for navigational hazards; the plan was executed despite its title remaining red, indicating that the intended route crossed the safety contour set or other defined dangers; the safety contour alarm did not sound as the vessel approached the shallow because a watch vector had not been set."

The vessel was sailing 'paperless' and was equipped with dual-ECDIS for navigation, with one as a master unit and one as back-up, and as such was not required to carry paper charts. Any changes on the master unit were instantly duplicated on the back-up, to allow for an easy transition in the case of a necessary switch.

Radar, AIS, gyro, speed logs and GPS were all connected to the ECDIS via a local area network, and the units had separate uninterrupted power supplies (UPS). An ECDIS operations manual had been provided to the vessel, though MAIB notes that this was more than 600 pages long.

Training

With the vessel sailing paperless, one would expect that the bridge crews would need to be well versed in the use of ECDIS and comfortable navigating with the system. However, MAIB's investigation revealed significant problems in the training of those onboard in this regard.

The report says: "ECDIS training (was provided) on board CFL Performer for the master, chief officer and second officer who were in post at the time. The training occurred before the vessel entered service, and was specific to the (ECDIS)."

"The training consisted of two sessions, each lasting between 4 and 5 hours. No training in the use of ECDIS was provided for officers who subsequently

joined the vessel."

"Of the officers on board at the time of the grounding, neither the chief officer nor the second officer was trained in the operation of ECDIS, but both had used such equipment on previous ships. The master had no previous experience or training on ECDIS or any other form of electronic navigation system."

"None of the officers were aware of the significance of the safety contour, the safety depth, and the shallow and deep contours, and did not know how to establish a watch vector ahead of the vessel, or its significance. They also did not know how to use the 'check page' to ensure that all course lines and associated channel limits were clear of navigational dangers."

MAIB notes that the company was in the process of reassessing its ECDIS training procedures and needs at the time of the accident – a process that was, unfortunately, seemingly undertaken a little too late:

"At the time of the grounding, the vessel's owner was in the process of obtaining feedback from its ships' officers regarding their experience with ECDIS, with a view to identifying future training needs."

"There was no written policy regarding the length of handover between officers leaving and joining CFL vessels."

However, despite those on the bridge not having been extensively trained in the use of ECDIS, it seems that the crew was, in fact, unduly reliant on the technology for situational awareness and navigation of the ship.

The report says: "During the afternoon of 12 May, the OOW relied on ECDIS alarms to warn when the vessel was approaching an alteration of course or was more than 185m off the intended track. In effect, the monitoring of the vessel's progress was undertaken by the ECDIS, while the OOW spent much of his watch preparing for forthcoming audits and passage planning."

"ECDIS provides a potentially invaluable asset to passage planning. However, there is a danger that many bridge watchkeepers will increasingly trust what is displayed without question. As this case demonstrates, such trust can be misplaced. The need for bridge watchkeepers to remain vigilant and continuously monitor a vessel's position in relation to navigational hazards remains valid, regardless of the electronic aids available."

"The OOW placed an undue reliance on the ECDIS, and it is possible that the grounding could have been avoided had he remained vigilant and continuously monitored the vessel's position in relation to navigational hazards."

"Although the safety contour was set at 30m, its associated alarm did not activate because a watch vector, which defines the predicted movement of a vessel, had not been set. The setting of a watch vector is therefore an extremely important feature without which many of the chart alarms cannot operate. The significance of this function requires emphasising to all ECDIS users."

Time to update

Having established that there were some serious issues with the training and experience of the bridge crew in the use of ECDIS, despite it being the only primary navigation source on the vessel, MAIB goes on to suggest that the current international regulations with regard to ECDIS training are not enough to make sure these

types of incidents don't reoccur.

The report says: "Although Table A II/1 of the STCW95 Convention states that: *ECDIS systems are considered to be included under the term "charts"*, there is no mandatory international requirement for navigating officers to undertake specific ECDIS training, and the requirements of individual national administrations differ in this respect."

"(Most EU countries) rely on the general requirements placed upon ship owners and managers by the ISM Code to ensure all personnel are familiar with the equipment they are expected to use."

"The Code states: *The Company should establish procedures to ensure that new personnel and personnel transferred to new assignments related to safety and protection of the environment are given proper familiarization with their duties."*

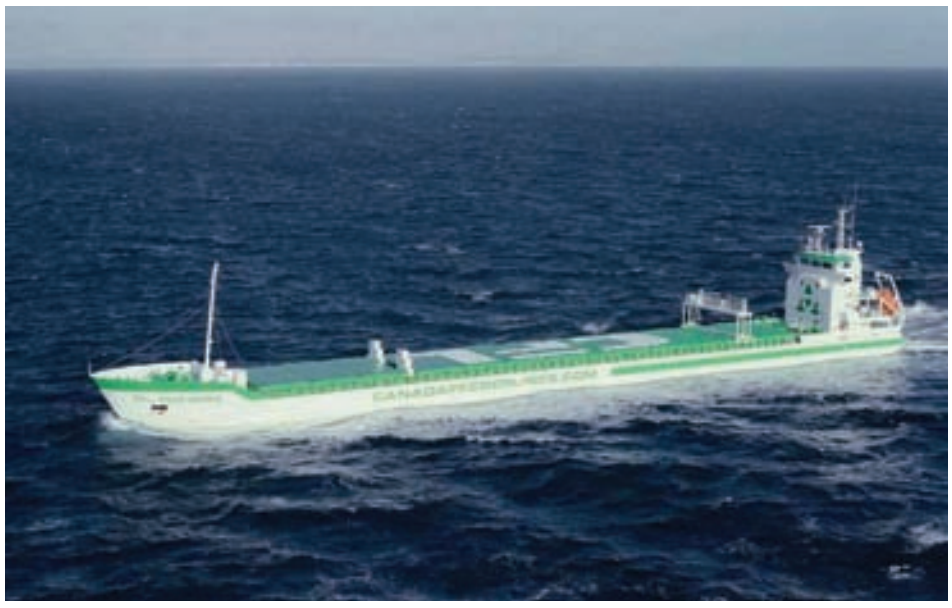
"Guidelines have been issued to surveyors conducting PSC inspections under the Paris Memorandum of Understanding, which includes: *Are the master and deck watchkeeping officers able to produce appropriate documentation that generic and type specific ECDIS familiarisation has been undertaken?"*

IMO published a framework for an ECDIS model course as far back as 2000, titled 'Model Training Course on the Operational Use of ECDIS' and including guidance on content and basic qualifications, among other things. However, MAIB's report questions whether or not this requirement provides a sufficient level of training for ECDIS navigation.

It says: "Many ECDIS training courses based on the IMO model course are run by maritime training colleges and other educational organisations around the world. The course is designed for 40 hours of instruction (1 week), and successful completion is dependent on attendance. Although tests and evaluations are suggested, there is no requirement for attendees to pass an examination."

"Although the structure and syllabus of the course provides a benchmark for training establishments, it is (more than eight years) since the course was developed, and a review of its content may be beneficial to take into account the experience gained in the use of the system over that period, the lessons learned from this and similar accidents, and to ensure the course still meets the requirements of the maritime industry."

"Although ECDIS must meet the specific performance standards set by the IMO, manufacturers inevitably vary aspects of equipment operation in order to remain commercially competitive. This has led to differences between systems in terms of menus, terminology and equipment interface."



The report said that the OOW aboard the **CFL Performe***r placed an 'undue reliance' on the ECDIS – Photo: MAIB*

"Such differences can be marked and, although operations manuals are provided, these are not always easily understood. A mariner's proficiency in the use of a particular system is therefore undoubtedly best served by the provision of equipment-specific training, regardless of any previous training and experience."

Paper v Electronic charts

MAIB also points to the marked differences in navigating with an ECDIS compared to traditional paper charts as evidence of the need for training in navigation to be updated and revised.

The report says: "Route planning and monitoring are critical to the safe operation of every vessel, and it is essential that requirements of SOLAS V are met, regardless of whether ECDIS or paper charts are used. However, the differences between the two media are considerable."

"This has been recognised by the International Chamber of Shipping (ICS) in its Bridge Procedures Guide, which states: *Navigation with ECDIS is fundamentally different from navigating with paper charts. As a consequence, the safe use of ECDIS requires the mariner to be appropriately trained and appropriate bridge procedures to be established."*

"While the information shown on a paper chart is fixed, the electronic data within ECDIS can be displayed and used in a variety of ways, which requires both careful consideration and manipulation. This can be daunting and confusing to untrained users."

"On this occasion, although the vessel's deck officers were trained in, and had experience in the use of paper charts, none had been trained in the use of ECDIS. Consequently, they were ignorant of many of the system requirements and features, and operated the system in a very basic and inherently dangerous manner."

"ECDIS will soon replace paper charts as the primary planning and monitoring media on board most vessels, but the system can only realise its potential benefits to maritime safety if all mariners who are expected to use the equipment at sea are properly trained. Therefore, the need for mandatory training in ECDIS is compelling."

"Given the sophistication of the systems, and their differences in terms of user menus, hardware interfaces and terminology, this can only be achieved through both generic and equipment specific training."

"Reliance on the requirements of flag states, knowledge of paper charts, on the job training and self-tuition are not realistic or sensible options for such a vital piece of navigational equipment."

Other incidents

In addition to its conclusions in the case of the CFL Performer, the MAIB report points to a number of other investigations over the last five years where unfamiliarity with, or improper use of, ECDIS and other electronic chart systems (ECS) has been a contributory factor in an accident.

The reports states: "In August 2004, a cross channel ferry grounded after the helm was put the wrong way as the vessel approached a port entrance. This mistake was not noticed by the bridge team and, although an ECDIS was in use, no warning was given to indicate that the vessel was approaching shallow water because the watch vector or predicted movement warning area had not been correctly enabled."

"In 2006, a ro-ro ferry ran aground after the safety contour in her ECDIS was set at 30m. This caused the chart display to be shaded blue, which severely impeded the bridge team's ability to see that the vessel was outside the navigable channel."

"In January 2008, a ro-ro passenger ferry hit a submerged wreck near Dover and severely damaged her propellers. Although the vessel's primary means of navigation was paper charts, her deck officers relied on the vessel's ECS, despite not having been trained in its use. The wreck was not shown on the ECS display due to the settings applied to the system at the time."

"Contributory factors to the grounding of a container ship in UK waters early in 2008 included the lack of training in the use of the vessel's electronic chart system. This resulted in the use of inappropriate settings with regard to depth contours, and chart and depth alarms."

While these incidents only occur on a miniscule percentage of the overall total number of ECDIS-based voyages, there are still some serious lessons to be learned by the industry ahead of the introduction of a mandatory requirement, as shown by the incidents on the CFL Performer and elsewhere.

It must be hoped that improvements in the area of ECDIS training and competence will come sooner rather than later – and well ahead of the day that the technology is present on the bridge of most internationally trading vessels. DS

When integrated systems create integrated problems

The introduction of electronic navigation systems has created the possibility of greater integration between positioning and passage planning equipment on modern vessels, with the aim of providing the best possible situational awareness for those onboard.

ECDIS can distinguish itself from paper chart navigation in precisely this way – as a 'display and information system', like the name suggests, the technology can bring in data from numerous sources to supplement what is contained in the navigational chart and give a better overall picture of the navigational situation.

However, the introduction of more levels of technology and sophistication into the process also increase the need for vigilance as to the integrity of the system. When there are more different systems involved there are more different things that can go wrong.

An example of this was illustrated by a recent contributor to the Nautical Institute's Marine Accident Reporting Scheme (MARS), recounting his own experiences with an integrated system onboard a 'state-of-the-art' bridge.

The report on MARS case number 200928 reads: "I recently piloted out a medium-sized, one-year-old product tanker from a top operator. The ship had no paper charts and was fitted with an integrated bridge system (IBS) with two interchangeable radar / electronic chart display information system (ECDIS) displays on the bridge with a third, separate unit, used for passage planning."

"Prior to departure, the Captain explained that they had been experiencing problems with the displays. While alongside, a service engineer had changed a circuit board but, because of the terminal's radar policy, they had been unable to test the repair."

"One unit was set up as a radar and the other as the ECDIS and although both the displays seemed to be functioning correctly, the Captain indicated that there was still a problem."

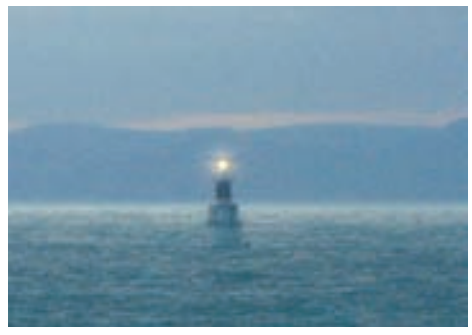
"I understood this to be that he was unable to bring the ECDIS overlay on to the radar display screen. Apparently several service engineers had checked the systems but were seemingly unable to resolve the difficulty."

"With good visibility, I navigated the ship mainly by eye, but when I looked at the ECDIS unit I was concerned to note that the position being displayed was well over 100m out, showing the vessel proceeding down the wrong side of the channel."

"The Captain checked the back-up ECDIS unit and discovered that it, too, was displaying the same error."

"After about 30 minutes the position error suddenly disappeared and the chart subsequently displayed the correct position; however it is of concern that no alarms had indicated any GPS input problems during the period of the position error."

"During the passage, an AIS alarm sounded, and, although we were still



Seafarers observed a vessel's AIS ID changing to the ID of the N Kish light off Dublin as it passed the marker

transmitting an AIS signal, we were not receiving any AIS data on any of the screens. With no back-up AIS system, this meant that there was no AIS information available to the bridge team."

