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# THE NAVAL ARCHITECT



This month's issue includes an extensive report on Romania's marine industries in all their diversity. A survey of leading yards sees shipbuilders steeped in orders, with entrance into the EU seemingly having had little impact.

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**WÄRTSILÄ**

# The case for mandatory Ecdis

**I**F Electronic Chart Display and Information Systems (Ecdis) were to be made mandatory onboard ships, the number of groundings would likely be reduced by a third, according to a new study carried out by DNV.

The class body says that the effect of Ecdis has been documented in previous studies, but uncertainty has remained relating to the coverage of electronic nautical charts on which Ecdis performance depends, which some have claimed is still inadequate.

When preparing for the next meeting of the International Maritime Organization's committee on Safety of Navigation, DNV's researchers were asked by Denmark, Finland, Norway, and Sweden to assess the adequacy of the electronic nautical chart coverage.

DNV says it has already documented the fact that Ecdis is a preventive measure, reducing the probability of grounding by well above one third when electronic nautical charts are available.

Two previous studies on navigational safety have been reported to IMO where the effects of Ecdis have been evaluated in particular. These studies focused on large passenger ships and on other ship types such as oil tankers, product tankers, and bulk carriers. The conclusions arrived at were:

a. Ecdis is a cost effective risk control option for large passenger ships, with a significant potential to save lives

risk-reducing potential. This perception bias, according to DNV, is considered one of the major obstacles faced by advocates of a mandatory Ecdis carriage requirement.

In fact, one of the key findings of the new DNV study is that the coverage of electronic charts in coastal waters is already very good and improving.

The class body says that the global coverage of suitable electronic navigational charts in coastal areas now lies between 84% and 96% and that this is expected to increase to 87%–98% within a few years. The coverage of suitable electronic navigational charts along selected routes considered representative of worldwide shipping varies between a minimum of 28% and a maximum of 100%. Some 36% of the selected representative routes already have 100% coverage in coastal areas, according to DNV. For five of the seven routes currently without 100% coverage, an increase in coverage is planned for the near future.

'These results support that an Electronic Chart Display and Information System should be implemented as a mandatory requirement for most ships,' comments DNV's chief executive Henrik O Madsen. 'Besides, the more ships that install such equipment, the more electronic charts are likely to be produced.'

It is the common view of those administrations behind the report that a lack of electronic navigational chart coverage should no longer be seen as a reason not to introduce mandatory Ecdis carriage requirements, since the current electronic navigational chart coverage is hereby shown to be sufficient.

The DNV report, which used the Formal Safety Assessment and the IMO risk evaluation criteria, concluded by recommending a relatively fast implementation plan.

Based on current cost efficiency criteria used at IMO, DNV is recommending that Ecdis should be made mandatory for all new oil tankers of 500gt and upwards, should be made mandatory for all new cargo ships, other than oil tankers, of 3000gt and upwards, should be made mandatory for all existing oil tankers of 3000gt and upwards, and should be made mandatory for all existing cargo ships, other than oil tankers 10,000gt and upwards.

It acknowledges that exemptions may be given to existing oil tankers of less than 10,000gt and existing cargo ships, other than oil tankers, less than 50,000gt when such ships will be taken permanently out of service within five years after the implementation.

All this is not to say that DNV is promoting the adoption of new technology for technology's sake. There are areas of concern regarding the way IT systems onboard ships integrate, according to Mr Madsen. He tells this month's *The Naval Architect* that information collected by the class body points to an increasing number of near accidents that were to do with the IT systems rather than the operator (see feature article, pp18-19).

'It is easy enough to blame human error when an accident happens,' says Mr Madsen, 'but it is preferable to look at root causes. Was there a lack of competence or of training, or were the IT systems too difficult to operate?'

Steering gear problems that have led to groundings can often be traced to software problems, either because of the way different software packages on the bridge interacted (or rather, did not).

'Let's be honest, at the sea trial stage parameters are set and systems are programmed, and the documentation is not great. The way one signal affects another system can be an unknown.'

Napoli, classed by DNV.



by reducing the frequency of collision and grounding.

b. Ecdis is a cost effective risk control option for all other vessel types engaged in international trade, with the exception of the smallest vessels.

c. The potential for saving lives is small for cargo ships, but Ecdis represents a net economic benefit in itself.

However, the previous studies did not consider the coverage of electronic navigational charts in detail or the effect of this coverage on Ecdis performance, and the simplifications, and this introduced uncertainty.

The current study was initiated in order to investigate this in more detail, and to evaluate the effect of Ecdis given the actual coverage of electronic navigational charts.

As DNV points out, for many ship types, collision is the dominant risk, while grounding is second.

The motivation for the study has thus been to challenge the common industry perception that the lack of global electronic nautical chart coverage is diluting Ecdis's

## International cooperation on ship design

**A**KER Yards, Rolls Royce Marine, and DNV have joined forces with the Norwegian University of Science and Technology (NTNU) to build a core research and educational team studying, 'The effective design of ships for the future.'

The intention is for the industry to be better prepared to meet increased focus upon environmental performance and onboard working conditions. The team will be made up of five graduate engineers, along with two post doctorate positions, and 10 – 15 students with MSc degrees.

End-user needs for new designs will change, so the group will be researching how to meet and exceed these needs, in order to prepare vessels for a long life. Also under consideration will be state-of-the-art design and production technologies, as well as processes, to enhance quality and cost-effectiveness.

Tor E Svensen, chief operating officer DNV Maritime commented: 'Through this initiative, we intend to further strengthen our position by attracting the most competent people and building the knowledge and process to enhance the ability of Norwegian-based maritime companies to compete internationally.'

Through this initiative, Aker Yards, Rolls Royce Marine, and DNV will support NTNU by providing funding, active involvement in factual cases, and close cooperation between the research and education environment, and the industry partners.

### MAN ENGINES BREAK THROUGH

THE first order for MAN Diesel's 1000kW per cylinder, 51/60DF dual-fuel, four-stroke engine for liquefied natural gas (LNG) carriers has been placed by a Spanish owner. Building at STX Shipbuilding, Korea, the 173,600m<sup>3</sup> carrier is claimed to be the largest ever commissioned with electric propulsion, based on five of MAN's dual fuel engines.

An innovative propulsion arrangement is intended to give the vessel a higher degree of redundancy in terms of maintenance while sailing, and takes advantage of the 51/60DF engine's multiple fuelling options. These comprise a gaseous fuel mode, in which LNG boil-off gas is ignited by pilot injection of marine diesel oil (MDO), as well as two liquid fuel modes in which the engine can operate on either 100% MDO or 100% heavy fuel oil main injection.

The engine is rated at 8000kW at 514rev/min, and will be built in Augsburg, scheduled for delivery in early 2009. Vessel delivery is subsequently planned for mid 2010.

Another contract won by MAN is for complete propulsion packages based on its medium-speed 48/60CR common rail engine, to be installed aboard two new Stena Line ferries. The two new ferries are to be built by Aker Yards Group, and will be 240m long, weighing 62,000gt, featuring 5500m of trailer lanes and 700m of car lanes, with a 1200 passenger capacity. Delivery is scheduled for the 1st and 3rd quarters of 2010.

The engines offer 1200kW per cylinder at 500rev/min and are used in a four engine, twin propulsion train diesel mechanical system. In a 'father and son' engine arrangement, each train consists of one inline eight cylinder 8L48/60 CR and one six cylinder 6L48/60 CR connected by a twin input shaft, single output shaft type NDSHL-3400 double reduction gear from Renk AG. The gears also feature shaft alternators driven from 3000kW power take offs.



51/60DF dual-fuel, four-stroke engine from MAN Diesel for liquefied natural gas (LNG) carriers.

Completing the MAN Diesel propulsion packages are twin 5.2m type VBS1560, controllable pitch propellers, 41m shaft lines and ODF servo systems, together with the Alphatronic 2000 propulsion control and management system for engine control room, main bridge, and bridge wing consoles.

The overall machinery package of each vessel is completed by MAN Diesel GenSets, with each vessel featuring four generator sets based on one 7L21/31 and three 6L21/31 engines.

### LIGHTWEIGHT CONCEPT COULD INCREASE RO-PAX CAPACITY

A NEW lightweight sandwich composite concept may reduce the weight of a ro-pax superstructure by up to 60%, compared to a traditional steel design, giving increased loading capacity and operator profits.

A recent amendment to the SOLAS regulations means that merchant ships can now be constructed using alternative arrangements to non-combustible materials, provided that adequate safety is demonstrated by an engineering analysis.

DNV, together with Stena, FiReCo, and Brødrene Aa have researched the material, taking into account structural fire protection and other risk control measures. Stena applied the technology to one of its existing ships, and believes two years of operation would cover the slightly higher building costs.

A risk-based design process has been performed in which the risks were estimated based on available fire statistics and evacuation simulations, among other factors. A range of risk control options was studied, with the cost-effective ones adopted, and an acceptable level of safety was documented.

This concept is one of eight being considered within the partially EU-funded SAFEDOR programme.

### SANDWICH DE-LIGHT

ELSEWHERE, a research project has been launched to develop technologies and applications for lightweight sandwich materials in the transport sector, including the marine and container industries. DE-LIGHT Transport is a multi-national initiative supported by the European Commission's Framework 6 programme.

Sandwich materials consist of two thin facings separated by a low density core, and can be used to produce structures which are light and stiff. Parts reduction can also be achieved through design integration, improved surface finish, and lower assembly and outfitting costs.

DE-LIGHT Transport aims to promote the use of sandwich materials by developing a multi-material sandwich design tool, strategies for joining, assembly, and outfitting, plus testing and validation procedures. These technologies will be demonstrated within the project through the design and manufacture of six prototype structures, incorporating deck and deckhouse structures, and a freight container. Risk-based design principals will be applied throughout to ensure that the new designs comply with existing regulatory frameworks.

It is anticipated that DE-LIGHT Transport will provide vessel designers with practical approaches to the implementation of sandwich solutions as an alternative to traditional stiffened-plate designs. The aim is to unlock the benefits of sandwich construction for a wider range of applications.