"The Mate re-booted the systems but only a few targets were displayed while, later on, the AIS was again lost from the displays and could not be restored."

"The Captain explained that even when the AIS overlay was working, he found it very frustrating that it only displayed the call signs rather than the names of vessels. Having to interrogate each target and note the ships' names manually posed an especially serious problem in busy areas: a practice that he considered dangerously distracting to the bridge team."

"In seeking to change it, he had been told by a service engineer that it was an IMO requirement that only the call sign could be displayed in order to avoid cluttering up the screen."

"I advised him that all the ECDIS systems that I had seen were capable of displaying the full name on the screen, rather than just the call sign. On learning this, the Captain felt seriously let down by the manufacturer's support service."

"While discussing the topic of AIS, he advised me that he had encountered another problem at two specific locations involving the Europlatform off Holland and the N Kish light off Dublin, in which, when vessels passed them, their AIS IDs changed to the ID of the mark and subsequently their data displayed as Europlatform / N Kish. Another master subsequently confirmed observing this phenomenon."

"Overall, this Captain was not impressed with ECDIS, even when it was working correctly."

"In particular, he found route planning cumbersome because, in contrast to a paper passage planning or routing chart which could be laid out to provide an overview of the passage to be undertaken, trying to plan a route on a 17-inch monitor involved constant jumping between ranges, then having to zoom in and carefully re-check the proposed passage on the larger scale."

"I therefore left the vessel with a Captain extremely disillusioned with his integrated, 'state-of-the-art' bridge. His views on the concept of e-Navigation are probably best left unrecorded." DS

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The journey to 'adequate' ENC coverage

One of the greatest stumbling blocks in ensuring the effectiveness of ECDIS is the availability of electronic navigational chart (ENC) data, without which the potential benefits of the equipment count for nothing. Will global coverage arrive in time for ECDIS implementation? Gerry Larsson-Fedde, Norwegian Hydrographic Service, and Tor Svanes, Jeppesen Norway, told *Digital Ship* about the latest developments

With mandatory ECDIS looming on the horizon for most shipping companies, much of the potential success of implementing the system will depend on the production and availability of adequate data.

Like any computer-based system, the benefits you can derive from using ECDIS are only as good as the data you put into it. Quality electronic navigational charts (ENC) are a pre-requisite if any potential improvements in operation are to be realised.

Capt Gerry Larsson-Fedde, director general Hydrographer of Norway for the Norwegian Hydrographic Service (which also operates ENC distributor Primar), says he is certainly aware of the importance of expanding ENC coverage, and says that his organisation is fully behind the push towards ECDIS carriage.

"We are fully supportive of the mandatory carriage requirement of ECDIS, and also co-sponsored the DNV Formal Safety Assessment related to ECDIS," he told us. "The DNV study showed that this could reduce the risk of grounding by up to 40 per cent."

"There are also some time and fuel saving areas that were also brought up by the Canadian Coast Guard in the survey. It's easier and more cost efficient for route and voyage planning, and is efficient for updating of ENCs in terms of time, cost, accuracy, reliability, and ease. It also allows for integration with AIS, Radar, ARPA, GPS and other functions."

"Obviously this allows for a better utilisation of resources on the bridge through improved watchkeeping and increased safety, with more situational awareness amongst the bridge officers. However, they need to know how to operate the systems."

Implementation schedule

The proposed ECDIS implementation schedule, which is tabled to be adopted at IMO's MSC 86 meeting that concludes on 5 June 2009, includes a phased implementation schedule commencing in 2012, so there is still some time remaining for ENC coverage to be increased to a more suitable level.

Mandatory carriage will be introduced for new passenger ships of 500 gt and upwards constructed on or after 1 July 2012, with ships constructed before 1 July 2012 to be equipped not later than the first survey on or after 1 July 2014.

New tankers of 3000 gt and upwards constructed on or after 1 July 2012 will have to be fitted, while ships constructed before 1 July 2012 must be equipped not later than the first survey on or after 1 July 2015.

New cargo ships of 10,000 gt and upwards constructed on or after 1 July 2013 will have to carry ECDIS; new ships of 3000 gt and upwards but less than 10,000 GT, constructed on or after 1 July 2014, must have the equipment; and ships of 50,000 GT and upwards, constructed before 1 July 2013, must be fitted not later than the first survey on or after 1 July 2016.

Ships of 20,000 gt and upwards, but less than 50,000 gt, constructed before 1 July 2013 must have ECDIS not later than the first survey on or after 1 July 2017, while ships of 10,000 GT and upwards but less than 20,000 GT, constructed before 1 July 2013, have to be equipped not later than the first survey on or after 1 July 2018.

'Today we have only two RENCs, it's very Euro-centric and very static' – Gerry Larsson-Fedde, Norwegian Hydrographic Service

This slightly complicated division of vessel classes means that it will be many years before the majority of ships are required to carry ECDIS, and Capt Larsson-Fedde is sure that the efforts of global Hydrographic Offices (HOs) will have led to a vastly increased level of ENC coverage by that time.

"It will start in 2012 with passenger ships over 500 gt, and end in 2018 with cargo ships between 10,000 and 20,000 gt," he said. "That means we have an implementation schedule of about 6 years."

"In order to implement this we also need ENC coverage on a global basis. The IHO has done a study on this which was presented to IMO's NAV54, and was part of the grounds for the decision to put this forward to MSC, which was where the decision for mandatory carriage requirements was agreed."

'Adequate' coverage

To coincide with the introduction of the mandatory carriage requirement, IHO has defined a level of "adequate coverage" which it feels will be necessary to make the use of ECDIS systems more effective.

"The definition of adequate ENC coverage that IHO is using is that it is 'equivalent to the best available paper chart coverage of either a hydrographic office providing global coverage or the hydrographic office of the coastal State'," Capt Larsson-Fedde explained.

"For this 'adequate coverage' IHO has focused on international trade routes, covering the top 800 ports and major routes."

"As of June 2008, in the planning scale, which is the small scale, we had 94 per cent coverage. In the medium scale, the coastal approach scale, we had 68 per cent, and on the large scale it was 65 per cent. As of that time there were about 8,400 ENCs available, with about 1,500 additional ENCs awaiting validation."

Capt Larsson-Fedde says that Hydrographic Offices around the world have shown their commitment to this ENC development programme, and that international cooperation will be a key factor in reaching IHO's 'adequate' goal.

"There are some initiatives that have been put in place to help to achieve global ENC coverage and ensure proper ENC production," he told us. "There is regional cooperation between the regional hydrographic commissions, with bilateral assistance and production programmes, including Australia, France, Norway, UK, and Portugal. There is also a capacity building programme to which IHO offers technical assistance."

"The Asian Development Bank has helped Papua New Guinea, while the IMO, IHO and Global Environment Foundation have been involved in the Marine Electronic Highway in Singapore and the Malacca Straits, and the Marine Highway in the Indian Ocean."

"The prediction for the end of 2010 is that we'll have 100 per cent coverage in all scale bands. IHO's statement to IMO has been that there is going to be adequate ENC coverage by 2010, and that will be two years before the mandatory ECDIS carriage requirement is put in place."

Capt Larsson-Fedde encourages those interested in seeing the development of electronic chart coverage to examine the current ENC availability and see how changes and additions are made to the portfolio.

"IHO has an ENC Coverage Catalogue that was requested by IMO, showing ENCs that are commercially available, the Raster navigation charts that are commercially available, the state-by-state requirements for paper charts used in conjunction with ECDIS, and links to State on-line catalogues (where they exist)," he said.

"These database sources come from two RENCs (Regional Electronic Navigational Centres), from individual States, and from the value added resellers. That is constantly updated, and you can go in there at any time and see what the latest movement has been on ENCs."

The IHO ENC Catalogue of coverage is available on the organisation's website at www.iho.org.

New RENCs

Once criticism that Capt Larsson-Fedde makes of the current situation with regard to the further development of ENCs is the concentration of Regional Electronic Navigational Centres, or RENCs, in one area of the world.

"Primar was set up in 1999 by Norway and the UK as the world's first RENC," he told us.

"It has been operated by the Norwegian Hydrographic Service since 2002, when the UKHO (United Kingdom Hydrographic Office) set up IC-ENC, which was the second RENC in the world. Unfortunately we only have two and they are both in Europe."

"We believe that regional centres are needed to deal with the regional issues which only those in that region can comprehend and resolve effectively. As I mentioned, today we only have two RENCs, it's very Euro-centric and very static and we think that it's now time to start looking at helping to build regional ENC centres all over the world."

Capt Larsson-Fedde seemed to suggest that the UKHO has not helped the creation of further RENCs in other world regions through its choice of chart distribution policies.

"One of the challenges that we have is that not all hydrographic offices appear to fully support WEND (Worldwide Electronic Navigational Chart Database) and RENCs as long as their ENCs are distributed," he said.

"This leads to confusion between core HO tasks and competitive services, which leads to a Euro-centric situation. This is leading to exclusive data and integrated services, lack of choice for distributors and end users, and lack of innovative solutions for the mariners."

"This goes back to UKHO's ENC programme, with ENCs that are being produced by them being primarily only distributed through the UKHO and their service, and not through the RENCs."

Capt Larsson-Fedde says that his organisation is willing to contribute resources to those other parts of the world that do not have the expertise of the European HOs and could benefit from assistance in building their ENC databases and creating better regional cooperation, in pursuit of the goal of worldwide coverage.

Ultimately this could possibly lead to the creation of what he describes as a 'virtual WENC', a Worldwide Electronic Navigational Centre that exists as an amalgamation of data from RENCs around the globe.

"We believe that it's now time to share the collective experience and develop

RENCs in other regions of the world before the mandatory carriage requirement comes into effect," he said.

"The goal is that we would have RENCs all over the world based on regional hydrographic commissions. What we at Primar would like to do is provide the technology and the resources for these areas of the world to establish RENCs so that all of the RENCs would eventually communicate with each other and create a virtual WENC which would be linked to the distributor network."

"As it is today, this is something that we find to be very important, and that's why we believe that by sharing our technology, which Norway and the Norwegian government has spent a considerable amount of money on, we would like to share this with the rest of the world to make sure that IHO reaches the goal of global coverage of ENCs by 2010 and to let the regions get involved in the charts for their own areas of the world."

While there are no firm plans in place for the development of a WENC at this time, and with no guarantees that UKHO would wish to be involved in such a project, Capt Larsson-Fedde firmly believes that the idea has the potential to be beneficial to the maritime community in the pursuit of increased ENC coverage, and says that other HOs around the world could be willing to support it.

"We, just recently, presented this concept, and we've already had some responses, for example India is one that really wants to build its own RENC, and we know Australia is considering doing the same," he said.

"We've also had dialogue with Japan and others. But I think that this will need to be a discussion between the regional commissions in those areas and how they want to do this."

"The fact that they can be given the technology for free and some resources to apply to this, it's a different situation to what existed before, it doesn't take as much as it did before to try and do this. You don't have to invent the technology all over again, you can get it for free."

Capt Larsson-Fedde is even confident that such a system could be in place before the introduction of the mandatory ECDIS requirement in 2012, though he concedes that it will take a lot of effort on behalf of a number of industry stakeholders for that to be achieved.

"I think that by 2010 we will get this in place, but there's a lot of work ahead of us, both for the IHO and the member States, and that's why Norway thinks that it's important to take a lead role in this to try and help those countries that are struggling with this type of ENC production," he told us.

"There is also room to use other companies to produce ENCs based on paper charts, so I definitely think that by 2010 there will be global coverage in accordance with what we define as 'adequate coverage'. But there's a lot of work ahead, for sure."

Tor Svanes, Jeppesen Marine

The issue of ENC coverage is one that is also of great importance to Jeppesen Marine, owner of C-Map and one of the world's biggest distributors of ENCs, as well as being a provider of private navigational chart data.

While the company is supportive of the potential benefits of mandatory ECDIS and believes that it can increase onboard safety, Tor Svanes, managing director of Jeppesen Norway, says that promises on

'The introduction of Raster charts was a big blow to the development of ECDIS' – Tor Svanes, Jeppesen Norway

chart coverage will not be worth much if they do not result in viable ENCs.

Mr Svanes has been involved with electronic charts for a long period of time, having originally been part of the Seatrans project, an early ECDIS research project intended to study the feasibility and potential benefits of navigating with electronic chart systems and among the first to carry out sea trials of the fledgling technology.

"I worked at Robertson Tritech at that time, in 1988 and 89, and we bought something called 'disk navigation' from Wilhelmsen," he told us. "That turned into what was called the 'Seatrans project'."

"As we went into this project in 1991, the Hydrographer of Norway at that time told me 'Tor, don't worry, build your ECDIS – in two years we will have full coverage of data'. I guess I shouldn't say that they failed, it's probably better to say that they were a bit optimistic about what we were doing."

"At that time we operated on something called NSKV format, before DX90 and long before S57, which we talk about today. But, due to the fact that this didn't happen, C-Map Norway was invented and brought me to where I am today with Jeppesen Norway. So, to say that there will be full coverage in 2010, and that there will be a lot of RENCs in 2010 – we'll see. It takes time and it's international work."

Mr Svanes recalls the excitement of the early trials of the technology, and the hope that it could be a major step forward in improving safety at sea.

"I remember very well when we did the sea trial on the Nornews Express, and the director from Seatrans was jumping up and down on the bridge and saying that this was the biggest invention since the radar," he said.

"I'm talking about 1992 here, that's part of history now, and it shows that it takes time to get things done."

Raster charts

One of the factors that Mr Svanes believes seriously hampered the further development of electronic navigation was the approval of the use of Raster charts on ECDIS systems.

Raster charts are essentially, under the IMO definition, a 'visual scan of a paper chart'. As such they can be displayed on a screen as a chart image but cannot be used to provide any further data to the ECDIS explaining what information the chart contains.

An ENC, by contrast, is a vector chart, where the details of the features in the chart image are also stored as data within the chart, allowing for the use of more sophisticated navigational integration.

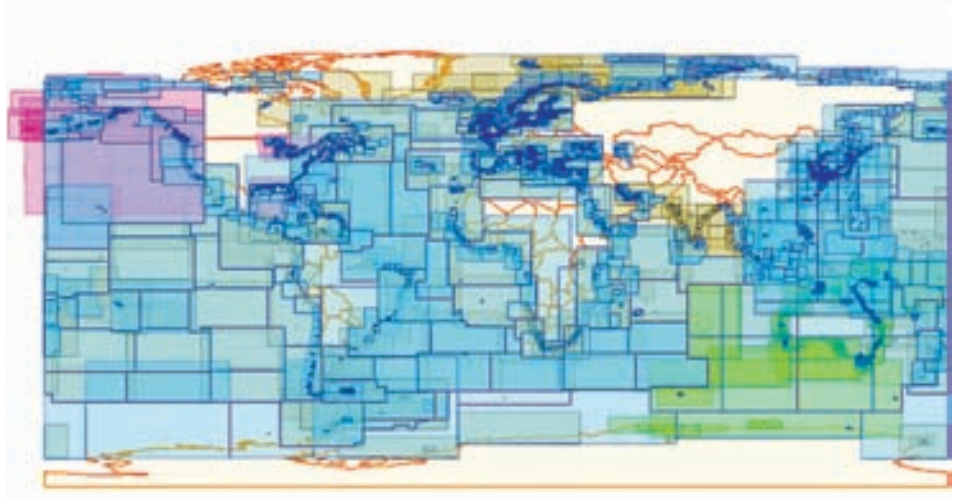
IMO rulings during the 1990s allowed for the use of the limited Raster charts on ECDIS where ENCs were not available – a move that Mr Svanes believes was detrimental to the development of proper ENCs.

"Could we have been further down the road if the history with Raster charts was different? Yes, I think so," he said. "The introduction of raster charts was a big blow to the whole development of electronic charts and ECDIS as we see it today."

"There was an option to use an ECDIS but no unambiguous legislation, and, in addition, the hydrographic offices couldn't supply ENCs. The 'Dual fuel' solution with raster charts was introduced, but paper charts still had to be used were there was no ENC coverage."

"When we started in 1993 raster charts were dead, they had no functionality and didn't work properly. But then they were introduced again in 1996/7 and it delayed the whole development of ECDIS."

Mr Svanes notes that an ECDIS displaying a Raster chart can offer no safety benefits over a paper chart, given that it contains no more information for



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the system to work with.

"I agree that ECDIS can reduce groundings risk and things like that, but it's not the ENC itself, it's the electronic navigation that creates better safety and the connection to other equipment," he said.

"Raster charts can never be a substitute to vector charts. The consequence was confusion and frustration."

"ECDIS is more than a chart machine. We've been running projects here in Norway that try to look at the rest of the ECDIS, the 'IS' means information system, so it's not only electronic charts. It's a display system, and within that you can have a lot of new things, new functionality and extra information. It might be track steering, route planning, tidal heights and streams, port and terminal databases, pilot information."

Mandatory ECDIS

Mr Svanes believes that there are a number of key issues relating to IMO's decision to introduce a mandatory carriage requirement for ECDIS that need to be addressed in the lead up to the first implementation phase in 2012.

"Finally, after about 30 years of debating, we now have a carriage requirement for ECDIS," he said.

"However, if you look at it closely you'll see that it only covers about 25,000 vessels of the SOLAS fleet. The entire SOLAS fleet is about 48,000 vessels – so what about all the others? It's not mandatory for those? I would say that, to increase safety at sea in general, it should apply to all of them."

"In the US, regulations have been discussed that all non-SOLAS vessels should carry electronic charts, not ECDIS but electronic charts down to 65 feet. Some changes will still come."

The actual requirements that the mandatory carriage requirement will impose on vessel operators is also not as widely understood as perhaps it should be, says Mr Svanes.

"So what do you need to meet the carriage requirement?" he asked. "You need a type approved ECDIS, that's number one. Then you need updated charts for the intended voyage, ENCs where there is suitable coverage and then alternative approved charts otherwise."

"If you want to go paperless you'll need a dual station (of two ECDIS). If you don't go paperless you can use paper charts as a back-up."

"There have been some things that were unclear and I'm sure it is still difficult for some shipowners to find out what the real situation is."

The final, and potentially most important, issue Mr Svanes raised was the problem of ECDIS training within the industry.

It has been widely suggested that the current IMO model course on ECDIS is unsuitable to prepare mariners for the reality of navigating a ship using ECDIS, and that a more rigorous mandatory training schedule needs to be introduced when, or before, the equipment is required on the vessels.

"ECDIS training has to be looked into, some countries already have mandatory training, like Russia, all of their navigators have to go through yearly training," said Mr Svanes.

"We need some regulation at this point, I think, to ensure that people are trained well enough to understand the limitations and possibilities and functions of an ECDIS."

Mandatory ECDIS seems to be a widely welcomed development in the maritime industry, but it is also clear that the road to 2012 and beyond will require a lot of hard work if seafarers are to truly enjoy the potential safety benefits of this technology. DS

GPS Jamming and Maritime Safety

GPS plays an essential part in modern navigation, and is relied on by mariners the world over to provide accurate position fixes anywhere on the globe. However, GPS is an inherently vulnerable system – so is our dependence on it a potential problem? *Dr Paul Williams and Dr Alan Grant of the GLA* discuss their research into GPS jamming

The General Lighthouse Authorities of the United Kingdom and Ireland (GLAs) comprise the Commissioners of Irish Lights, the Commissioners of Northern Lighthouses and Trinity House, who between them provide aids to navigation (AtoNs) for the benefit of all mariners in British and Irish waters.

In 2008 the GLAs conducted a trial to investigate the effects of GPS jamming, whether by intentional or accidental means, on marine aids-to-navigation, and ship-borne and shore-based navigation and information systems.

It is common for today's mariners to use GPS enabled devices to navigate their vessel, however large, from port to port and berth to berth. The International Maritime Organisation (IMO) mandates the carriage of electronic position-fixing systems by all vessels over 300 gross tonnes, and those carrying passengers on an international voyage, in accordance with the Safety of Life at Sea (SOLAS) convention.

The GPS position is often fed into other vessel systems, for example an Electronic Chart Display and Information System (ECDIS), the vessel's Automatic Identification System (AIS) or a plotter.

The use of Differential GPS is preferred; mariners improve their positioning accuracy and ensure the integrity of their GPS derived position by using the large number of differential GPS radiobeacons located around the world.

While GPS receivers for navigation are commonplace and very conspicuous on the bridge, the use of GPS is often more inconspicuous in AtoNs, communications and positioning devices. Examples include its use for providing position input to the onboard AIS transponder, as well as the Digital Selective Calling (DSC) system, which has the capability to include the vessel's position as part of a distress signal.

In addition to vessel-based systems, marine aids-to-navigation use GPS.

AIS timeslots may be synchronised using GPS as a source of accurate time. AIS also provides AtoN position information based on GPS input. Synchronised lights use GPS as a common timing source and differential GPS services provide accuracy and integrity to the mariner.

Therefore, GPS denial, whether intentional from malicious jamming or unintentional due to malfunctioning equipment, such as television antennas, may affect safety both on the bridge and on-shore.

Jamming trials

During the jamming trial, a GLA vessel was fitted with two typical marine grade DGPS receivers, a survey grade GPS receiver and an eLoran receiver.

The UK Ministry of Defence assisted in the trial by providing and operating a GPS jamming unit. This was located at Flamborough Head Lighthouse, which is also the site of a DGPS reference station, throughout the duration of the trial.

The jamming unit transmitted a known pseudo-random noise code on the L1 frequency, with an effective radiated power of 1.5W. On full power, using a directional antenna, this unit was capable of jamming GPS over a 30 km envelope (Figure 1).

The trial vessel made several runs between two waypoints spaced 10M (nautical Miles) apart off the coast of the United Kingdom at Flamborough Head.

Each waypoint was positioned outside the jamming area (including the areas affected by the main lobe and side lobes as indicated by the red and black hatching areas in Figure 1) to allow onboard GPS devices to reacquire satellites before starting the next run. Each passage took approximately 1 hour at a steady speed of 10kts.

The results were a mixture of the expected and the surprising.

It was expected that the GLAs trial eLoran service would not be affected by the GPS jamming unit. This was found to be the case, and was not surprising given the widely differing operating frequencies of the two systems.

eLoran gave a consistent position accuracy of 8.1m (95 per cent) during periods of GPS jamming, demonstrating the advantages of an independent electronic navigation system with dissimilar failure modes to GPS.

The typical marine grade GPS receivers did not fare so well.

Both units were forced to operate in stand-alone GPS mode as the DGPS reference station was also jammed. Both receivers reported erroneous positions, often indicating implausibly high speeds and equally implausible position errors.

Figure 2 details the recorded positions from one of the GPS receivers where each recorded position has been colour coded depending on the reported speed. Where the receiver is operating correctly the resulting positions are reported as blue.

The effect of GPS jamming can be seen with the yellow, orange and red positions, which are reporting erroneous speeds and positions. This figure also shows a comparison of the positions given by the GPS receiver and the eLoran receiver.

It can clearly be seen that the two reported positions differ significantly, being over 22 km apart.

Other effects

It was not only shipborne systems that were affected by the jamming.

The Automatic Identification System (AIS) enables vessels to communicate with other vessels and shore based infrastructure to exchange information such as their call sign, position, destination, estimated time of arrival and other pertinent information.

This information is often used by vessel traffic systems (VTS) on shore to monitor traffic in and out of port and other waterways. During periods of GPS jamming the traffic picture can be compromised due to

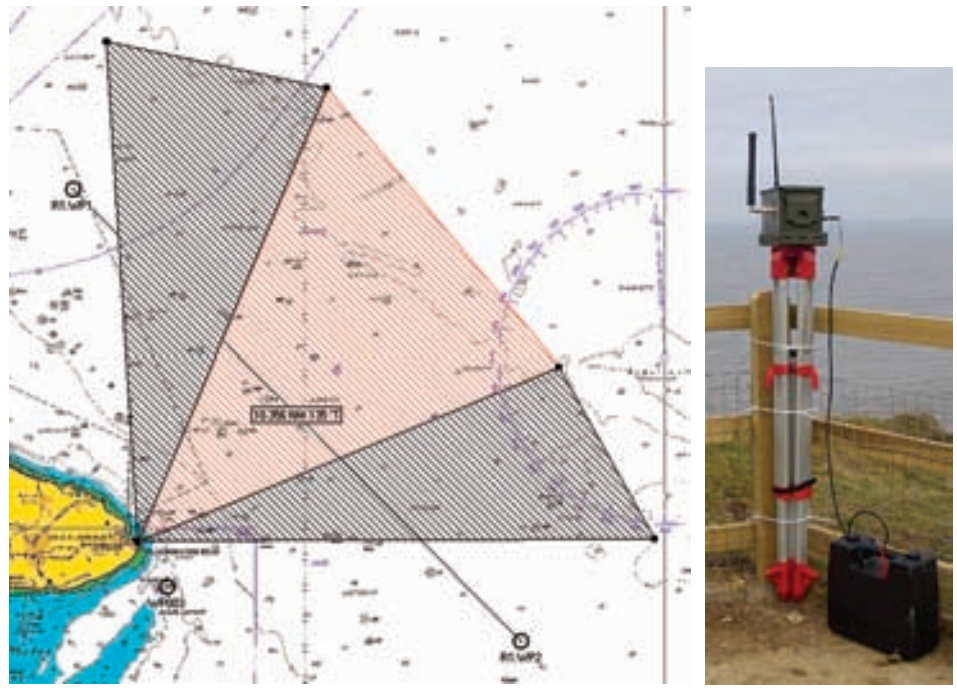

Figure 1: On the left is a screen capture showing the approximate area affected by the GPS jamming unit (shown on the right) along with the passage between the waypoints used in the trial, plotted using Meridian SeaTrack software

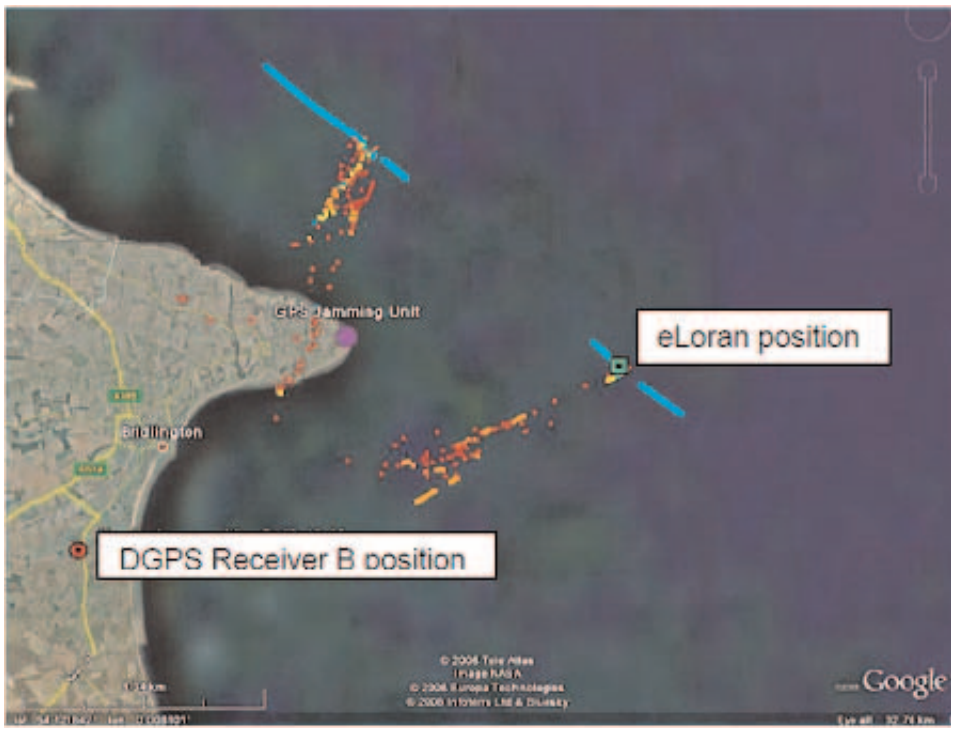

Figure 2: Google Earth plot showing the reported position from one of the GPS receivers during a passage through the jamming zone. Highlighted is a comparison between the erroneous GPS position (red circle) and the eLoran position (green square) measured at the same time. Colours indicate reported speed: blue <15knts, yellow< 50knts, orange <100knots and red >100knts

erroneous positions being reported by the vessel's GPS receivers (Figure 3).