### NEWBUILD PIPELAY VESSEL ORDERED

THE Larsen & Toubro/Sapura Crest Petroleum Bhd joint venture has ordered an innovative heavy-lift/pipelay vessel designed by Sea of Solutions, part of the Offshore Ship Designers Group. The S2500 model, thought to be worth US\$138m, will be built by ASL Marine, Singapore, for delivery in 2009.

The design is a customised version of Sea of Solutions' Seabarge 3000, featuring a more shipshape hull and bulbous bow, increasing transit speed and generating additional space for the 10-point mooring system. It can also be upgraded to DP lay-out.

Deltamarine of Finland also assisted with this project, and a centre firing line with six single joint welding stations to optimise pipelaying operations was included. The vessel is also equipped with a 3000 short ton single post crane.

The design innovations are intended to speed up operations and deliver cost savings to operators.

### WÄRTSILÄ EXPANDS IN VIETNAM

A CONTRACT for propulsion systems to be installed in five chemical tankers has been awarded to Wärtsilä by Vietnam Shipbuilding Industry Corp (Vinashin). The vessels will be built at the Pha Rung Shipyard in Haiphong, for Iason Hellenic Shipping Co Ltd, Greece, and the equipment will be delivered during 2008-2010.

The package includes a five-bladed fixed-pitch propeller of 4.30m diameter, shafting, and stern-tube – including seals, bearings, and an intermediate shaft bearing.

Another Vinashin contract for Wärtsilä involves propulsion systems for eight car carriers to be built for Ray Car Carriers Ltd, Israel. For each vessel Wärtsilä will deliver a five-bladed FP propeller of 6.45m diameter, together with shafting, stern-tube seals, shaft bearings, and two 1000kW transverse thrusters.

The 4900 car capacity carriers will have car decks of 41,000m<sup>2</sup>, an overall length of 185.6m, a beam of 32.26m, and design draught of 8.4m. They will be delivered from September 2008 onwards.

Wärtsilä's first Vietnamese propeller order was for 5.6m diameter propellers to be fitted on five Diamond 34K bulk carriers under construction at the Pha Rung shipyard for Graig Group, UK. The package included shafting and Wärtsilä's JMT Sternguard type seals, with the first vessel being delivered in November this year.

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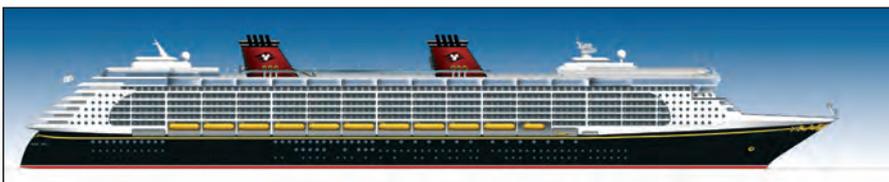
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Design drawing for the latest cruiseships to be ordered by Disney.

During 2006 Wärtsilä received orders for six-cylinder RT-flex50 common-rail low-speed engines for three 56,000dwt handymax bulk carriers, building at Nam Trieu shipyard for Dutch owners. Vinashin also ordered six-cylinder Wärtsilä RTA62U-B low-speed engines for four 1700TEU vessels constructed by Vietnamese owners.

**AKER CABINS' FRENCH LAUNCH**

AKER Yards Cabins has been launched in France, and should benefit from its Finnish head office's experience in research and development, design, production, sourcing, and human resources. Both units are aiming to develop synergies in these areas.

Damien Flichy, appointed managing director of Aker Yards Cabins SAS, noted: 'Sharing our best practices with our Finnish colleagues, we plan to become the preferred partner of shipowners and shipyards.'

Located in Montoir, near St Nazaire, the French unit has around 120 employees and five lines of production. By the end of the year, the 22,000m<sup>2</sup> factory will have eight production lines and plans

to hire 50 more staff. Aker Yards Cabins, France, will provide cabins for all passenger vessels of Aker Yards, France.

**HOPPER WORK FOR BOSKALIS**

DREDGING contractor Royal Boskalis Westminster is investing around €450 million in equipment, including a new 40,000m<sup>3</sup> capacity mega trailing suction hopper dredger as a replacement for *W D Fairway*, which was involved in a collision in China. IHC Holland has been contracted, and the ship will be completed in 2011.

A constructive total loss of *W D Fairway* means that Boskalis will receive insurance payments of more than €165 million, with the financial settlement leading to a positive result of approximately €85 million before taxation.

Two large trailing suction hopper dredgers, each with a capacity of 12,000m<sup>3</sup>, will also be constructed for Boskalis by IHC Holland. The ships will be completed in 2009 and 2011 respectively, and are part of a newbuilding programme aiming to provide new capacity in response to increasing market demand.

**TWO CRUISESHIPS FOR DISNEY**

DISNEY Cruise Line has placed a firm contract with Meyer Werft, Germany, for two cruiseships, following the letter of intent in February this year.

The newbuildings, yard numbers S 687 and S 688, will have a tonnage of 124,000gt, and are scheduled for delivery in 2011 and 2012. Each ship will have a length overall of 339.8m, a breadth of 37m, and a cabin capacity of 1250 persons.

'This makes the shipyard's workload last well into the next decade,' commented Bernard Meyer, managing partner, Meyer Werft.

**SCM GOES FOR AUTOHYDRO**

SHIPS Classification of Malaysia (SCM) has installed the hydrostatics and stability programme, Autohydro, from Autoship Systems Corp (ASC), Canada. Version 6.1 will be used to check the stability of ships under SCM's registry.

This version introduced new features such as DXF Import of components for the Geometry File (GF). The user can treat the component as if it were created in Modelmaker, and manipulate its offsets values to fair the shape, add tanks and superstructure, and then save as a GF.

It is claimed that Autohydro will allow SCM to quickly develop the ship model and perform various intact and damage calculations, such as stability, longitudinal strength, and survivability.



A hard hat, a flashlight and sound, professional judgement will always form the bedrock of effective classification services.

SCM now has a total of 441 ships under its class register to date, with a combined gross tonnage of approximately 300,000.

#### TWO RO-RO VESSELS FOR BORE

AS part of its fleet renewal programme, Bore has signed a contract for two new ro-ro vessels, with Flensburg Schiffbau-Gesellschaft mbH & Co KG, Germany. The two vessels will be delivered in May and August 2011 respectively, with another two on option.

They will have a capacity of 2900 lane metres each, will be able to accommodate double-stacked containers on all decks, and can also be equipped with hoistable car decks. With an overall length of 195m, a breadth of 26m, and a design draft of 7.05m, the deadweight will be about 13tonnes.

The vessels will comply with the rules of the Finnish Swedish ice class 1A, fulfil the latest safety and environmental rules, and be able to operate at a speed of up to 19knots with efficient bunker consumption. The overall investment in these vessels is an estimated €100 million.

#### REGASIFICATION PLANT CONTRACT FOR HAMWORTHY

SAMSUNG Heavy Industries has ordered onboard vaporiser systems for two 145,000m<sup>3</sup> shuttle regasification vessels (SRVs), plus one option, from Hamworthy plc. The vessels will serve the Neptune LNG deepwater terminal, to be sited about 35km north east of Boston, USA.

Hamworthy will supply three regasification skids per ship, and each shipset will have a capacity of 210tonnes/hr of LNG with a send-out pressure

The EctoSys disinfection system has been acquired by RWO. This disinfection process is part of the RWO ballast water treatment system, CleanBallast.

of 115bar. The regasification process is based on technology developed by Hamworthy in conjunction with Höegh LNG, and it has already been tested in a prototype test plant in Norway, which was another joint project between the companies.

The US\$290 million SRVs were ordered by Höegh on behalf of a 50/50 joint venture with MOL. The vessels will be delivered in 2009 and 2010, and an option exists for a third ship. The average send-out capacity of each SRV will be 11 million m<sup>3</sup> per day, with a peak capacity of approximately 21 million m<sup>3</sup>.

#### RWO ACQUIRES DISINFECTION SYSTEM

THE EctoSys electrochemical water treatment system has been acquired by RWO GmbH Marine Water Technology, Germany. Permascand AB, Sweden, sold the intellectual property-rights and know-how, and the technology is now due to be applied as a component of RWO's treatment system for ballast water on ships, CleanBallast.

The system treats water using an electrochemical process inline the pipe. A contaminated water stream is fed to the electrolytic cell, containing pairs of electrodes perpendicularly to the flow, with a direct current supplied to the cell. Specific



electrodes with high oxygen over potential are utilised, which results in production of different short-lived disinfectants such as hydroxyl radical directly into the water.

Using this process, flows up to 500m<sup>3</sup> per hour can be purified from organisms and bacteria, with a single EctoSys module. Several modules can be connected to treat larger volumes. 

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# The rise of cold water cruising

THE cruise line industry is increasingly seeing more specialist destinations – away from traditional tropical and warm waters. A newer type of clientele is choosing destinations such as Canada, the Polar Regions, and the Baltic Sea around St Petersburg when the winter sea ice relents.

This move brings with it different issues in passenger safety. In contrast to cruising in tropical waters, sailing in cold waters presents different challenges in rescue situations. The effect of low temperatures and hypothermia is a critical issue for people who evacuate into the water. Within minutes, blood rushes away from the extremities making evacuees unable to even grab onto lines or haul themselves up using ladders or the like. People can become hypothermic in less than an hour, depending on their clothing, size, and level of fitness, and expected survival time can be just three hours in 15°C water.

The problem is escalated as passenger numbers increase, potentially rendering many traditional methods of passenger retrieval too slow to avoid hypothermia and resulting loss of life. In the time it takes to rescue hundreds or maybe even thousands of waterborne evacuees, hundreds could

potentially die from the effects of hypothermia. A lifejacket will keep them afloat but it will not offer much protection from the cold.

As the Baltic Sea and St Petersburg rise in popularity, Russian authorities are demonstrating that they take passenger safety seriously, and are addressing the problem of mass evacuation from cold water.

The Russian state-owned company, Rosmorport, is installing Viking evacuation slides on their new ice breakers, the first of which, *Moskva* is due for delivery from the Baltiyski Zavod yard in St Petersburg this year. During the winter the vessels will serve as ice breakers, and in the summer months when cruise vessels sail into St Petersburg the ships will act as standby rescue vessels.