It is also important to note that, during the trial, shipborne systems reliant on GPS input failed to maintain GPS lock and alarmed audibly.

This resulted in a higher level of noise on the bridge lasting several minutes and also in the denial of some ship-borne systems, such as the vessel's ECDIS, gyro calibration, dynamic positioning system and input to the DSC.

A lack of familiarisation of the vessel's crew in such situations could clearly affect their ability to respond, particularly if an outage occurs while the vessel is performing a difficult manoeuvre.

The GLAs are actively looking at methods for making AtoN lights more conspicuous so that they can be more easily recognised against background lighting.

One important method is to deploy lights that are synchronised to a common time source. These can be configured to either flash together or flash in sequence, drawing the attention of the eye along a channel.

Typically, GPS is used as the common timing reference as it provides a cost effective source of universal time (UTC). It was found that the effect of GPS jamming on synchronised lights depends on whether the lights have been able to synchronise or not before the jamming occurs.

If the lights have been able to synchronise then they are reasonably resilient to jamming signals. The GLAs found that even after an hour of the pre synchronised lights running with jamming enabled, no apparent loss of synchronisation was visible.

Manufacturers state that lights can remain synchronised for several hours before any noticeable effects occur, depending on the quality of the crystal oscillator used. However, with jamming enabled before the lights have synchronised then the lights will not synchronise at all.

eLoran is a Stratum 1 frequency source, and with Eurofix or 9th Pulse communications (data communication schemes using pulse position modulation of the eLoran signal itself) it is capable of disseminating UTC. Therefore eLoran would be a suitable timing source that is unaffected by GPS interference and jamming.

Impact

While GPS jamming incidents are relatively rare they can occur; and when they do, their impact can be severe. The GLA trial showed that some typical marine grade GPS receivers can be affected significantly, reporting erroneous positions and implausible speeds.

In addition, other GPS dependent systems can be adversely affected; the vessel's AIS unit for example.

In such a situation the traffic image for the area, whether viewed from other vessels or by shore-based infrastructure, would be seriously confused.

Particularly important to the GLAs was the fact that some AtoNs were affected. Differential GPS services were disrupted, AIS AtoNs were affected and synchronised lights were also vulnerable.

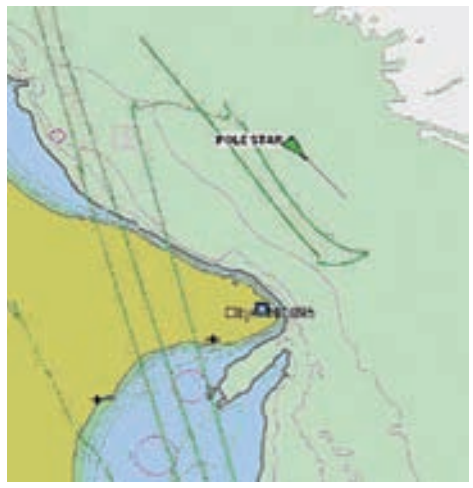

Figure 3: Extract of a vessel traffic image recorded during the jamming trial. GPS jamming resulted in erroneous positions being reported for the trial vessel "NLV Pole Star", giving the impression that she sailed across the peninsular

Having gained this experience with real life jamming events the GLAs are in a position to be able to identify when GPS denial occurs and to be able to respond appropriately.

The IMO and the GLAs promote the use of multiple, dissimilar navigation systems, just for this kind of event. As such, the GLAs recommend that all mariners be familiar with diverse navigation systems, and they are promoting the use of eLoran as a terrestrial back-up and complementary system to all satellite navigation systems. DS

**** The authors would like to thank the crew of the Northern Lighthouse Board vessel Pole Star, the Maritime and Coastguard Agency and the Ministry of Defence for their assistance in this trial.***

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Technology and bridge design

With its new notation for OSV bridge design, Lloyd's Register has explored how technology and seafarers are integrated on modern vessel bridges. *Jonathan Earthy and Brian Sherwood Jones of Lloyd's Register* explore the difference between 'equipping the staff' and 'staffing the equipment'

New technology is being added to ships' bridges at a remarkable rate. Unfortunately, a deep understanding of user needs is not always the prime consideration when it is being introduced.

The technology on offshore support vessel (OSV) bridges is changing very rapidly, and the vessels are becoming large complex global assets. The prescriptive approach to specifying OSV bridge requirements has been found to inhibit innovation and to lead to shortfalls in the usability of complex computer systems.

Lloyd's Register Marine Product Development was asked to develop a notation for OSV bridges that would provide the flexibility necessary for innovative designs, support the bridge team as a whole (including operational roles such as anchor handling) and address the usability of integrated computer systems.

Human error, such as mode errors, is of particular concern to the OSV sector and would need to be fully considered. Given the severity of OSV operating conditions, a good working environment would be an important ergonomic requirement.

The response to the request is the WHeeLhouse (WHL) notation (being published as Provisional Rules) with both navigation and operational functions in its scope.

The request for a new bridge design notation was very welcome as it provided an opportunity to apply a longstanding line of research into the usability of complex systems.

OSVs are leading examples of the progression towards the ship control centre (SCC) concept, whereby the bridge becomes the hub for much more than navigation. Other current examples of 'navigation plus' bridges include passenger ship safety centres, double acting tankers, and ships with cargo handling or office functions on the bridge.

The SCC concept was the focus of the ATOMOS European research project, which produced several international standards, a ship demonstrator, and a body of guidance. Of direct relevance to the WHL notation was ATOMOS work on dependable computer systems, support to bridge resource management (BRM) and bridge design guidance.

Perhaps even more pressing than dealing with new technology was the opportunity to try to fix some of the basics.

Lloyd's Register had assisted Kalmar Maritime Academy and Chalmers University, both in Sweden, in the 'MTOSea' project. This project trained cadets in some basic human factors.

They used their last period of sea time to study the bridge as a workplace, gather data on ergonomics issues, and record how the bridge team 'makes safety': in other words making a positive contribution to safety, rather than just being seen as a source of errors.

Successful cadets were awarded certificates from The Nautical Institute.

A number of basic issues kept showing up, notably dimming, poor console design, and alarms. As regards interaction with computers, there were numerous examples of 'integration work', where the crew had to make the connections between disparate applications, or to correct assumptions about operation made by the system designer.

Simulator trials at Chalmers University researching yet more technology to go on ship bridges. Photo: Gustav Klock/Chalmers University

The standards community is aware of this problem and IEC TC80/WG13 (*Presentation of Navigation-Related Information*) has workload and information management with complex systems as issues to address.

Human-centred approach

A human-centred approach to bridge design does not just accommodate technology push; the aim is 'to equip the staff' not 'to staff the equipment'. The bridge layout, automation and equipment are considered as resources to the bridge team.

It was decided to incorporate the requirements of IMO SN.1/Circ. 265 [Guidelines on the application of Solas Regulation V/15 to INS (integrated navigation systems), IBS (integrated bridge systems) and bridge design] into the notation.

This circular identifies the needs of the bridge team and the pilot and the BRM (bridge resource management) principles that should be taken into account in the design and arrangement of INS, IBS, and for bridge design for the installation of INS and IBS on the bridge.

In practical terms, it aims to enable a watchkeeper to know what the ship and the team are doing without being glued to a computer screen, providing the basis for BRM and the prevention of single operator error.

A human-centred approach will be necessary for the introduction of e-navigation, where the aim is 'to equip shipboard users and those ashore responsible for the safety of shipping with modern, proven tools that are optimised for good decision making' (IMO NAV 54/25 annex 12).

There are some unresolved dilemmas in current thinking about bridge design. There seems to be a wish to provide a quiet air-conditioned island of calm for the comfortably seated bridge team; but also an expectation of unremitting vigilance.

The team is assailed with a stream of alarms, but is not allowed to depend on them for safe navigation.

With the loss of the radio officer the bridge has become a communications hub but there is an expectation that mobile phones and commercial communications are to be banished rather than managed.

The list of audible alarms grows ever longer, but providing audio cues to restore the situational awareness given by traditional bridges is viewed with great concern about distraction.

Non-navigation activity on the bridge is considered with both caution and ambiguity. Is a sofa on the bridge a resource attracting additional expert eyes and facilitating information sharing – or a source of distraction?

Assurance

Rules that are sufficiently open to allow flexibility incur a number of risks.

The first is that they are open to abuse, and that a sub-standard design could claim compliance. The next is that compliance is harder to assess.

Ways to mitigate such risks need to be found as we move towards goal-based regulation. In this case, the mitigations include specialist training and supporting guidance for appropriate surveyors and a collaborative working approach between class and the shipyard.

Where yards are building to a standard design with defined equipment, a simpler relationship is likely to be sufficient to address any changes, such as details of equipment fit.

Current commercial and regulatory arrangements unintentionally impose a division between design and operation; this gap is filled by the crew doing integration work.

A key role in minimising unnecessary integration work by linking design and operation is the 'bridge integrator'. This might be the yard or a manufacturer; the main task is to ensure that the entire bridge system (including the bridge team) works as a whole in an operational context.

It is important that the crew is able to understand the design intent, and is aware of design assumptions and limitations. For example the provision of good manuals has been highlighted as important for OSVs.

The design process needs to give explicit consideration to the different watch states and operating conditions to confirm that the members of the bridge team can perform their roles. Process requirements are still relatively rare in rules and regulations.

Design issues

From an engineering point of view, passageways and walkways are dead space, which can result in congested routes with snagging hazards.

There are established dimensions that can provide the crew with ease of movement, although some common sense and judgment is still required, like provision of sufficient space for getting in

and out of seats.

There is reasonable consensus on the requirements for a comfortable working environment (noise, heat, lighting, vibration) and these can be specified for the bridge or for the whole ship.

It is common to find bridge consoles that do not allow control operation while seated. There are frequent examples of control panel layouts that are physically hard to operate or where the meaning of the layout is not obvious.

However the widespread problem of poor dimming of displays and indicators can be mitigated by sensible design. The 'dream' solution of centralised (or automatic) dimming is expensive to achieve and difficult to maintain through-life.

Consistency at the level of symbology and labelling is vital, and the 'common display surface' IEC 62288 (*Presentation of navigation-related information on shipborne navigational displays*) marks an important step in working toward this aim. Detailed prescription at this level can be invaluable.

Combining information into 'task based displays' will progress beyond conning displays. The use of multi-function consoles will expand; prescriptive solutions are less appropriate at this level of design.

Ships have become dependent on computer systems: it is important to know just how much a ship depends on its computer system, and how dependable the system is. This has gone long past the point of specifying the number of power supplies, and there is a through-life aspect as well.

Lloyd's Register has developed a principles-based approach (drawing on ISO 17894), which is used in the controls section of its rules and in the WHL notation. Such an approach is necessary if the real risks of modern technology are to be addressed.

Clearly, the operational bridge should not interfere with activities on the navigation bridge. The two parts of the bridge may need to work together, or share human or technical resources.

An important consideration is voice communication. If the conversation in one part of the bridge is a distraction to the other part, then there needs to be some physical separation. For example, using a chart table on the bridge for operational planning may not be appropriate.

Meeting the combined visibility requirements may be demanding. The operational bridge may interfere with navigation visibility requirements, and may have demanding visibility requirements of its own, viewing the aft deck, watching loads on a platform crane etc.

Conclusions

In summary, the modern ship bridge is very different from its forebears in its implementation, and the role of the bridge team has evolved.

The traditional requirements of good watchkeeping and lookout remain, but need to be maintained in a context of greatly expanded communications and information flow.

It is expected that the range of operational functions and communications activities associated with the bridge will grow.

Lloyd's Register has adopted a human-centred approach that treats technology as a resource to be used by the bridge team, rather than an entity in its own right.

Continuing technological and operational change requires a flexible approach that focuses on enabling the bridge team to carry out their roles safely and effectively. The assessment of system dependability is based on established principles rather than specific design solutions.

A move away from detailed prescription is necessary. This move introduces some new challenges.

These have been addressed in the development of the WHL notation by drawing on an extensive base of research. However, the organisational change necessary to address these challenges will continue to confront the industry for some time. DS

**** This article has been adapted from an article first published in Seaways magazine, the International Journal of the Nautical Institute***

Dr Jonathan Earthy *is Principal Human Factors Specialist for Lloyd's Register, where he has worked for 17 years. He co-ordinates all technical aspects of Lloyd's Register's treatment of the Human Element and its involvement with IMO, IEC and ISO on this issue. He previously worked for British Petroleum.*

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Technology can't beat the pirates

With pirate attacks reaching almost critical levels and causing grave consternation in the maritime industry, people everywhere are looking for ways to combat seaborne mercenaries. Radar and communications may be useful aids when dealing with pirates, but unfortunately technology is not the solution to this growing threat, *writes Neil Daboul, US Naval Reserve*

Since the major trade publications began running articles on piracy and avoidance operations more than a year ago one thing has happened; the pirates have read well our published advice and adjusted their operation accordingly.

They have adapted faster and better than the shipowners resulting in attacks outside the traditional trade lanes made at higher speeds and freeboards.

To owners and masters, a pirate attack is an exercise in asymmetry: tankers are slow and difficult to maneuver against the fast, light and highly maneuverable open boat; the youthful pirates are armed compared to more mature mariners aboard ship.

However, owners and masters have some advantage to exploit and it may be sufficient to buy time or distance in an encounter. This assessment of the situation attempts to find some measure of advantage for the master to implement, however passive it may be.

The master remains the person aboard the vessel responsible for mitigating piracy risk on behalf of the owners; his strategic and tactical tools in the effort are domain awareness, vessel's equipment, the vessel itself and more superior seamanship skills.

The objective in applying these advantages is to prevent pirates from identifying, approaching or boarding the ship during passage through pirate waters.

The master must have domain awareness at all times during the voyage but especially in pirate waters.

Lookouts and radar

The traditional lookout must be used to spot and track any small open boat at the height of eye limit. There is no substitute for the lookout and radar can not be trusted for small fiberglass targets or take the place of trained eyes scanning the horizon.

Given the low profile of high speed pirate vessels, lookouts should be maintained on the navigation or flying bridge where height of eye provides better domain visibility and access to safety.

The installation of an additional 3CM Radar may also work in tandem with visual lookouts when attempting to identify small targets at the 12NM range. Teaching sailors to use this Radar for contact affirmation is prudent.

If the lookout can spot pirates at the horizon they are denied the element of surprise and the master has gained time to broadcast their position to coalition naval vessels, prepare his vessel and begin evasive maneuvering.

Naturally, it is assumed the vessel's fuel rack is at maximum and additional speed can not play into the equation. In naval terms, the vessel must avoid a tactical situation and maintain a strategic posture of avoidance and deterrence.

Recent accounts seem to indicate pirates lack basic ship identification skills and exploiting that ignorance may be the best way to frustrate them.

Camouflaging their vessels to a degree that confuses the untrained eyes of the pirates and renders the vessel indiscernible or undesirable should be considered. Simple camouflaging may be done by the ships crew or may be undertaken by a short alongside period.

The paint scheme can be changed to the traditional haze grey or broken up to appear like a vessel farther away or perhaps appear as a naval vessel. Two examples have been submitted with this article.

If the pirates are unable to identify a naval warship from a MPV they may well be confused by a basic camouflage scheme.

Early detection and camouflage are strategic tools used to keep the pirates away from the vessel but what happens if the pirates approach the ship and the situation changes from elusive to evasive? The master must be prepared for a tactical situation that prevents the pirates from boarding.

Consider the point of asymmetry again. Small open boats used by pirates may have speed but they lack the power available to the oil tanker. Masters may be able to maneuver their vessels into the weather making it unfavorable for open boat approaches, flipping the power advantage in their favor.

The outcome of this tactical situation will depend upon the seamanship skills of the master and all aboard.

Technology

Technology is not the solution, and crews that depend upon LRAD's, fire hoses, reflective mirrors and similar deterrents could prevent a boarding of pirates and frustrate them in favor of another vessel, but the situation has become tactical and that is too close.

The goal is to elude at long range not evade at close range.

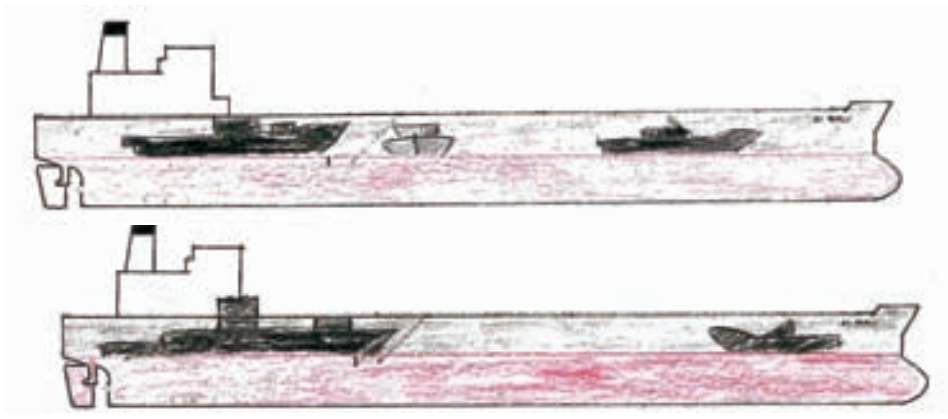
At the time of this writing it is unknown if the pirates broadcast some sort of radio signature that can be tracked by present technology aboard the ship. Gone are the days of the RDF (Radio Direction Finding), but something similar for pirate radios would be helpful.

In many ways piracy in the Gulf of Aden during the later part of 2008 resembles piracy off the Barbary Coast between 1624 and 1801, with the most notable of the similarities being in the control of a major commercial choke point through which much wealth passed some of the world's poorest nations.

Poverty anger and desperation were rampant in North Africa prior to Jefferson's decision to send the Mediterranean Squadron in 1801. The region, operating under a form of thuggish theocracy, sent their poorest into the sea to capture the vessels laden with cargo much like they do in 2008 off Somalia[1].

Merchant ship masters must exploit the limited resources they have in the pirate environment and those resources are limited time and distance, horsepower and skill. He must combine these resources to outthink untrained, greedy armed youth to his advantage and until help arrives.

The master must have the goal of keeping the situation strategic over tactical and prevent the pirates from boarding the ship. DS



Camouflaging a vessel could be a low-tech aid in avoiding pirates

Reference:

1. *Wheelan, Joseph, Jefferson's War, Carroll and Graf, New York, 2003 Ch2, P19*

***Captain Neil A. Daboul** is an active participant in the Merchant Marine Reserve programme of the United States Naval Reserve. As a deck officer he has sailed all classes and types of ship, with companies such as Seariver Maritime, and was also part of the Exxon Valdez Post Spill Assessment Programme aboard the NOAA ship Fairweather.*

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AIS - Training and Technology

AIS has provided an important contribution to maritime situational awareness, allowing vessels and shore based authorities to more easily follow what is happening in busy shipping traffic. *Nicholas Bailey of Lloyd's Register Educational Trust* discusses the evolution of seafarers' use of the system, and the future of AIS

AIS, the VHF based automatic identification system, is now well embedded aboard ship and within the maritime sector more generally.

The system provides for greater situational awareness for both those on the shore and onboard. It allows shore side authorities to monitor vessels in their waters and seafarers access to information about ships in their vicinity, while systems like 'AIS live' allow other interested parties to locate and monitor the progress of vessels.

Like any other new technology, the benefits of the system are only realised when it is functioning and operated correctly, and this in turn requires some degree of awareness, often based on training. In the maritime sector, however, it is often stated that seafarers frequently appear to lack adequate training in the use of shipboard technologies.

December 2004 saw the universal introduction of AIS for vessels over 300gt.

Researchers within the Lloyd's Register Educational Trust Research Unit (LRETRU) at the Seafarers International Research Centre (SIRC), Cardiff University, already committed to investigating the extent to which crews receive appropriate training when new technology is introduced aboard ships, took the opportunity with the introduction of AIS to conduct an in-depth case study.

The fundamental function of AIS is the automatic transmission of information by VHF radio between ships, and between ships and shore stations.

As a ship comes within range of another ship, or a shore station, the AIS automatically identifies the vessel on which it is stationed. This facilitates the earlier, and easier, identification of vessels than is possible using radars alone.

In the LRETRU study particular attention was given to the contribution of AIS to safer navigation via improved on-board situational awareness.

For the navigator on the ship's bridge, the ability to positively identify surrounding vessels by name and type, combined with the availability of voyage information and real time vessel movement information (such as course and speed), provides for an improved awareness of the developing navigational situation within which to make collision avoidance decisions.

However, to make effective decisions on the basis of AIS data requires that the data transmitted are correct and that those receiving the information are able to interpret it correctly.

AIS errors

The first stage of the research thus involved an assessment of the level of errors in the information transmitted by AIS. This was treated as a proxy indicator of the competence of seafarers in relation to the use of the equipment.

Data were collected at Dover Coastguard (CNIS) during three time points over a four year period (October 2004, October 2005 and October 2007). It was found that between the implementation of AIS in December 2004 and the final data sweep in October 2007, a process of change, learning and improved awareness had taken place in relation to the operation and use of the system.

In 2004, the researchers found that 10.4 per cent of ships in the sample were transmitting errors in their AIS information.

The greatest numbers of errors, for each of the three years, were in the 'destination' and 'draught' data. Lesser numbers of errors were also detected in all other categories, including course and speed data.

The different types of errors detected raised questions about the level of competence of those operating the system and also the technical adequacy of the system. As such, it was argued that this brought into question the level of confidence that could be placed in the information received by both those ashore and aboard ship.

The LRETRU researchers argued that, while the availability of information from AIS could aid the situational awareness of ships' officers, the frequent errors in these

categories meant the information could not be relied upon to inform situational awareness and consequently navigational decisions.

For instance, wrong installation type data, such as an incorrectly spelled 'name', may cause confusion should a vessel need to contact another. Erroneous voyage data, such as 'destination', could lead a vessel to wrongly anticipate a manoeuvre by another in close proximity, say one being overtaken or running alongside, while the appearance of incorrect navigational data, such as course or speed, introduces a serious risk into the decision making frame.

This was deemed to particularly be the case in heavily congested waters where the navigator would be liable to place greater reliance on electronic aids.

The nature of these errors was seen to be due to a combination of operator input, technician input, and electronic interfacing. Furthermore, from observation and discussion with the operators at Dover CNIS, it became apparent that some ships' officers lacked awareness of, and competence in, the use of the system.

The researchers witnessed instances of CNIS operators reporting to ships that they were transmitting erroneous information, and those onboard clearly indicating that they had no idea what to do about it. In one case an individual denied that they even had an AIS unit onboard.

Similar cases have been reported by VTS (Vessel Traffic Services) operators in Singapore.

Importantly, however, over time the researchers recorded a reduction in the numbers of errors transmitted. Equally CNIS operators reported that ships' officers appear to be far more responsive in correcting any errors detected.

By 2005 the number of errors detected had reduced to 7.9 per cent, and by 2007 had come down to 3.5 per cent. This, the researchers suggest, would seem to indicate that ships' officers have become increasingly proficient / diligent in ensuring that information is entered correctly and that their equipment is kept updated.

Technical issues

As well as operator errors, the researchers also identified a number of technical issues.

A problem associated with radar derived data is a phenomenon known as 'target swap'. When two vessels pass close to each other it is possible for the symbology (and associated information) relating to one vessel, e.g. the vector indicating course and speed, to swap to the passing ship.

This can introduce an element of confusion into the decision making processes. An advantage of AIS is that this should not happen, yet CNIS operators reported witnessing this taking place.

It was reported, for example, that the AIS symbology and information from a car carrier, presented on the CNIS radar screen, was seen to have attached itself to another vessel of a different type, while also continuing to be displayed in association with the car carrier.

Several instances of this phenomenon were pointed out by the CNIS operators and observed by the researchers in 2007.

A further possible source of confusion was identified by the CNIS operators. At installation the co-ordinates of aerials are entered into the system in relation to GPS units. Although password protected, it is possible for authorised personnel with access to a password to change these settings.

By changing the offsets it is possible (accidentally or intentionally) to create the effect of locating the displayed ship AIS symbology at a distance from the ship itself.

Such cases had been observed by the CNIS operators; in one instance the symbology was a distance of 2 miles from the ship. The effect of such an offset could lead an observer to believe that another vessel is present but not detected by radar. Such an effect could be particularly problematic in poor weather conditions.

Analysis of AIS usage in the Dover Strait indicated that seafarers were learning how best to apply the technology over time. Photo: NASA

In 2007 the CNIS operators drew the researchers' attention to the case of a ship's AIS that was continually polling between two different positions, locating the ship alternately in a south coast port in the UK and in the port of Dunkirk, France.

A further reported case involved a ship that suffered a power loss to its AIS unit. When the power was restored the system reportedly reverted to former settings, including prior name and other identification details.

AIS text messaging

In addition to recording errors in AIS data, the LRETRU researchers also examined how the availability of ship-identification information, i.e. the names of nearby ships, influenced seafarers' use of VHF and also how they utilised the AIS text-message facility.

On the positive side, analysis of VHF conversations and AIS text messages revealed that ships' crews were routinely and pro-actively checking their AIS transmissions with those on other ships and with shore-stations.