Should the unthinkable happen and a large number of passengers evacuate into the cold water, *Moskva* will launch the Viking evacuation slide (VES). Evacuees will be rescued from the water and will be able to pull themselves up the slide using ropes that run its entire length. A large number of people can be evacuated from the water much faster than by man overboard boat – critical in areas where water is cold throughout the year.



Should the unthinkable happen and a large number of passengers evacuate into the cold water, *Moskva* will launch the Viking evacuation slide.

The slide can even be deployed in very heavy weather conditions, not uncommon in cold water areas.

Even in high summer, the sea temperature around St Petersburg and the Gulf of Finland is only around 16°C. Waterborne evacuees can become hypothermic in just 1-2 hours (depending on individual weight, size, and fitness). It is critical that those suffering from hypothermia remain as horizontal as possible to avoid cold shock.

The slide system from Viking for *Moskva* is equipped with stretchers and winches that allow evacuees to be hoisted up the slide in a lying position to help prevent cold blood from the extremities reaching inner organs that can potentially cause heart failure.

The International Maritime Organization (IMO) is currently discussing the issue of mass rescue from evacuated ships, and the subject is increasingly the matter for discussion after the cruise vessel, *Sea Diamond*, struck an underwater volcanic reef off the Greek island of Santorini and sank. It took local fishermen, coast guards, nearby ferries, and the Greek military three hours to evacuate the vessel, which finally sank 15 hours after hitting the submerged rim of the ancient volcano.

In cold waters, such slow rescue by small vessels may not be an option as the risk of hypothermia and poor conditions may limit survivability. Viking, for one, expressed the hope that organisations such as IMO (their sub-committee on ship design and equipment is expected to outline a draft proposal by 2008) and national authorities will address the issue and begin to follow the example of the Russian authorities and their adoption of evacuation slides as rescue equipment.

TECHNICAL PARTICULARS	
1ST VESSEL	
Company:.....	Rosmorport
Vessel name:.....	<i>Moskva</i>
Vessel type:.....	Multi purpose vessel (Winter: Ice Breaker Summer: Rescue Vessel)
Flag:.....	Russia
Homeport:.....	St Petersburg
Area of engagement:.....	Gulf of Finland
Yard:.....	Baltiyski Zavod, St Petersburg
Built year:.....	2005-2007
Length:.....	116m
Breadth: .....	26.5m
Draft, design: .....	8.5m
VIKING supply:.....	2 x VIKING VES-ED MOR (VIKING Evacuation Slide as Means of Rescue)
	Each consisting of;
	- Single track slide with 1 x 50 pers. platform
	- Hydraulic hoisting winch with special stretcher 4 x 16DK liferafts
VIKING delivery:.....	November 2006

TECHNICAL PARTICULARS	
2ND VESSEL	
Company:.....	Rosmorport
Vessel name:.....	<i>Sankt-Petersburg</i>
Vessel type:.....	Multi purpose vessel (Winter: Ice Breaker Summer: Rescue Vessel)
Flag:.....	Russia
Homeport:.....	St Petersburg
Area of engagement:.....	Gulf of Finland
Yard:.....	Baltiyski Zavod, St Petersburg
Built year:.....	2006-2008
Length:.....	116m
Breadth: .....	26.5m
Draft, design: .....	8.5m
VIKING supply:.....	2 x VIKING VES-ED MOR (VIKING Evacuation Slide as Means of Rescue)
	Each consisting of;
	- Single track slide with 1 x 50 pers. platform
	- Hydraulic hoisting winch with special stretcher 4 x 16DK liferafts
VIKING delivery:.....	September 2007

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## Future uncertainty over emissions reduction

DEBATE still surrounds the way forward with regard to reducing exhaust emissions in the marine industry, writes *Clare Nicholls*. With the North Sea Sulphur Emissions Control Area (SECA) due to enter into force on 22 November this year, and compliance to MARPOL Annex VI and the upcoming 2005/33/EC directive from the EU relating to the sulphur content of marine gas oil (MGO) generating discussion, voices from many sides are proposing various methods of obtaining emissions reduction.

Globally there are many different regulations which demand compliance, and the variation of standards and limits is creating confusion. The Baltic and forthcoming North Sea SECAs set a limit of 1.5% m/m sulphur content in fuel oil, whereas the USA is close to incorporating MARPOL Annex VI as law, which only requires a 4.5% m/m limit.

MARPOL Annex VI was finally ratified by 41 states in May 2006 after an eight year wait, but the 4.5% limit looks to have become rather lenient in the intervening years, as technology and climate change issues have moved on. The UK already ratified the regulations in August 2004, but the drawing up of its own merchant shipping regulations will be behind schedule, as it intends to include the implications of the 2005/33/EC directive.

The EU directive sets a limit of 1.5% sulphur content in fuel oil in the waters of a member state, and applies to passenger ships only. It was introduced in August 2006, and is due to be enforced in August 2007. Colin Thomas, marine surveyor, environmental quality branch of the UK's Maritime and Coastguard Agency (MCA), claimed that the UK would not be able to make the August deadline due to its regulations re-write, as originally the EU legislation did not apply to MGO.

Discussion regarding the interpretation of 2005/33/EC has also taken place, as the wording of the directive was changed. The text previously stated that the sulphur emission limit applied to passenger ships on regular service 'between any European port'. However, it has since been modified to 'to and from any European port'. The UK's MCA had signed up to the agreement on the basis of non-inclusion of cruiseships, but with the text change, there has been debate as to whether a cruiseship sailing from a European port would have to comply when it moves outside of European waters.

### Methods of reducing emissions

Using low sulphur fuel is one option available in the move to cut emissions. The Hong Kong Shipowners Association chairman, David Koo, speaking at a Royal Institution of Naval Architects function in November 2006, backed calls to move to cleaner fuels. He also questioned shipping's arrangement with the oil majors, which sees the global commercial fleet burn the lowest quality, albeit cheaper, fuel.

All ferries on the Dover to Calais route use low sulphur fuels as the waters around the port of Dover are designated as an air quality



Trials of scrubber technology took place onboard *Pride of Kent*.

management area. This sets a 1.5% m/m SOx limit, in line with the EU directive, but there has been discussion surrounding reducing the limit even further. MCA's Mr Thomas queried the need for a reduction as sulphur levels around Dover have never breached the requirements for longer than one 15 minute measurement period, since low sulphur fuels were introduced.

Alternatives to SECAs are being suggested as well. Intertanko recently proposed that all ships should burn low sulphur distillate instead of residual fuel to reduce emissions. This would negate the need for SECAs, as a uniform global standard would be applied. Furthermore, the US introduced the idea of NOx emissions control areas to the IMO, but the concept has faced opposition.

The International Chamber of Shipping believes that existing engines could not be upgraded to meet NOx restrictions, however, and that these particular engines would need to be identified. It points out that engines may also lose efficiency through NOx reduction, which would force owners to burn more fuel, increasing CO<sub>2</sub> output.

An alternative technique to limit sulphur emissions has been developing in the shape of exhaust gas scrubbing, with extended trials taking place aboard the P&O Ferries vessel *Pride of Kent*. Speaking at Cruise and Ferry 2007 in April, Mike Langley, the company's fleet manager, described how the fitting of a first generation ecosilencer scrubber from DME on the vessel resulted in water carryover at high load and fouling of uptake above the scrubber itself. The causes were found to be high velocity of exhaust gases, along with difficulty in maintaining the water level of the ecosilencer. Even with level probes changed and demisters fitted, the scrubber efficiency

decreased as the seawater became saturated, with the best results seeing only around a 60% reduction of sulphur.

A third generation Krystallon scrubber was also trialled on the vessel from December 2005. This time the excess water overflowed back into the circulation system and the water level ceased to be a problem. Additionally, no fouling or corrosion of uptake above the scrubber was reported. The best result gained at this point was about 98% sulphur reduction. However, a large amount of seawater was required – a 1MW unit generator required 50 tonnes of water per hour.

P&O is currently assessing the results and believes that disposal of the sludge waste stream, as well as the physical room required for retrofitting, need to be considered when contemplating the scrubber option. Allowance should also be made for the electrical capacity to accommodate the operational load of circulating sea water.

Manufacturer Krystallon feels that the technology has an important part to play in reducing ship emissions. Together with MES and Wärtsilä, it has formed a joint initiative to inform the industry about the features of scrubber systems. The companies claim that power consumption of scrubber systems is low, achieving SECA compliance while utilising 1% or less of a ship's engine power. The initiative also intends to emphasise the growing scope and reliability of abatement technologies in general.

However, MCA's Mr Thomas feels that it is only worthwhile to install a scrubber if the total SOx emissions of a vessel, including auxiliary and main propulsion engines, can be reduced to less than 6.0 SOx/kWh. His opinion is that there is no need to fit a scrubber to every engine on a vessel, unless the SOx limit is reduced in future.

Another option being considered by the marine industry is emissions trading. Also at Cruise and Ferry 2007, Don Gregory, director of environment and sustainability for BP Marine, suggested that there could be three ways of implementing an emissions trading scheme, a credit-based programme, offsetting, or cap and trade.

In a credit-based programme, credits would be bought and sold, depending on the sulphur emissions of a vessel. For offsetting, a group of ships would club together with only the aggregate total emissions needing to meet the target. BP believes that this could save shipowners 30% of costs needed to comply with MARPOL Annex VI, and rewards good environmental behaviour. The cap and trade idea would involve the designation of a specific region or sea air with an emission allowance, based upon annual total fuel consumption in that area.

**Pilot schemes and future regulations**

A pilot project for offsetting emissions within a SECA took place in 2005 in the North Sea, conducted by Shipping Emissions Abatement and Trading (SEAA/T). The results were presented to the International Maritime Organization's (IMO) sub-committee on bulk liquids and gases (BLG) in November last year. A group of seven international shipping companies comprising 58 vessels was involved in the scheme, and found that in total, the requirement of below 1.5% m/m of sulphur content was met, and a safety margin of excess credits was gained.

Compliance through offsetting within that exercise was claimed to be significantly cheaper than if all vessels had individually met the standard. SEAA/T recommended that if a permanent scheme was implemented, there would be a reduced risk of non-compliance with SECA regulations, the scheme would have to be accountable to avoid geographical sulphur 'hotspots', and it could allow individual operator flexibility to offset within its own fleet, going beyond compliance if desired. The UK's MCA also supports calls for further trials to reduce SOx in 'hotspots'.

BLG met again in April this year, where NOx emission limits for new engines were under discussion. A three tier system has been proposed, with Tier I being the current MARPOL Annex VI limits. Tier II, due to be implemented on 1 January 2011, would possibly reduce the limits by 2g to 3.5g per kW/h across the current NOx curve, which would be attainable through in-engine design.

It was generally agreed to slate implementation of Tier III for 2015/2016. There were three suggestions regarding the limits which would be imposed: an 80% reduction from Tier I levels, applicable to all marine diesel engines within 50nm from shore; an 83% to 85% reduction to be applied to engines on large vessels only, in specific near shore areas; or a 40% to 50% reduction to be applied to all diesel engines worldwide.

Large-displacement engines built before 2000 were concluded to be viable for emission modification, but for some pre-2000 engines this would not be possible due to practical difficulties.

Difficulties include unavailability of parts with some engine manufacturers no longer being in business.

**SECA compliance issues**

The cruiseship sector is currently exploring the issues surrounding SECA compliance before the North Sea SECA is enforced. Philip Naylor, general manager, Carnival UK, said that a dual fuel (high sulphur/low sulphur) system would be used by Carnival's fleet when passing in and out of a SECA. He asserted that this would be feasible as modern cruiseships are designed with equipment duplication and system redundancy.

Warning that there would be a slight risk increase of single point failure during fuel changeover, Mr Naylor was of the opinion that the changeover time needs to be carefully chosen, ideally whilst alongside in port, prior to SECA entry. With the full application of MARPOL Annex VI looking to occur from 2010 onwards, the suggestion of a triple fuel system has also been made. High sulphur fuel would be used outside a SECA, low sulphur fuel inside, and distillate in port.

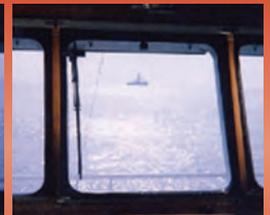
The environmental impact of the marine industry needs to be carefully considered. The planning and implementing of regulations and methods required to make emissions cleaner will no doubt continue to generate debate. All shipowners, designers, manufacturers, and classification societies will need to take into account future emissions reduction requirements in order to bolster shipping's 'green' image. 

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# Submersible decommissioning vessels that heavy lift

NORWEGIAN consultancy Multi Maritime has been awarded a contract to design two very special ships for Seametric International, which will be outfitted with a patented heavy lift system to install and remove offshore oil installations, writes David Foxwell.

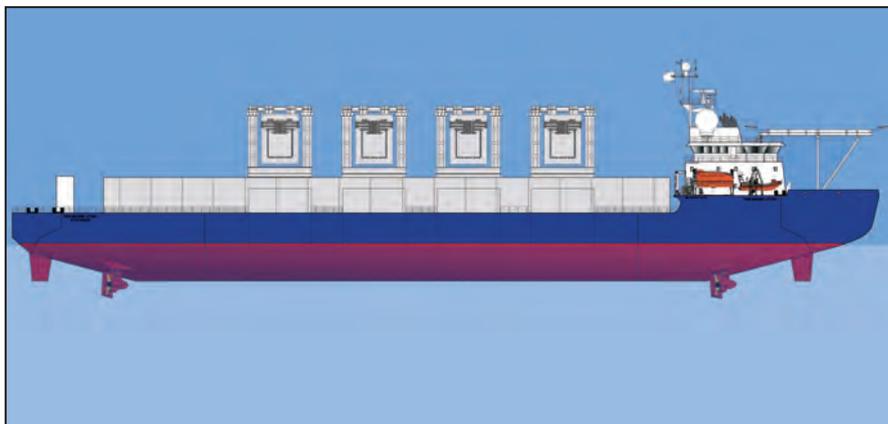
THE highly specialised heavy lifters being designed by Multi Maritime are primarily intended to carry out lifting operations offshore, working in tandem, removing offshore structures and lifting them onto barges for transportation ashore in order to work in the fast-growing offshore decommissioning market. The ships will be capable of removing jackets and topsides and, with a length overall of 140m, and a breadth of 40m, the MM130 heavy lift designs will be equipped with four lifting ‘arms’ that can be adjusted to the dimensions of the object to be lifted.

The lifting arms will be 75m long and it will be possible to extend them by 15m. Each of the lifting arms installed on the vessel will have a lifting capacity of 2500tonnes, giving the two Twin Marine lifters a maximum lifting capacity of 20,000tonnes and 18,000tonnes in wave heights of 2.5m. The lifting force is created by de-ballasting the buoyancy tanks and at the same time ballasting the ballast tank on the opposite side.

The vessel concept is designed to be independent of water depth, and is capable of installing and removing both topsides and jacket structures. The DP 3 semi-submersible vessels will be capable of submerging by 20m, so that they can also work in the ‘float on - float off’ market when not fitted with the lifting arms, and are also expected to play a role in the salvage market when and as required.

Seametric International believes that the Twin Marine Lifter has a number of advantages, and is confident that, in the improved market situation in which it now finds itself, the time is ripe for the first such vessels and equipment to be ordered.

- In choosing to use modern semi submersible heavy lift tonnage with DP as the basis of its proposal, Seametric International is also ensuring that the ships could find alternative work, in the marine and offshore heavy lift market, if the need should arise.



Seametric International has ordered engines, thrusters, and other long lead items for the first two Twin Marine Lifters, a profile drawing of which is shown here.



The Twin Marine Lifters will work in tandem to handle topsides and jackets in the same campaign, can install and remove, uses only proven systems, and is flexible with respect to the size and shape of loads lifted.

- Choosing this type of well known, well understood, fully self-propelled vessel as the basis of its proposal also minimises risk, both operational and financial. The Twin Marine Lifter concept has a number of merits, including what Seametric believes is the lowest capital expenditure of any of the alternatives currently being proposed.
- The concept can, notes Seametric International, also be constructed ‘anywhere’ due to its simple design, and will have low running and maintenance costs.
- The company also believes that its idea represents the simplest single lift system produced to date, and the best documented by third parties, having been evaluated on no less than three occasions by DNV for different clients.
- Seametric International also believes that a Twin Marine Lifter can handle larger, heavier loads than any of the other proposals to date, and that its ability to complete lifts in a relatively short space of time provides it with a high level of inherent efficiency.
- As highlighted above, the Twin Marine Lifter can also handle topsides and jackets in the same campaign, can both install and remove, uses only proven systems, and is flexible with respect to the size and shape of loads to be lifted and with respect to capacity.
- Another benefit is that the concept experiences low levels of ‘interface forces’ and lifted object motion during lifts. It is said to be an inherently safe concept, which requires little human intervention, being remotely operated during ‘lift-off’

## TECHNICAL PARTICULARS TWIN MARINE LIFTER

Designer.....	Multi Maritime
Owner.....	Seametric International
Length, oa.....	140m
Breadth, moulded.....	40m
Depth, moulded.....	10.75m
Depth, submerged.....	20m
Speed, transit.....	12-13knots
Positioning.....	DP Class 3
Accommodation.....	41 persons
Lifesaving.....	50 persons



Photo courtesy of Niveko

# Propulsion systems for today's sea-going vessels



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The Twin Marine Lifter seen from below.

and downloading, and having low emissions. The technology can also be used for many other types of heavy lift, and can be utilised in other sectors.

Detailed engineering of the Twin Marine Lifter lifting arm is ongoing. Seametric International received a 'certificate of fitness' for the concept in June 2006, and vessel design approval is now ongoing at DNV. Thrusters and engines for the ships have been ordered, for delivery in the period October 2008 to June 2009, and a contract for the diesel electric machinery has been signed, with other long lead items under control.

The Twin Marine Lifter concept has been under development for a number of years, but is proceeding apace now that the necessary approvals have been obtained. Removal of



The Twin Marine Lifter in topside lifting mode.

large offshore structures can be very costly when conventional heavy lift technology is used, so this new concept was developed to lift large, heavy structures utilising specially developed techniques.

The feasibility and technical advantages of the concept have been demonstrated in a number of computer simulations and model tests, which have shown that it is possible to lift topside deck structures and jackets.

Three projects funded by the members of Decommissioning Technology Forum (DTF), consisting of BP UK, Shell UK, Total E&P Norge AS, and Kerr-McGee (and previously also ConocoPhillips Norge), permitted an in-depth assessment of the Twin Marine Lifter and its applicability to lifting large and medium size topsides and jackets.

Seametric International was founded in March 2000 in order to develop an environmentally-friendly and cost effective marine heavy lift system, and in the period 2000-2003 it conducted a series of four successful model tests at Marintek in Norway. Between 2000 and 2005 the company commenced development and marketing, and funded studies on behalf of a number of oil companies which might make use of the concept. In June 2006 the company secured a private placement of Nkr300 million.

In November 2006, a new board of directors was appointed at the company, and a decision was taken to acquire DP vessels. Engines and thrusters for the craft were ordered in November 2006, and in December a decision was taken to use heavy lift vessels as the basis of the Twin Marine Lifter.

Seametric International issued an invitation to bid for construction of the Twin Marine lifters to a total of 13 yards at the end of last year. At the end of April, Multi Maritime noted that negotiations were still ongoing with the yard, and said it expected the first vessel to be delivered in the second quarter of 2009.

That there would undoubtedly be a major market for decommissioning offshore oil installations has been understood for some time, and a number of potential concepts for doing such work have been proposed.

Seametric International says it has received support from several governmental organisations and oil companies, with positive feedback from the Minerals Management Service (MMS) in the USA, the Norwegian Petroleum Directorate, and UK Department of Transport & Industry.

### SeaMetric issues Lol for first vessel

SeaMetric International AS has issued a Letter of Intent (Lol) to ESSCA (Hong Kong) Ltd in consortium with China Petroleum First Construction Corporation (CPFCC) and the JingJiang shipyard near Shanghai for the construction, assembly, and testing of the first 20,000tonnes capacity Twin Marine Lifter (TML) system.