It is not clear whether such behaviour is the result of company instructions or down to seafarers acting on their own initiatives. Importantly, however, it served to confirm that over time seafarers had become increasingly aware of the availability of AIS information and the need to keep it up to date.

Typically, AIS test messages transmitted by the text facility took the following form: "THIS IS AIS TEST PLS REPLY THKS BRGS" or "AIS TEST! PLS ACKN! THNKS!", while acknowledgements took the form of "ALL RECEIVED" or "TEST MSG RECVD WELL, TKS".

Similarly, seafarers were found to be prompting others to correct their data with messages like: "TRY CHECKING YOUR AIS DATA…WRONG INFO" or most commonly "CHECK YR NAV STATUS BRGRDS".

Others were slightly more sarcastic such as "WHERE RU GOING. ZEEBRUGGE IS TO STBD".

This type of instructional or corrective activity was also recorded on VHF:

Ship R: Just for information Zeebrugge is other side, you are going to Felixstowe on your AIS.

Ship T: Thank you.

Analysis of recorded VHF calls during the research likewise indicated that seafarers were both more aware of AIS data and, over time, were beginning to make reference to it in their navigational decision-making.

In 2004 and 2005 ships' officers routinely called each other by VHF radio and asked for the destination of the other vessel, even though this information was readily available from their AIS units:

Ship x: Where is your destination?

Ship y: We are going to Rotterdam, we will alter course in a few minutes.

Ship x: Roger, we will pass on your port side.

However, in 2007 hardly any such examples were recorded, but examples were identified of ships' officers making explicit reference to AIS, as the two examples show:

Ship M: What's your intention?

Ship P: I'd like to pass ahead of you; you're bound to Rotterdam according to your AIS, so you will join us to the East.

And again:

Ship R: I am going to come a little to the right

Ship K: That's not a problem, I see you on AIS

This again supports the claim that seafarers have undergone a process of learning and have developed a greater awareness of the system.

Changing practices

While analysis of VHF conversations provided positive support for improved awareness of AIS information, it also revealed that the availability of name information had changed the form of VHF calling.

It was found that ships' officers now routinely use ship's name to identify other vessels, rather than their relative or geographical position, as was the case before the introduction of AIS.

Moreover, the ability to identify a ship by name was found to have made VHF calling easier and consequently led to a statistically significant increase in the level of calling taking place between 2004 and 2007.

In 2004 it was found that 544 ships, i.e. 12.5 per cent of those transiting the Dover Straits during the week of the study, initiated inter-ship calls.

In 2007, these figures had increased significantly, with some 20 per cent of ships in the vicinity of the Strait initiating 583 calls, of which 491 were recorded as successful.

Thus, taking into account those vessels that responded to the calls, in 2007 there were 982 recorded instances of ships participating in an inter-ship VHF call, 1.8 times as many as the same period in 2004.

Importantly, the overwhelming majority of these calls were for the purpose of discussing collision avoidance.

This activity took place against the background guidance of the UK Maritime and Coastguard Agency (MCA) on the use of VHF Radio and Automatic Identification Systems (AIS) at sea (MGN 324) issued in July 2006, which cautions against such behaviour.

A detailed analysis of the conversational exchanges between ships was carried out and reported in Bailey (2005)[1].

In that paper it was shown that, while the use of VHF in appropriate circumstances could be highly effective in alleviating uncertainty in a collision avoidance situation, even with the availability of ship names the researchers still found cases of ships mistakenly negotiating collision avoidance manoeuvres with the wrong ship, of confusion arising from negations between ships and, arguably, significant numbers of occasions of unnecessary

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calling - all points previously highlighted by the MCA.

The researchers also found that text messaging was becoming increasingly common. In addition to sending test messages the facility was also being used for general communication, including the passing of information to shore-stations and passing general comments between ships.

The latter tended to take the form of: "HAVE A GOOD VOYAGE", "GOOD WATCH", etc. Others were more involved and included requests about the nationality of the crew, whether a particular person was onboard or involved conveying greetings and salutations, as for example: "WHAT IS NAME OF CH MATE" or "GUD PM TO 3M (NAME) & 2M (NAME)! RGARDS (NAME)".

Of greater significance, though relatively few in number, text messages were also found to be used in collision avoidance situations.

Messages relating to collision generally took several forms as the following examples illustrate. Some messages alerted others to action to be taken: "GD EVENING I LIKE TO OVERTAKE YOU ON PORT SIDE. PLS KEEP CURSE AND SPEED. THANKS /BON VOYAGE".

Messages relating to overtaking manoeuvres were the most common, but there were also references to other types of situation as in this example: "GOING TO CROSS YOUR BOW".

Other messages were in a more tentative form, suggesting the wish to agree a course of action, as these two unrelated examples show: "HI! WHAT IS YR INTESION?" or "GREEN TO GREEN PLS".

There were several instances of messages intended to alert another vessel to the fact that they were in close proximity. For example: "YOU ARE COMING TOO CLOSE. WILL ALTER 255 IN FEW MIN." and "KEEP SAFE DISTANCE!!!"

Others were more critical and expressed annoyance at perceived inappropriate action, as the following examples illustrate, in increasingly strong terms: "WHAT ABT COLREG"; "STUDY UR REGULATION"; "CONGRATULATION. WHERE DID YOU FOUND YOUR LICENCE."; "IDIOT!"; "YOU ARE AN ASS****".

Thus, to summarise, VHF calling in 2007 had almost doubled from 2004, and AIS was clearly the system that facilitated this process.

However, changes were noted in the types of calls being made. Specifically, officers were no longer explicitly requesting destination information.

This suggests that this information is now being taken directly from AIS and used with increasing confidence. Indeed, other recorded conversations clearly indicated that AIS is being used to inform situational awareness, and as a basis of navigational decisions.

Operational impact

Changes have also been recorded in relation to other parties involved in the operationalisation of AIS as a shipboard system.

For instance, the Coastguard operators modified their form of exchange with reporting ships. Now, when communicating with reporting ships instead of requesting ship's name, draught, and destination, etc., they specifically refer to the ship's AIS information and simply ask for verification.

This change in operational practice both facilitates the ease of the information exchange, but also alerts ships' officers to the need to keep the system up to date.

Similarly, the UK MCA responded in 2006 by publishing a new guidance notice that explicitly refers to the use of AIS.

Arguably this learning process is ongoing and there is still room to further reduce the number of operator entered errors transmitted, to eliminate technical anomalies and for finding the best way to monitor the system and enforce compliance.

Looking beyond the immediate operation and use of AIS for improved situational awareness, the research identified that the introduction of the system has additionally led to unintended changes in the behaviour of ships' officers with respect to the use of VHF radio and the developing use of the AIS text facility.

Other, as yet unidentified, changes may still emerge. We have seen that the use of VHF radio has greatly increased year on year since the introduction of AIS which facilitates ship identification.

Moreover, VHF calling is widely being used for negotiating collision avoidance, which runs contrary to current MCA advice.

Furthermore, the use of the AIS text facility is increasingly being used as a form of communication between ships, and ships and shore.

Each of these communicative activities has the potential to distract ship navigators from the business of the watch. Furthermore, there are wide differences in the forms in which communications are expressed both verbally by VHF radio and in writing by text message.

This lack of consistency itself potentially introduces an extra element of risk into the navigational situation.

Future AIS developments

In terms of the future development of AIS, certain specific solutions may suggest themselves in terms of enhanced regulatory monitoring, the codification of different forms of communication exchange and the need for further research.

For instance, enhanced regulatory monitoring during Port State Control inspections provides an opportunity to identify appropriate procedures within shipboard Safety Management Systems, and other forms of inspection, such as International Ship and Port Facility Security (ISPS) audits and ship vetting inspections, offer the potential for monitoring AIS systems aboard ship.

The discussion has focused on the developments around the implementation and use of AIS within the context of shipboard navigation, but the findings have illuminated serious issues concerning the introduction of new technologies more generally aboard ship.

When considered in the round, what has emerged from the range of issues identified is that a learning process has taken place in conjunction with the introduction of AIS, with the consequent development of unanticipated practices and problems.

While this process of learning has led to greater awareness and increased competence, it is unclear what the essential drivers are behind these developments.

Are the developments identified the result of an informal process of increasing familiarity with the equipment and awareness of the need to keep the system up to date, or are the changes observed due to officers undergoing formal instruction and training?

Additionally, there are questions to be asked about the role and influence of changes in practice by the Coastguard, the issuance of advice by Maritime Authorities, the role of Port State inspectors, the development of Company procedures, and the effect of media publicity and the reporting of research findings, etc.

Furthermore, if the changes detected have emerged as a result of officers having undergone formal training, then, given the emergence of what may be described as unintended behaviours, there are questions to be asked about the adequacy of the training available.

Evidence from interviews with seafarers, though limited at this point, suggests that most have had no formal training in the operation of AIS. Thus, it is arguable that the ways in which AIS is used in practice is a result of seafarers learning to utilise the technology for themselves.

The full findings of the LRETRU research are reported in Bailey, et al. (2008) and are available at the SIRC website: www.sirc.cf.ac.uk.

DS

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Cutting CO2 emissions from ships

The conversation about reducing carbon dioxide emissions from ships is growing – but can it be achieved? *Digital Ship* spoke to Dr Reinhard Krapp, head of research and innovation at Germanischer Lloyd, and Finn Vogler, fuel cells project engineer with GL's department of risk assessment and mechanical engineering, to get an update on the technology and regulations

The international Copenhagen discussions this December are aiming to set limits on emissions of carbon dioxide for most countries – and shipping won't escape.

The only way to significantly reduce fuel consumption on ships is to reduce speed. The speed of a vessel is proportional to the cube of its fuel consumption, so if you halve the speed, fuel consumption reduces by 87.5 per cent.

With overcapacity a serious issue in the current shipping market, forcing vessels to reduce speed would be a wonderful thing for shipowners, removing overcapacity at a stroke.

However, there will still be winners and losers no matter how the rules are implemented, as changes in one area will have direct effects in others.

For example, if a ferry carrying people to work is forced to reduce speed and to increase travelling time, people may find a different way to get to work because of it – and the use of these alternative methods may result in higher CO2 emissions than before.

As Dr Reinhard Krapp, head of research and innovation with Germanischer Lloyd, notes, "We don't have all the answers yet."

There are good market reasons why vessels go at the speeds they do – consider that container ships typically go at 20 knots and tankers and bulk carriers at 14 knots; the container cargo is worth more and has more capital tied up in it.

"The market wants a certain speed of ship," says Dr Krapp.

You also can't just reduce speed forever to save fuel costs. There is a point when reducing speed further will increase the total power consumption for a given voyage, because the auxiliary power consumption (lights, pumps, air conditioning) of a ship is roughly constant each day.

If a ship takes longer to reach its destination the overall auxiliary power consumption will increase.

Additionally, there are plenty of other areas when reducing speed will increase the costs to the charterer / cargo owner (particularly in the capital tied up in the cargo), and it must be considered whether this will have to be taken as a 'reasonable price to pay' for the benefits of reducing carbon dioxide emissions.

The big question in this debate may come down to how well the system of monitoring and controlling emissions can be managed, and how accurately it can target the worst performing ships (such as high speed container ships with low value cargo).

If you were a shipowner building a ship today, you might be advised to prepare for future emissions requirements with your design, which could mean additional equipment needing to be fitted to reduce auxiliary power consumption, Dr Krapp suggests.

A shipowner might want to consider ensuring that the vessel is efficient at low speeds, because most propulsion systems are designed with a certain speed in the design point that creates the highest level of efficiency. And, of course, the shipowner should certainly be prepared for an increase in fuel prices.

Can't scrub it

A common misunderstanding in the emissions debate is that carbon dioxide can be removed simply by investing in shipboard equipment, such as scrubbers to remove particulates, SOx and NOx emissions.

Carbon dioxide emissions are proportional to the number of carbon atoms burnt in the fuel – because all the carbon atoms end up being emitted in carbon dioxide molecules.

The carbon atoms also turn from being a liquid (in the fuel) to a gas (in carbon dioxide emissions), in amounts that are far too great to simply be captured on the ship.

So the only way to reduce CO2 emissions is to either burn less fuel, or use a fuel with less carbon in it.

If you want to burn less fuel the options are very limited, apart from reducing speed, or having a smaller ship, or carrying less cargo (or not having a voyage at all).

You might be able to shave a few percentage points off the fuel consumption by cleaning the propeller, tuning the engine, or using a different kind of paint so you need less air-conditioning in the cabin.

Alternatively, you might look at other fuels with less carbon in them – methane / natural gas (CH4 - only one carbon atom to each hydrogen atom), or even pure hydrogen.

None of these options are particularly cheap – but doing nothing is not an option either.

IMO discussions

Despite the continuance of this debate in the wider world, there are no indications that IMO is imminently considering specific limits on maritime options.

The reasoning is quite complex. The carbon dioxide discussions in the United Nations covering the whole world (not just shipping) currently have two tracks – countries which will need to limit their emissions (called 'Annex 1 countries') and developing countries which will not (called 'non annex 1').

IMO has decided that the shipping industry won't have any exemptions, according to IMO's common practice – whatever the rules are, they will apply equally to all countries.

But the 'non-annex 1' developing countries are worried that if they agree to IMO's practice of refusing exemptions this could give other countries an excuse to inflict global carbon dioxide emission limitations upon them in the Copenhagen discussions in December.

So IMO has decided that it won't discuss any specific carbon dioxide limits at all - until after Copenhagen.