CPFCC will be responsible for the overall project management, the construction of the TML lift arm system, and for assembly and testing of the complete TML system.

The two DP class 3 heavy transport vessels, which are the basis for the TML lifting system, will be sub-contracted to the JingJiang shipyard which is a privately owned shipyard with 20 years experience.

CPFCC is a subsidiary of China National Petroleum Corporation (CNPC), the largest oil company in China and one of the most profitable companies in Asia. Refund guarantees will be issued by a major Chinese State bank.

Contracts for the procurement of major equipment on the critical path, 12 engines, eight thrusters, and the diesel electric systems has previously been placed by SeaMetric International AS for phased delivery from October 2008 to January 2009, and will be installed by the consortium.

Delivery of the completed and tested TML system is scheduled for the second and third quarters of 2009.

The DP Class 3 TML semi-submersible heavy transport vessels are 140m long, have a 40m beam, and have a deadweight of 25,000tonnes. They will have accommodation for 41, a helideck, and will be capable of submersion to -20m.

As such they will be capable of transporting jack-up rigs and the majority of semi-submersible drilling rigs as well as topsides modules and other major loads, in addition to their primary role as offshore decommissioning vessels.

'By having a DP Class 3 heavy lift system and accommodation facilities, we will not be dependant on anchor handler vessels, tugs, daily helicopter shuttling and accommodation offshore, which will reduce the operational costs significantly. We will also be capable of secure operation in congested areas and above subsea pipelines. The flexibility of use of the base vessels in the heavy transport market will maximise our utilisation and therefore improve our potential profitability,' said the company's managing director, Johan F Andresen.

The vessels will be financed with a combination of existing equity and a bond loan. Fearnley Fonds has been retained for assistance with placement of the bond.



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## Total cost of ownership fills pump

**I**N shipbuilding as in many other areas, the total cost of owning a pump is proving to be just as important as initial procurement costs, argues Allweiler.

**T**OTAL Cost of Ownership (TCO) includes all costs of owning and operating a pump, covering everything from design to procurement and purchasing through replacement parts and maintenance, and even downtime due to maintenance and disturbances. Energy costs, and therefore the pump's efficiency, are a major component of this.

Allweiler AG currently has orders for about 90 pumps for each of the three new Celebrity Cruises ships. Construction has begun on these first three cruiseships, each of which will weigh in at 118,000gt when completed (expected in 2008).

**Allweiler vertical centrifugal pumps in the NIM inline version for auxiliary diesel (low-temperature cooling water unit in a gas tanker).**



**Two vertically installed Allweiler SNF screw pumps for the fuel unit of a gas tanker.**



**Multi-stage Allweiler LV centrifugal pump for booster units.**

exhibit special innovative characteristics. Its new MI/MA water pumps, for example, feature a special split bracket fall, and deliver a maximum flow rate of 1800m<sup>3</sup>/h with maximum permissible pressure of up to 25bar and maximum delivery head of 140m. These pumps are commonly used as ballast, bilge, and cooling-water pumps for fresh and salt water.

In the view of Alois Walker of Meyer Werft's mechanical engineering group, the new split bracket comes with several benefits. 'This pump is lighter and easier to install. It is insensitive to twisting from the pipes and the ship itself, and it transfers fewer vibrations.'

The end result is that these pumps have longer maintenance intervals and, according to the shipyard, Allweiler is the only manufacturer to deliver pumps with a split bracket.

They can also often enable these pumps to operate with a smaller motor and a smaller flange than comparable pumps, according to Allweiler. A lower purchase price, lower energy consumption, and longer maintenance intervals all contribute to 'lowering the TCO' of these pumps, which is something that shipbuilders have been focusing on to an ever greater extent.

'Shipowners are becoming increasingly concerned with a pump's service life while simultaneously specifying a minimum efficiency,' says Meyer Werft.

For similar reasons, demand will increase for pumps with lower-maintenance magnetic drives (a design that foregoes the use of seals), according to Allweiler. This is especially true for fuel pumps in consideration of stricter regulations and the Clean Bilge concept.

Allweiler says its SPF/SPZ series of magnetically-coupled screw pumps includes both single and twin units. They can handle diesel and lube oil at temperatures as high as 150°C and viscosity anywhere between 3mm<sup>2</sup>/s and 760mm<sup>2</sup>/s. Maximum flow rate is 110l/min and maximum pressure is 40bar. 

The pump packages concerned include centrifugal, screw, and progressive cavity pumps for moving everything from saltwater, freshwater, and wastewater in all areas of the ship to a variety of oil types needed in engineering spaces, such as lubrication oils and fuel. To fulfil these varied requirements, Allweiler uses seawater-resistant materials for saltwater and food-grade stainless steel for moving drinking water.

Shipbuilder Meyer Werft perceives it as beneficial that Allweiler is a single manufacturer with a comprehensive line of marine pumps for many different pumping tasks and liquids. 'We have a single contact at Allweiler for design, consultation, and service. At the same time, shipowners can reduce their stock of replacement parts,' says Henning Stellermann, a certified engineer responsible for Meyer's mechanical engineering group, where all pumps are selected.

Generally speaking, though, pumps in this market are a mature product and manufacturers with the relevant experience deliver very similar products. However, Allweiler says that, despite the maturity of products available, its pumps



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## The view from the top of the class

**DET Norske Veritas chief executive Henrik Madsen probes for 'root causes' in defining the evolution of Class.**

CLASS faces so many challenges that some leading voices within its ranks have questioned whether it can survive in its current form. Last month, ABS chairman Robert Somerville told that class body's annual meeting in New York that there was a 'growing body of increasingly influential opinion' which believed that 'there is a commercial advantage to be gained if class is abolished, and these forces are becoming better organised'. With ABS still working through its court case with Spain over the sinking of *Prestige*, he said that unlimited liability for simple negligence could ring the 'death knell for all classification societies in the form we know them today.'

On another front, class has been facing a potentially costly change in the rules covering equipment certification at the hands of the EU. The Commission's Draft Classification Societies' Directive is expected to lead to the harmonisation of technical standards for marine equipment and to the mutual recognition of certificates, a position that has the potential to split the certification of ships from that of the equipment onboard.

With the hostile attempt by Bureau Veritas to take over Germanischer Lloyd still fresh in the mind, these are indeed heady times to be running one of the main classification societies. Eleven months into the job, Det Norske Veritas chief executive Henrik Madsen has already initiated a number of small but significant shifts in position, in an evolutionary recasting that he sees as essential for the classification society to flourish in the 21st Century.

Consolidation among the class societies is firmly off the agenda, despite the fact that DNV itself offered to act as a 'white knight' on GL's behalf at the time BV was making its unwelcome approaches.

'The reality is that there are four big players worldwide and a smaller one that control 80% of the market,' said Mr Madsen. 'We do not see the way forward as one of consolidation. We are a foundation and nobody can buy us against our will. BV and GL are the only ones that do not share that status and now they are both in the hands of family concerns.'

Meanwhile, latest soundings from the EU are by no means in class's favour. 'Class is open to looking at common rules on equipment,' said Mr Madsen, 'and there is room to streamline the process, but when we come to issuing certificates and assuming responsibility, we cannot see a situation where we class the ship but not its main engine. There may be room for harmonisation on more simple components, but the owner and the insurer are simply not going to accept going further. We have to remember that each component is part of a system and that we also certify the system. To be present at the point of manufacture is important and it should remain our decision as to how often we visit a manufacturer for testing and commissioning.'



**Henrik Madsen, chief executive of Det Norske Veritas: 'It is easy enough to blame human error when an accident happens, but it is preferable to look at root causes.'**

Setting such politicking aside, Mr Madsen has been concentrating on the changes he sees as necessary for his organisation to develop as the proactive class body of tomorrow.

'It has been our purpose since 1864 to safeguard life, property, and the environment, but we also need to develop our vision and ambitions for the next 15 years,' said Mr Madsen. 'We want to have a global impact on a safe and sustainable future, setting the agenda and leading the agenda on safety, the environment, and good governance. We don't want to be a collection of local organisations, but a global operation, organised by industry.'

Mr Madsen, who started his career with DNV in its research department back in 1982, has seen the class body evolve into a rounded provider of services to the upstream and downstream energy sectors (now 25% of its business) and to land-based industries such as IT/telecommunications, the food and beverage sector, and the automotive industry, while still retaining 50% of its business in the maritime sector. He visited London last month in order to sign a £10m risk analysis contract with the National Health Service.

'Currently, we have 75% of our business in the energy and maritime sectors. We want to keep that balance and look for growth across the board,' he said.

Since his appointment to the top job, Mr Madsen has been working hard to develop DNV's IT global risk management business as a new stream of income and, he said, this work would soon become of significance to maritime customers.

After acquiring a number of IT risk companies in Northern Europe focused on the defence, automotive, and telecommunications market,

DNV has built up a core of around 300 people with competence in this area in other industries and is now looking to transport that expertise into the marine and energy sectors.

'Software development, its maintenance, architecture, security, integration, and data collection is increasing across the industry,' said Mr Madsen, 'and we want to be in the position to offer IT risk management in a holistic way to customers in the maritime sector. With more and more IT onboard ships, and more and more systems integration, we have been collecting information that points to an increasing number of near accidents that were to do with the IT systems rather than the operator.'

'The amount of pollution and the number of casualties may be going down,' said Mr Madsen, 'but the fact is that the insurance industry in general is having to pay out more – whether that is to do with the increased price of steel or with other factors.'

'It is easy enough to blame human error when an accident happens, but it is preferable to look at root causes. Was there a lack of competence or of training, or were the IT systems too difficult to operate?'

Steering gear problems that had led to groundings could be traced to software problems, Mr Madsen said, either because of the way different software packages on the bridge interacted (or rather, did not). 'Let's be honest, at the sea trial stage, parameters are set and systems are programmed and the documentation is not great. The way one signal affects another system can be an unknown.'

'We call it hardware in the loop testing – going out to all corners of the system to verify that it will actually work.'

Mr Madsen said DNV was working with the University of Trondheim's cybernetics unit to develop its maritime IT risk assessment consultancy service.