What it can do, in the meantime, is try to work out how it will assess the environmental performance of a ship – so it will know which ships to put pressure on once decisions are made.

Index

A ship's environmental performance can be assessed by calculating its 'Energy Efficiency Design Index' (EEDI) – a measure of how energy efficient a ship is, per ton of freight moved (bulk cargo), TEU moved (containers) or volume of passenger space (ferries and cruise ships).

According to a complex calculation (which is still under development), it will be possible to work out how a given ship on a given voyage is performing compared to other vessels.

This would allow authorities to formulate procedures to enforce any necessary penalties – perhaps by banning vessels in the bottom 10 per cent, or asking vessels in the bottom 50 per cent to improve to match those above the average.

The speed of the ship is taken into consideration when calculating the index – so the faster the ship goes, the worse its index. To improve the index, the design speed of the ship has to be reduced.

There would need to be a variety of 'fudge factors' to care for special design requirements in this regard – for example, ice class tankers are heavier than normal tankers because of the thickness of the metal required to get through the ice.

And no matter how well the index is designed, it is unlikely to be able to pick out the worst performing vessels with complete accuracy.

For example, one vessel had a calculated EEDI which was half that of other vessels of the same size, although it was going at 27 knots. Dr Krapp explains that this was due to its low deadweight (low mass of cargo being transported) and high gross tonnage (internal volume).

There are also concerns about quaintly named 'paragraph ships', which are built to meet the paragraphs of legal requirements but not built to minimise carbon dioxide emissions.

Tax

Another possible alternative would be the use of some kind of financial penalty system for ships which are deemed to emit too much carbon dioxide. But how would that work in practice?

One thing that won't be happening is the charges being seen as a 'tax' – since taxes are seen as something only national governments can levy, not the IMO.

There are also plenty of concerns about what this money might be used for – for example, the shipping industry wouldn't be happy if it was used to improve roads.

"If we make shipping more expensive we might increase the truck traffic," said Dr Krapp.

However, there is a precedent for IMO / international organisations collecting money, with the Oil Pollution Compensation Fund. Conceivably any system could be set up similar to that one, with the money spent on a yet-to-be-determined environmental cause.

Gas ships

One way to reduce carbon dioxide emissions is to run ships on gas (compressed or liquefied), which has only one carbon atom for each four hydrogen atoms (CH4).

"The Norwegians are pushing for this, and the Norwegians have lots of gas," says Dr Krapp.

The problem with compressed gas is the space that the tank takes up – about twice the volume of a liquid tank with the same energy content – and that the tank itself takes up more space because it has to be designed as a pressure vessel (with thick walls and a strong structure) which can't fit neatly into the hull of the ship like a bunker tank.

However, this could be an ideal solution for ferries and short sea voyages.

"If you arrive every day at the same port, you could use a gas bunker station," said Dr Krapp.

"I can imagine we'll see gas ferries and gas feeders in the Baltics. We will see all ferries and small vessels in Norway running on gas."

There are environmental advantages to burning gas – all of the sulphur can be removed before the gas enters the fuel tanks, so it does not enter the atmosphere.

On the downside, if there is any release of methane to the atmosphere, it has a much stronger greenhouse gas effect per molecule than carbon dioxide.

In a gas engine, the gas must be ignited through the use of spark plugs or by

adding a small amount of diesel (approx 1 per cent diesel).

Diesel can ignite under pressure, which creates a spark to ignite the gas. This is considered safer than lighting the gas using spark plugs, as in a gasoline engine.

There are already designs for gas fired engines – which are used in land power stations – and this design has been adopted for use onboard ships by some manufacturers.

"It's a proven technology on land," noted Dr Krapp.

The first obstacle in this process would be getting approval from the IMO to allow gas as a fuel in international trade, he pointed out.

Under current IMO rules, any maritime fuel must have a flash point (vapour ignition temperature) of above 60 degrees C. The flashpoint of methane is -188 degrees C, so the challenge is to prove to IMO that gas powered vessels can be safe.

This work has been underway for some time. Finn Vogler, fuel cells project engineer with GL's department of risk assessment and mechanical engineering, expects that IMO's 'Provisions for gas-fuelled Ships' will come into force on July 1 2010 and allow for the approval of gas powered vessels by authorities.

The interim guideline for gas as ships' fuel has been submitted by IMO subcommittee BLG to IMO MSC-86 for adoption.

Heavy fuel

There is another good reason for developing gas propulsion for vessels – a forthcoming crunch in the supply of marine liquid fuel.

As the sulphur in heavy fuel oil can causes hazards to human health, authorities around the world feel that they have no option but to restrict its use.

Regulations are spreading rapidly – already ships have to run on fuels with no more than 0.1 per cent sulphur in EU ports, 1.5 per cent sulphur in the Baltic and North Sea, and an Emission Control Area has been submitted for the whole US and Canadian Coastline.

By the year 2020, the IMO plans to implement regulations saying that heavy fuel oil can't be burnt anywhere in the world. It will re-consider the plausibility of this in 2018, but people are already making plans for this regulation to be accepted.

If ships don't use heavy fuel, they use distilled fuel – i.e. fuel which has been boiled in a distillation column in a refinery.

This is similar to the type of fuel which is used for shoreside vehicles, so the shipping industry would be competing directly with car transportation for limited fuel supplies, which would probably push costs up.

Hydrogen power

One way to get rid of carbon dioxide emissions completely is to fuel the ship with hydrogen, so there are no CO2 emissions.

However, hydrogen still has to be sourced from somewhere – and currently most plans are for hydrogen to be made from natural gas, so carbon dioxide emissions would not be avoided.

Many people believe that hydrogen power is the only real solution for a post-oil age, whether it is created from wind, coal (with carbon capture) or hydropower.

The 'Alster Wasser', the world's first hydrogen / fuel cell powered vessel for more than 100 passengers, is already in operation on Hamburg's Alster Lake. The vessel has been built and operated within the scope of the EC-funded ZEMSHIP project.

Unlike a diesel engine, the fuel cells on a vessel like this operate silently. This has led to surprising discoveries about how much noise other parts of a vessel make.

The **Alster Wasser**, *powered with hydrogen fuel cells, is already operating on Hamburg's Alster Lake – Photo: HOCHBAHN*

On normal ships, the engine makes so much noise that nobody has worried about the noise which other components (such as pumps) make, Mr Vogler says.

But on the 'Alster Wasser', people were suddenly aware about how noisy the rest of the ship is – and reducing the overall noise has proved a complex exercise.

"As soon as they isolate one noise, they find 3 other noises," said Mr Vogler.

The vessel runs on two 48 kW fuel cells and stores hydrogen onboard in 12 x 350 bar (high pressure) hydrogen tanks. The hydrogen is actually supplied to the fuelling station as a liquid, and evaporated and compressed before being pumped onto the vessel.

Fuel cells have also been used in submarines built in Kiel. These submarines have proven successful because the fuel cells give the owner the benefit of increasing the duration of diving by a factor of 10.

GL has established published guidelines for using fuel cells on watercraft, having started as far back as 2003, and has certified a number of ships according to these guidelines, including the 'Alster Wasser'.

Hydrogen fuel cells are currently not available to power larger ships, but they are close. Development projects have been started and could result in fuel cells for seagoing ships with a power of 500 kW per unit within the next 5 years.

"GL is contributing to this development by participating in the SchIBZ and Pa-X-ell projects, which will start in July 2009," said Mr Vogler.

The available power of fuel cell systems will be enough to cover the auxiliary power needs of a large number of vessels – for example, a typical ROPAX (roll-on, roll-off, passenger carrying) ferry needs about 1.5 to 2 MW of constant auxiliary power from the total installed auxiliary power, which can be provided by 3 or 4 large fuel cells.

The biggest problem with fuel cells is managing sulphur in the hydrogen supply – it needs to be removed before entering the fuel cell because it can do a lot of damage.

There is no sulphur in hydrogen which comes from gas which has been liquefied (because the sulphur is removed in the liquefaction process check) and there is no sulphur in hydrogen produced by separating water with electricity (electrolysis).

Hydrogen might not be the technology for the immediate tomorrow, but has potential in the longer term.

"I think this is on the right track, but it will take some time," said Mr Vogler.

"We are getting much more interest in the technology. Every time the oil price rises – people say 'maybe we need another solution'."

It is unlikely that hydrogen will ever be directly stored onboard vessels, however, due to the amount of storage space required, Mr Vogler says.

If the hydrogen is made from reformed natural gas, this task could actually be completed onboard the vessel – so the vessel would have natural gas storage.

Research into the best methods of fuelling vessels with natural gas is already underway, as part of a project to produce an anticipated series of vessels which burn the natural gas in a combustion engine.

If the gas was reformed to hydrogen and then passed through a fuel cell to make electricity, it would be much easier to reduce emissions of NOx and SOx (nitrous and sulphur oxides), Mr Vogler says, and the overall efficiency could be similar to, or even better than, big diesel generators.

Demonstration projects

Three maritime demonstration projects are being planned using hydrogen on ships, funded by the German government.

The first project, SchIBZ (which stands for 'ship integration fuel cell' in German) is to install a fuel cell on a 90m vessel which carries paper from Scandinavia to Germany. The system will be installed by German shipbuilder Thyssen-Krupp Marine Systems.

The molten carbonate fuel cell to be used in this case operates at above 600 degrees C. It won't power the vessel's propulsion, but will power everything else – the 'auxiliaries', like pumps, lights and ramps.

This project will start on June 1 2009 and run for up to 4 years. The module will first be tested by Thyssen-Krupp Marine Systems before operation on board.

The fuelling system will use liquid fuels (generated from gas, biomass or coal) which are passed through an onboard reformer to make hydrogen, which then enters the fuel cell to create electricity.

The system is called "XTL" - which stands for X to Liquids – where the 'X' denotes different substances which might be used to make the liquid (like gas, biomass or coal).

The second project, called Pa-X-ell, starting in July 2009, will use a fuel cell running on natural gas on a vessel, but with the reformer included as part of the fuel cell rather than as a separate piece of equipment.

This project will be carried out by the yards Meyer Werft, Friedrich Lürssen Werft and Flensburger Schiffbau Gesellschaft.

The importance of the project is in its attempts to find ways to include a number of fuel cells and reformer units around the ship, so that if one is out of action, or if there is a fire in one part of the ship, there are others available which can get the vessel to port.

This configuration will probably use natural gas cooled down to a liquid.

The third project, Hy-ferry, being undertaken by Beluga Shipping, will look to install a polymer electrolyte membrane (PEM) fuel cell onboard 2 ferries running in coastal waters and in the port of Bremen, Germany.

This system will use gaseous hydrogen, generated from wind power, to create electricity which will then be used to electrolyse water.

All of these projects are funded by the German government, under a mother project called 'e4ships'. Further information about them (some in English) is available on the website www.now-gmbh.de.

Germanischer Lloyd's role in these projects is to provide safety analysis and consultancy, covering the fuel cells, reformer technology and overall safety assessment.

On the subject of hydrogen safety, Mr Vogler believes that it is no problem with today's technology.

"If you handle it right, it can be safer than gasoline," he said.

Germanischer Lloyd recommends double wall pipes, so the hydrogen will be contained if one pipeline fails. It is also important to avoid having an explosive mixture of hydrogen and air in the presence of a spark.

Hamburg has a number of other energy projects currently underway, including a number of forklift trucks at Hamburg airport running on hydrogen, and several hydrogen cars and hydrogen buses.

"People are very aware of the technology in Hamburg," said Mr Vogler.

A further project has been initiated to provide a fuel cell to a whale-watching vessel in Iceland, so it could keep auxiliary power running on the vessel while the engine was switched off during whale-watching. DS

Positioning – call for back-up

With Global Navigation Satellite Systems (GNSS) like GPS now so heavily depended upon in maritime navigation, are mariners in a position to cope if these systems are down? Dr Andy Norris examines the backup alternatives to satellite navigation

GPS has revolutionised ship navigation practices and makes a major contribution to the safety, environmental protection and fuel efficiency of the industry.

In the immediate future, GLONASS is set to provide a significant boost to ships' positional integrity and further improvements will come when the proposed Galileo and Compass systems come into full service.

There is no doubt that a well designed satellite navigation shipborne receiver system, consisting of a least two multiservice receivers, with associated use of augmentation, such as differential systems, will give a vastly improved level of integrity.

However, satellite based position fixing is vulnerable to various problems that could simultaneously affect all services and therefore a satellite-only system has inherent weaknesses.

The most common of these is interference, although even this remains relatively unusual (except in certain areas).

Other potential problems include intentional jamming (see page 50) and the possibility of multiple satellites being damaged in a solar particle 'storm'.

A backup service to satellite navigation is therefore seen to be valuable, especially if the system can automatically detect failures in the primary service and switch to the backup. However, it can be argued that existing procedures on ships are satisfactory, provided they are properly carried out.

These procedures involve regular checks on GPS position using visual, radar and dead-reckoning information.

As well as checking on GPS integrity this helps to maintain manual positioning skills, which become essential should the GPS-positioning system fail. Just as importantly, it is also a way of helping the OOW to keep fully aware of the current situation.

Some bridge officers have a misguided faith in simple GPS-only receivers, which has resulted in them being negligent in taking proper secondary position fixes to check integrity. Unfortunately, this neglect is the primary cause of some accidents.