Mr Madsen emphasised that he was not referring to particular incidents, where DNV has been the class responsible in both the *Napoli* and *Sea Diamond* accidents. In the latter case, he would only observe that when it hit the reef, the result was serious damage to the hull.

In the case of *Napoli*, Mr Madsen reported 'nothing conclusive' in DNV's investigations so far, although he ruled out 'normal fatigue' from the vessel's breaking up, and said that neither was the 2001 grounding and repair of the ship, material to events. 'The thing is that there is no other ship exactly the same as *Napoli* in existence – this was the largest containership in the world of its day. There is no obvious reason for why things happened the way they did.'

More generally, Mr Madsen observed: 'We have seen the number of accidents traceable to navigational errors rising and there may be answers to this phenomenon. For example, we have suggested the standardisation of bridge layouts.'

### Crewing up

In today's maritime business climate, there is no shortage of work for class, and DNV has been crewing up across the board, with a view

to handling the current building frenzy, but also looking ahead to the operational requirements that will flow from the new ships once they are in service.

DNV classed 26% of new tonnage built last year, representing 605 ships (21% market share by ship number). Of these, 200 were built in South Korea, 150 in China, 150 in the Nordic countries and Poland, and 40 in Vietnam. Its 2006 performance was boosted by surging demand in China and Norway, while its strength in the tanker market also proved opportune. DNV also has a strong presence in the bulk carrier sector, where orders have been strong this year, while it has also been increasing its share of the containership market.

Around half of the 1250 people DNV hired last year (500 staff departed in the same period) have found their way into the class body's maritime services divisions. Of the newly hired, 275 jobs were filled in Norway, 106 in China, 81 in India, 61 in the UK, 61 in the US, 60 in Poland (here, the recruits are mainly naval architects), 44 in Brazil, 27 in Singapore, and 21 in Sweden.

But, despite the heavy workload, Mr Madsen has found time to apply his probing approach to establishing root causes to other matters. Exemplary are his views on the continuing debate over whether lower emissions from ships would best be achieved by the use of lower sulphur content distillates, or by the continued use of residual fuels in combination sulphur suppressing gas scrubbers – a debate that looks to have split the industry.

'We have research and development in Norway on emissions from ships to the air, but it is a project looking at the entire chain from the refinery to the emission,' he said. 'You can easily jump to the conclusion that distillates and blending are good from the environmental perspective, but what is the oil company actually going to do with the residuals in this case - to crack more could lead to huge CO<sub>2</sub> emissions. To reduce NO<sub>x</sub> and SO<sub>x</sub> it would be good if the fuel had less sulphur, but we have to agree what the environmentally sustainable level will be, and then perhaps have scrubbers as well. The CO<sub>2</sub> question must be considered in context of both the refiner and the ship involved.'

When it comes to NO<sub>x</sub> it is more difficult - at least short term - to do something to reduce the emission. Reduction targets can only be met by a combination of fuel saving, carbon pricing, and technology development.'

Mr Madsen said DNV is also ready for a future that included ships themselves being subject to compulsory carbon trading schemes. He pointed out that 1500 so-called clean development mechanisms had been launched in other sectors, where industrialised nations foster projects lowering emissions in other countries to achieve a smaller carbon footprint overall. Of these strict regimes, DNV had been responsible for validating and verifying around half.

Mr Madsen said he saw the way forward in emissions trading. 'We have a competence

around such trading mechanisms and the allocation of quotas and we know how it could work in the shipping sector.

'Shipping is global and I hope that this is something the IMO gets involved in, rather than leaving it to national or regional authorities. The IMO could move forward very quickly on this and it is better to be on the offensive than for some politician somewhere to suddenly make a decision.'

In April, IMO appeared to make a new push in the quest to develop regulations to cover air emissions from ships, with Secretary General Efthimos Mitropoulos setting up a new working group to look solely at the topic.

Mr Madsen said such a scheme could work whereby each ship, identified by its IMO number, had an emission quota and a means were developed of calculating whether that quota had been exceeded. Ships not exceeding their quotas could 'sell' emission quotas, and those exceeding them would have to 'buy' extra emissions quotas from others including industrial sectors outside shipping.

Also looking forward, Mr Madsen sees further evolution in the common structural rules that have entered into force in the case of tanker construction as entirely necessary. He said that it was a 'slower process' to update the CSRs than had formerly been the case with individual class rules, and that he was 'not sure we have found the operational model' to speed up that process. Once again, Mr Madsen is looking for root causes to initiate change. 

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## Croatian yards in suspended animation

**CROATIA'S shipbuilding sector remains in flux in the midst of the nation's negotiations to achieve EU accession.**

**E**ACH of Croatia's state-owned yards has had to submit restructuring plans for European commission assessment.

In a move that appears to look to avoid the protracted investigation that faced Polish shipbuilders after Poland's accession to the EU, the plans requested must find the means of dealing with past debts and map out a way forward for profitable operations without the safety net of state support that has, in the past, extended to as much as 10% of contract prices.

In the run up to accession, the EC has told Croatian shipbuilders that continuation of such practices will not be seen as fair competition.

The commission sent its representatives to Croatian yards on a fact-finding mission in late March and, in April, issued an 11 page commentary document on the restructuring plans submitted, with a response deadline of two to four months understood to have been given.

Ultimately, the EC envisages cuts in Croatia's shipbuilding capacity and privatisation of its shipbuilders.

Consistent reports suggest that moves are already afoot for Croatia's shipyards to be privatised, with Uljanik supposedly the first on the blocks, where privatisation is envisaged as early as this year.

However, according to one Croatian shipbuilder, at least, who has witnessed more than half a decade of government presenting shipbuilders to the market to no specific inquiries, 'privatisation will be a long and complicated story'.

The complexity of the process is witnessed by the structure of 3MAJ, which is not a standalone shipbuilding business. Instead it is part of a group of companies with 3000 employees, whose interests also include marine engine and crane construction, a catering business, and TIBO, which produces accommodation units, cabins, toilets, incinerators, separators, electric panels, and switchboards for 3MAJ and for other shipbuilders.

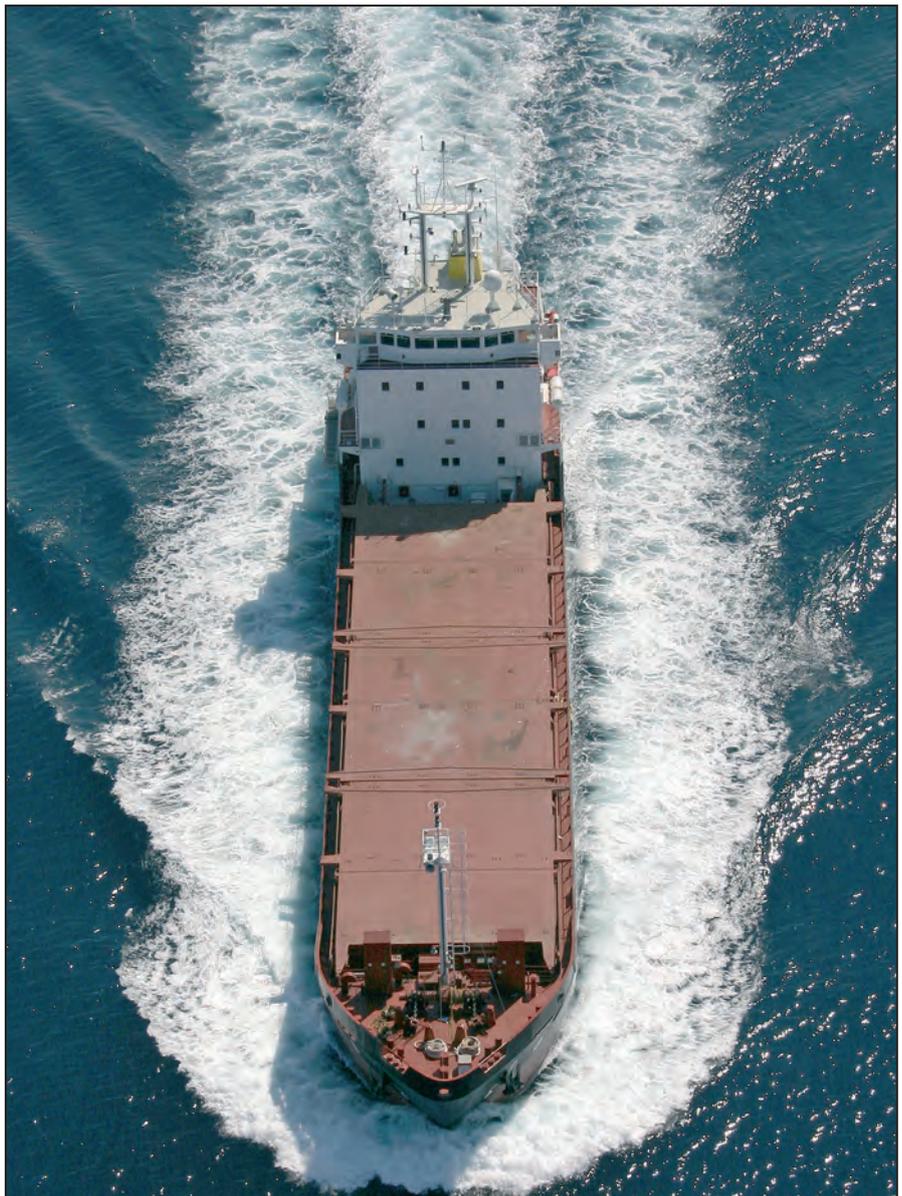
Here, yard management envisage a phased privatisation, over a 'five to seven year transition period', with the group's catering business and TIBO the first units expected to be privatised, and an initial 400-500 staff 'outsourced' to new and separate businesses.

If such a process seems protracted, what EC scrutiny does mean is that, in the current worldwide shipbuilding boom, Croatian yards have signed letters of intent in 2007 but have been unable to follow through with firm contracts because government is unwilling to provide the kind of underwriting that Croatia's commercial banks require to give guarantees.