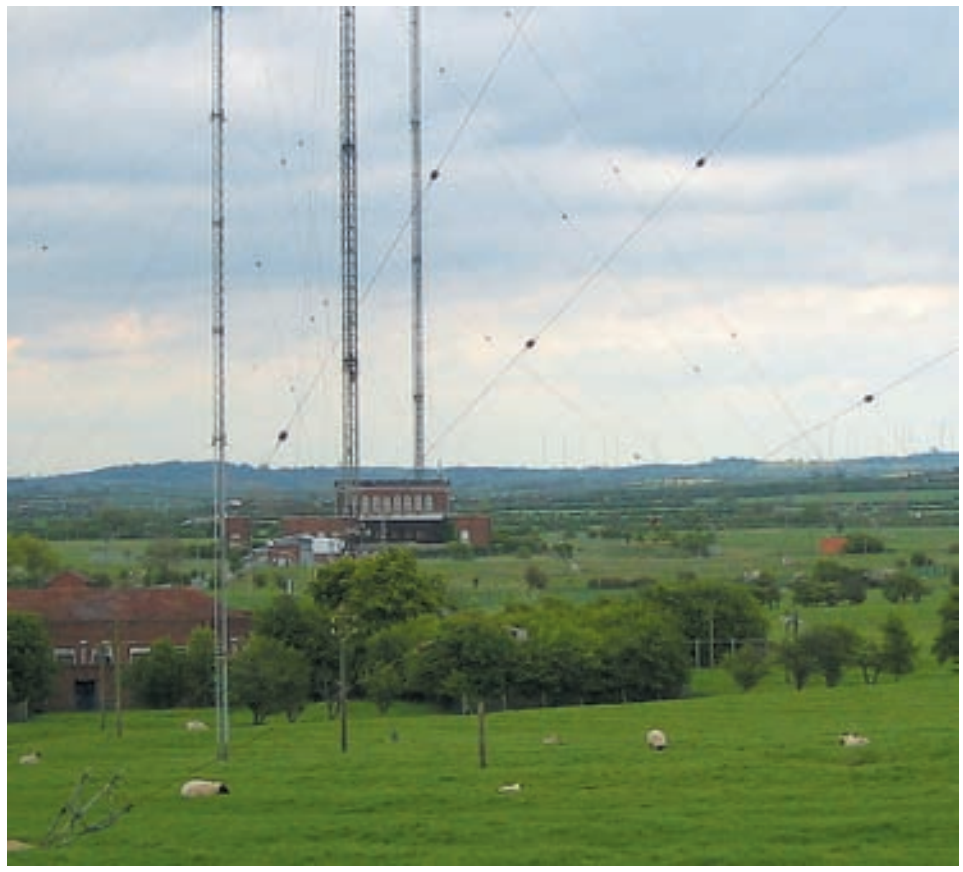
Higher integrity systems will help compensate for such poor practices but are bound to increase the number of bridge officers who consider that the system is infallible, thereby increasing the need for ever higher levels of automatic integrity checking and backup.

AIS and LRIT

As well as creating problems in determining one's own position, the lack of a satellite fix disables both AIS and LRIT. At sea, the lack of AIS signals from other ships is not a major hindrance to navigation because it mainly provides backup and additional information to radar and visual sightings.

Ships have no access to LRIT transmissions and therefore its disablement is not a problem onboard.

On shore, AIS plays a particularly important contribution to VTS. In many areas it provides the only indication of a ship on an operator's display, and so an AIS blackout would be highly detrimental.



The construction of Loran stations, like this one in the UK, requires significant investment – a difficult proposition during a financial crisis

Diverse commercial operations are also assisted by AIS, often supplied over the internet with global data, and would also suffer badly from area-wide satellite positioning problems.

Security services depend highly on AIS and increasingly on LRIT. The huge interest in AIS satellite surveillance techniques bears evidence to this and underlines the increasing need felt by governments to know all ships' positions accurately at any time.

These applications perhaps cry out even more loudly for a backup to satellite navigation systems than do ships – the latter already having acceptable systems in place, provided they are used properly.

eLoran

The need for backup to satellite navigation services is not just a maritime requirement. The common need of many applications has led to the concept of an enhanced Loran (eLoran) ground-based service.

An eLoran capability in a ship's electronic position fix system would enable an automatic switchover to occur if satellite services were disrupted, while warning the user of the change to a secondary system.

eLoran does seem to be a technically competent backup system, as being increasingly demonstrated at sea by the research team of the General Lighthouse Authorities (GLAs), who are demonstrating accuracies of the order of 10 metres.

The system does not share many characteristics with satellite navigation and so can be considered to be entirely independent – an essential requirement.

It uses ground stations with very tall antenna masts and transmits at powers of around 200kW. It therefore needs significant investment.

It is difficult to envisage a truly global service but it could cover large regions, providing governments are willing to collaborate and invest.

Even though eLoran would inevitably be a series of regional systems with optimum coverage only extending a hundred or so miles from the coastline, it also offers the potential of coarse positioning fixes thousands of miles from transmitters.

This uses the transmissions' sky-wave, perhaps being able to give about 1 mile accuracy in mid-Atlantic, which is still of great use.

Unfortunately, with the change in administration, the US has recently announced that it will be switching off its Loran service in 2010 to save $190 million over the next five years.

This does not bode well for a future upgrade to eLoran despite all US Loran stations being recently upgraded with caesium clocks, an important requirement for eLoran.

Nobody has managed to get a statement from the US authorities as to how this decision relates to eLoran, although the US appears to continue to see the need for a backup to GPS.

It is perhaps unlikely that Europe will go forward with eLoran without parallel commitments in the US. All governments are trying to save money in this time of financial strain.

What alternatives are there?

In fact, the VLF technology used by eLoran-like systems is effectively the only non-satellite method that can create a quasi-global electronic position-fix system, although a number of technologies can be used for short range backups.

What may be of particular use to mariners are ship-autonomous backup systems.

The first of these is the possibility of the enhanced use of radar. Chart radars are able to display radar data over an ENC underlay.

A future requirement could be incorporated to allow suitable ground fixed targets with known positional coordinates to be used to reference the radar picture to the ENC, when there was a failure in the main positioning system.

By tracking these targets the radar could automatically calculate the positional coordinates of the ship and send this data to other navigational equipment, particularly the ECDIS. In fact by using gyro stabilisation the system would satisfactorily operate with just one ground referenced target.

Suitable targets would ideally be identified by racons. Their position could perhaps be automatically downloaded from an associated AIS AtoN, with the information being 'hard-wired', rather than satellite derived.

This technique is likely to be able to give accuracies of a few tens of metres but is clearly limited to coastal or buoyed areas.

Use of inertial sensors

Another alternative is to develop good automatic dead-reckoning systems.

It is clear that estimated position techniques used by experienced mariners when there has been an onboard GPS equipment failure has allowed ships to travel thousands of miles of ocean passage safely and make a landfall 'with an accuracy of around 20 miles', in conditions where celestial navigation has

not been possible.

A study by the University of Nottingham for the GLAs in 2007 looked at using inertial sensors as a backup to GPS. It concluded that in the foreseeable future affordable systems would only be able to give a useful position over timescales measured in just minutes.

It assumed that GPS-aiding would be used, which continuously calibrates the sensor to the point that an outage occurs.

However, the ability of skilled human navigators to do a considerably better job, aided by conventional systems such as the gyrocompass and speed log, suggests that a far better automatic system is feasible.

Research should therefore be carried out to couple the long term stability of the gyrocompass and speed log with the short term stability of an affordable inertial measurement unit.

With digital current 'tables', wind measurement inputs and an appropriate digital model of the ship's handling characteristics it may be possible to design an automatic dead reckoning system that could be quite accurate over several hours – say to several hundred metres – and perhaps with a useful accuracy of several miles over several days.

Taking both the radar and postulated inertial-based system together they are likely to form the basis of a good alternative if eLoran does not get widely adopted.

DS

Dr Andy Norris has been well-known in the maritime navigation industry for a number of years. He has spent much of his time managing high-tech navigation companies but now he is working on broader issues within the navigational world, providing both technical and business consultancy to the industry, governmental bodies and maritime organizations. Email: apnorris@globalnet.co.uk

Globalstar and Blue Oceans launch vessel monitoring

www.globalstar.com
www.blueoceans.ca

Globalstar and Blue Oceans Satellite Systems have launched the Skyhawk M9601, a satellite-based global asset tracking and vessel monitoring system (VMS).

The Skyhawk M9601 utilises the Globalstar Simplex data network for transmission of vessel position, and is aimed at commercial fishing operators looking to meet government vessel monitoring and tracking requirements in coastal waters out to 300 miles.

The system transmits real-time GPS location monitoring data to a government-based tracking office, providing maritime authorities with the ability to monitor the location of commercial fishing vessels operating in regulated waters.

If a vessel is found to be in restricted waters, it is then contacted with an appropriate message or instructions.

"In Panama the Skyhawk M9601 provides commercial operators with a method of economically meeting the VMS requirements mandated by the government-based Autoridad de Recursos Acuaticos de Panama, or ARAP," said Tom Colby, COO of Globalstar.

"Our previous vessel monitoring solutions have been successful in other maritime markets, and last year we began marketing Blue Oceans' newest product in Panama. In just a few short months Globalstar Panama has managed to capture approximately 40 per cent of the Panamanian commercial fishing market."

Telemedicine system completes Iridium testing

www.telemedicsystems.com

TeleMedic Systems reports that its new VitalLink3 medical vital signs monitoring system has successfully completed testing over Iridium's communication network, and is now available to support mobile medical data transmissions anywhere in the world.

Designed to be a universal interface between medical devices and IT systems, the VitalLink3 acts as a communication gateway for the dissemination of acquired medical data and the integration of other specialist medical/IT systems, whether the patient is on a vessel at sea or in any other remote location.

The portal allows medical professionals to have remote access to vital diagnostic data, which can be integrated with patient records. Audit trails of actual or attempted access to any part of the system can also be created to ensure security.

"Leveraging the Iridium satellite network, we can now extend the reach of our telemedicine solutions to users who are beyond the reach of terrestrial wireless networks – from health workers in Africa to search-and-rescue teams in Alaska, from aviators flying across Antarctica to sailors on the high seas," said TeleMedic Systems CEO, Alasdair MacDonald.

Greg Ewert, executive vice president of global distribution channels, Iridium, added: "TeleMedic's VitalLink3 is a good example of how Iridium's service partners and integrators are leveraging our universal connectivity to create innovative solutions for tracking, monitoring and telematic applications around the globe."

UKHO reaches ENC agreement with China

www.ukho.gov.uk

The United Kingdom Hydrographic Office (UKHO) has signed an agreement with the Chinese MSA to licence official chart data from the Chinese government for inclusion within its Admiralty Vector Chart Service (AVCS).

The addition of the new data means that AVCS users will able to take advantage of official ENCs (electronic navigational charts) when sailing to and from Hong Kong and the Chinese mainland, and will have access to a single official vector solution for complete passages through the Far East.

These ENCs will be immediately available under a 'pay-as-you-go' system, whereby the navigator downloads the relevant ENC cells as and when they are required, and only starts paying for the licence from that point.

"The data covers the huge area of Chinese coastal waters and all the country's major ports," explained AVCS product manager, Jason Scholey.

"Some 252 new ENCs have been added and will be available to buy from 30 April 2009. Users can get immediate access to them using our flexible licensing system as they need them, with weekly updates also supplied in the normal way."

"Existing AVCS customers that have already purchased AVCS folios in Chinese waters will automatically receive the new Chinese coverage within the price of their subscription."

The AVCS system now comprises over 9,500 ENCs, covering major trade lanes between approximately 1,795 of the world's major ports.

GPS satellite system 'could fail in 2010' says US government report

A report by the US government accountability office (GAO) has raised some alarming questions about the ongoing viability of the Global Positioning System, or GPS, under current system maintenance plans, and has warned that potential failures in the system could be seen as early as next year.

Having been asked to undertake a broad review of the state of GPS by US authorities, GAO's report on the situation suggests that there are serious doubts about the ability of the US Air Force, responsible for overseeing the network and future GPS satellite acquisitions, "to acquire new satellites in time to maintain current GPS service without interruption."

The report warns that, while this would be a serious issue for the military, there is also the potential for civilian users of the positioning system, including the maritime industry, to be "adversely affected" by the developing problems.

GAO says that the Air Force "has struggled to successfully build GPS satellites within cost and schedule goals; it encountered significant technical problems that still threaten its delivery schedule; and it struggled with a different contractor."

"As a result, [the GPS satellite replacement programme] has overrun its original cost estimate by about $870 million and the launch of its first satellite has been delayed to November 2009 – almost 3 years late."

In addition to the problems with satellite acquisitions, the report also notes that the Air Force has "not been fully successful in synchronising the acquisition and development of the next generation of GPS satellites with the ground control and user equipment."

The consequences of these delays could be felt in the very near future, according to the report. The GPS network itself is approximately 20 years old, and needs an overhaul to maintain the required level of service availability.

GAO says that, if the scheduled goals set out under the satellite programme are not met, "there will be an increased likelihood that in 2010, as old satellites begin to fail, the overall GPS constellation will fall below the number of satellites required to provide the level of GPS service that the US government commits to."

While it seems inconceivable that the US government would allow a system like GPS to fail, with it being depended upon by so many and of huge military significance, questions will continue to be asked until the satellite replacement programme is underway and scheduled improvements are back on track.

Such a development may also spur on the European Union's development of its own global satellite positioning system Galileo, which has itself been plagued by problems since the outset but is currently set to commence roll-out in 2010.

Vessel operators will be hopeful that at least one of these systems is operationally viable come the end of next year.

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