**Shipyard Kraljevica is booked out to 2009, but future orders are less certain.**



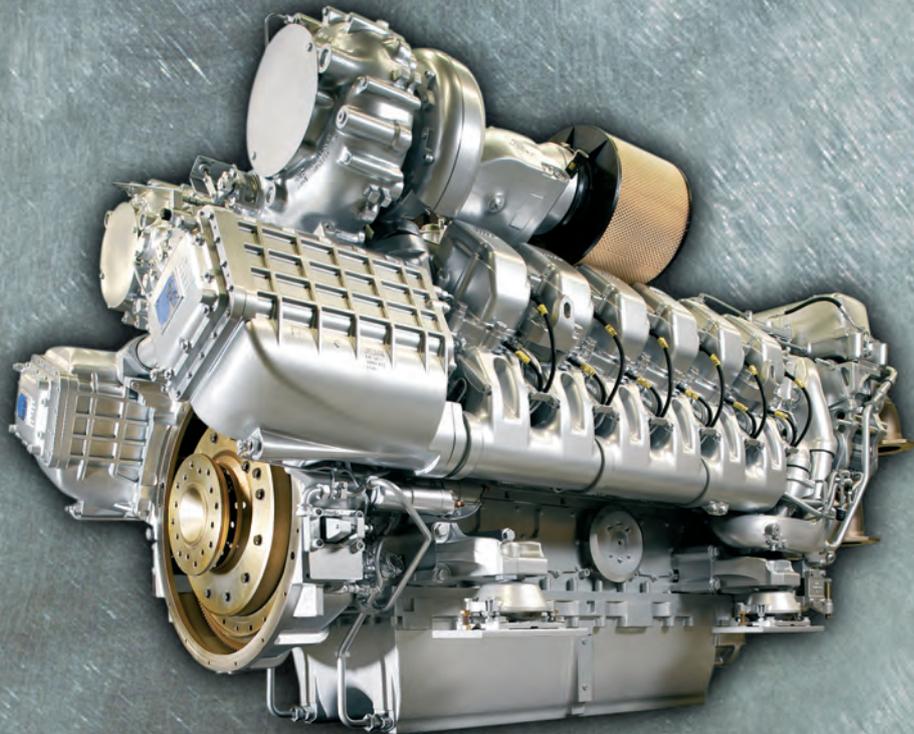
The multipurpose vessel *Šipan* on trials, April 2007, built by Shipyard Kraljevica for Atlantska Plovidba.



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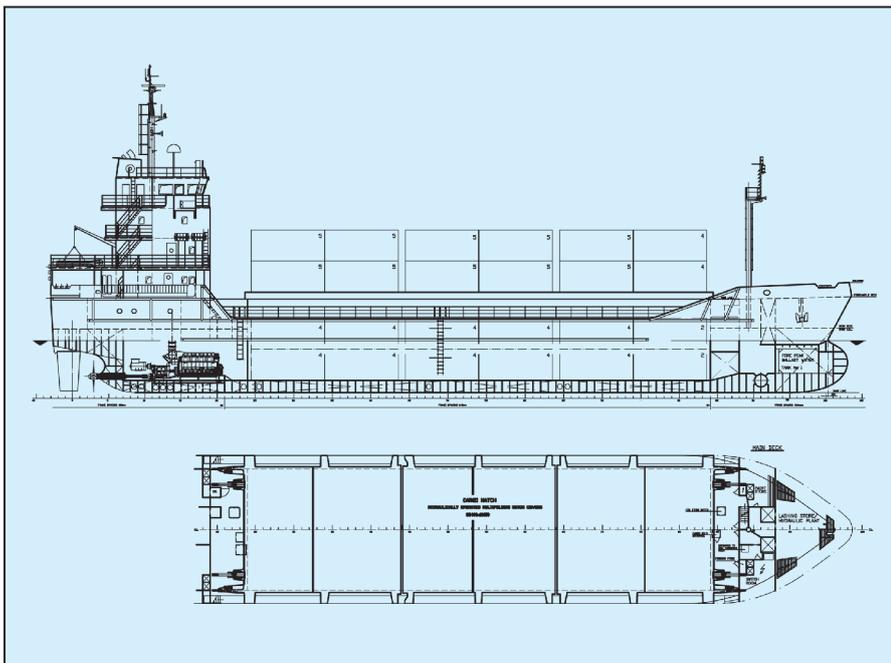
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Sketch of GA plan of Kraljevica multipurpose vessel for Atlantska Plovibda.

3MAJ head of ship sales department Zdenko Marčelja characterised the current situation as 'a vacuum', with government support 'limited and stymying our ability to negotiate. The [competition] agency programme must be finished and accepted by the EC. Then we can start again in full force. But we need to survive in the meantime. At the moment we have contracts that we cannot enforce.'

Shipyards Kraljevica sales manager Siniša Ostojić echoed these thoughts. He said: 'Croatia's shipyards have to live, and without temporary [government] measures it will not be so easy to survive.'

At 3MAJ, an order for two more 51,000dwt product tankers for the Latvian Shipping Company has been at an advanced level of discussion for some time but the deal - although apparently 'signed off' - is currently stalled because the yard has been unable to get the greenlight from Zagreb.

A similar scenario has faced the same yard with the finalisation of an order for two 18,000dwt heavylift ships for Dutch company Biglift, which were set to feature two 800tonne shipboard cranes apiece. It is understood that Biglift is now seeking other yards to fulfil the contract.

At a time when Croatian yards have switched their quotations wholesale from US dollars to an appreciated euros, steel price hikes from two years ago also remain germane to construction today. With even camshafts 50% higher in cost than they were in late 2006, these are by no means easy times for Croatian shipbuilding.

Set against the anxiety over the future, however, for the moment Croatian yards are enjoying high levels of activity, as contracts signed before the current EC inquiries work through the orderbook. While the order for the latest pair of LSC product carriers may be stalled, the current workload at 3MAJ involves completion of six identical ships for the same

customer, which are part of an original 10-ship order. Three of the latest ships are due completion in 2007, with the remaining three due in 2008.

In terms of current working conditions, 3MAJ management said the yard had also benefited from investments approaching US\$40m over the last decade, where in the period from the late 1980s to 1998 saw practically no investment in equipment at all. Investments in prefabrication and fabrication post-2000, as well as a new blasting area and a change from on-slipway construction to a covered hall, meant that the yard now builds in blocks, dramatically reducing its delivery lead times.

Now equipped with plasma cutting technology, a 180tonne capacity heavylift transporter and a new 40tonne capacity mobile harbour crane, 3MAJ has also invested in its IT capability, using Tribon process software installed in 2004, NAPA for basic design, and MARS software for materials purchasing. Indeed, the yard is in the throes of preparing a basic design software of its own for general release, in the shape of INDES - an inhouse design package developed to work in Windows.

Since 2003, 3MAJ has also renewed and digitised its main 300tonne capacity crane and a smaller 60tonne capacity crane, and refurbished its panel line, acquiring 100 new welding machines.

Ongoing is the yard's investment in a new building platform - formerly its third slipway - where work is due to be completed, and a second 100tonne capacity crane installed this year in order that 3MAJ can start work on a forthcoming chemical carrier construction.

Even in the current state of flux, 3MAJ has also set its sights on broader horizons, after 15 years when it has primarily been a builder of tankers, with the exception of a series of multipurpose ships it built for Chipolbrok.

Competition from Asia has been so intense that 3MAJ has been obliged to change its focus. As well as its intentions in the heavylift sector, the shipbuilder harbours ambitions in the ro-ro and containership sectors in the 15,000dwt-27,000dwt range, as well as putting forward its own multipurpose reefer ship design.

3MAJ also believes there remain opportunities for European builders in the car carrier sector, which is why it recently bought the design for a 4900 unit car capacity carrier design from Uljanik. It subsequently went on to secure an order for three ships from NSC Schifffahrts, of Hamburg, which are to be chartered to STX Corporation and employed in Asia-Europe trading.

Steel cutting started in March for the first 3MAJ-built car carriers and, the yard says, it has modified the original design acquisition to take into account that its wider group is a Wärtsilä licensee, where Uljanik works with MAN Diesel. Keel laying of the first ship was due in May. A further refinement is the fact that 3MAJ is proposing to shift part of the fuel oil capacity to the fore section of the ship, and is also thinking of taking out some of the transversal bulkheads in order that cars can be loaded more easily, although the latter proposal is being assessed in the context of new class rules on damage, because it may mean additional void spaces in the hull's upper section.

The yard says it has also received enquiries for ships of 7000 car capacity.

Workload is also strong for the moment at Uljanik, which has been undertaking the delivery of a massive series of car carriers, but is looking to other markets for its future sustenance.

Uljanik, based in Pula, is due to deliver the last in a series of thirteen 4500 car capacity ships for Grimaldi, a second 7000 car capacity PCTC for Norwegian buyer P D Gram, and is also two ships into a nine 4900 car capacity, 12,300dwt ship series for Ray Car Carriers, with the last of these due delivery in the first half of 2009.

Shipowner Rami Ungar, who heads Ray, took delivery of the third of these ships, *Opal Leader* on 25 April. They are 176m long, 31.1m across the beam, and can achieve a maximum speed of 20.8knots, driven by Uljanik/MAN-B&W main engines with an output of 12,460kW at 127rev/min. The division system and the internal ramp system under the sixth deck have been modified in order to achieve better cargo flow during the car loading and unloading, and reduce the number of waterproof doors and internal ramp ways.

Work has also started of the first in a series of five 25,000dwt container/ro-ro vessels, again for Grimaldi. These multipurpose deepsea ro-ro carriers, due delivery in 2008-2009 will feature 2500 lane meters of cargo space and will be used primarily for transporting new cars and vehicles, with additional container capacity on the weather deck. They will have capacity for 3500 cars and 1100TEU.

The yard's strategic decision to target the PCTC market saw it at one stage establish a healthy 15% of worldwide orders. While



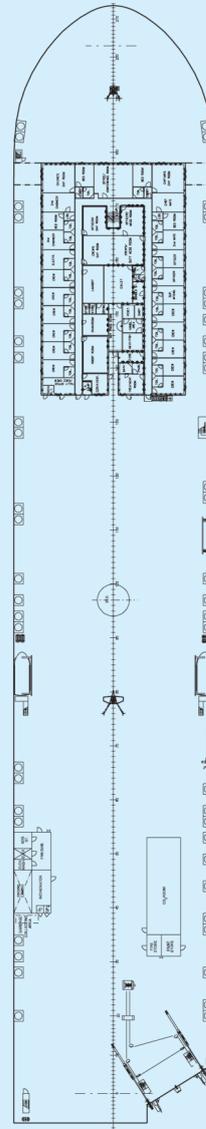
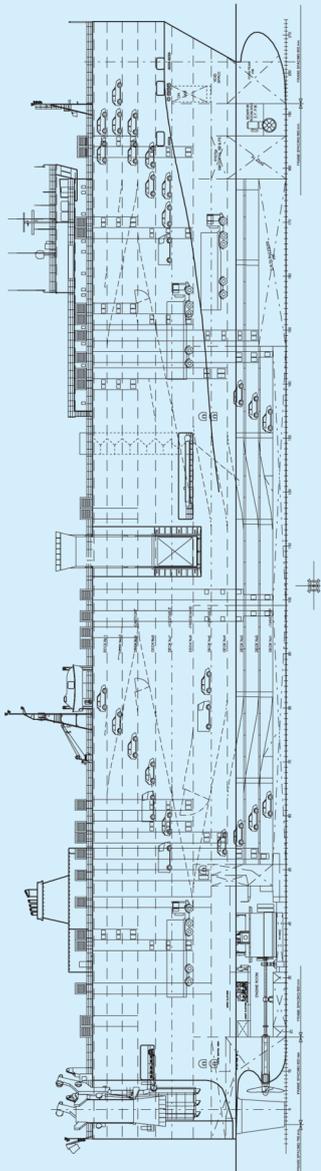
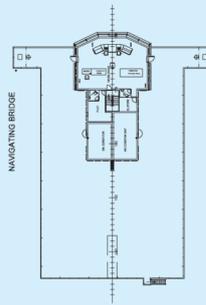
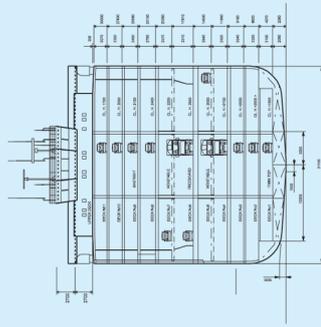
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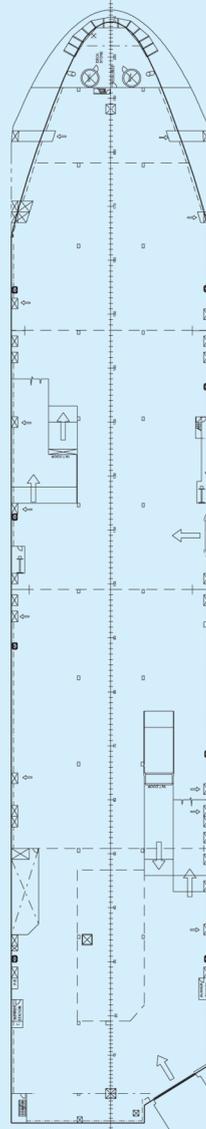
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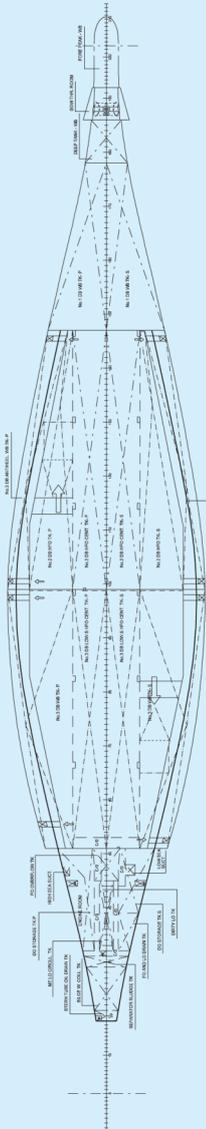
3 MAJ recently acquired a car carrier design from Uljanik.



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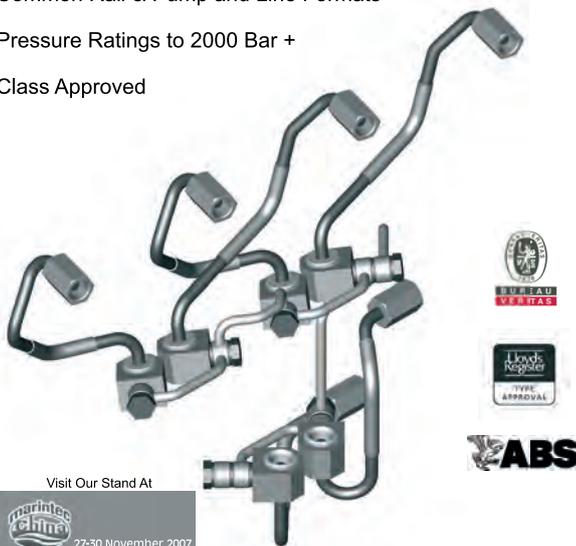
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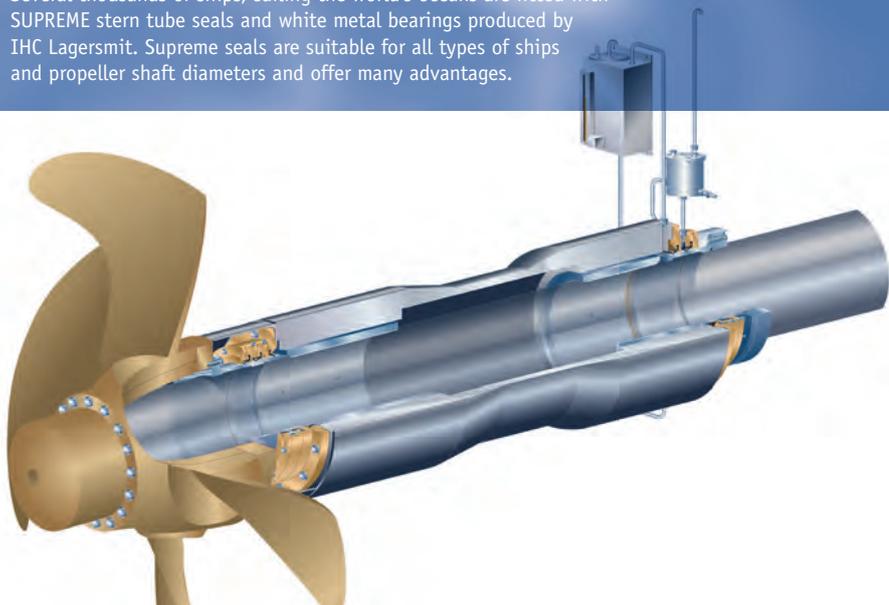


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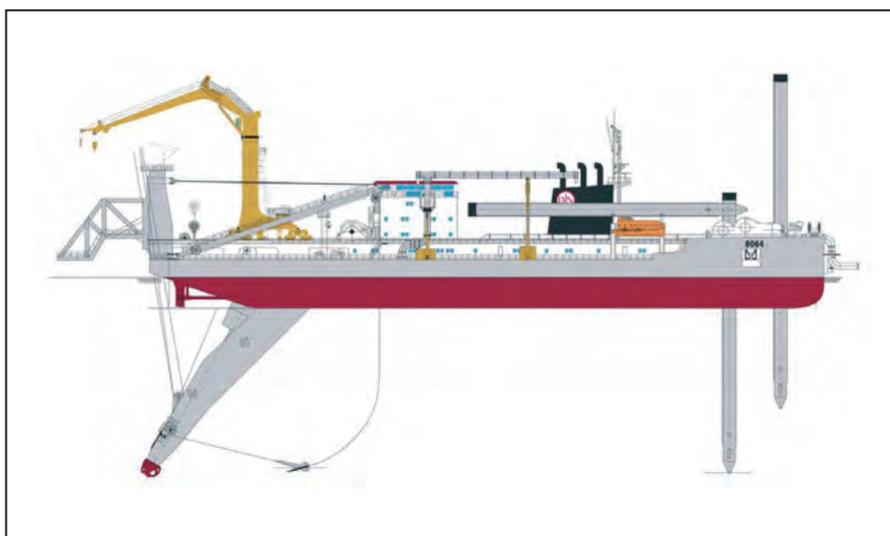


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Uljanik is working its way through a long pure car and truck carrier construction series, with this ship delivered to Ray Car Carriers.



In March, Uljanik Brodogradiliste signed a contract with Jan de Nul subsidiary Dredging and Maritime Management, of Luxemburg, to build two large self-propelled cutter suction dredgers, for delivery in 2009.



The first car carriers from 3MAJ will operate under charter to STX Corporation.

demand for such ships remains high, the incursion into the market of Chinese and, latterly, Vietnamese yards, has seen Uljanik cool in its pursuit of further deals, as prices have slipped, as the design sale to 3MAJ of one of its mainstay designs testifies.

Instead, Uljanik is now targeting the wider ro-ro sector, with a view to snagging ro-pax vessel orders later on. Its initial offering is a pure ro-ro carrier offering 2000 lane metres of freight capacity.

Ivan Pamić of Uljanik's sales department said that the shipbuilder was 'elaborating' on this design, with ships of 3000 lane metres and 3500

lane metres in the offing, adding that the yard was also well advanced in its plans to take a slice of the market for dredger construction, and possibly into pipe-layers.

Indeed, in March, Uljanik Brodogradiliste signed a contract with Jan de Nul subsidiary Dredging and Maritime Management, of Luxemburg, to build two large self-propelled cutter suction dredgers, for delivery in 2009. These 138.5m long by 26m across vessels are further developments of the self-propelled cutter dredger *Leonardo Da Vinci* and incorporate the experience and technical innovations of *J F J De Nul* – the largest and most powerful cutter

dredger in the world. Both of the latest vessels will be delivered in 2009. They will feature a total installed diesel engine power of 23,520kW and dredge up to depths of 35m.

Shipyards Kraljevica, meanwhile, is also booked out into 2009. Shipyards Kraljevica sales manager Siniša Ostojić gave an insight into the yard's restructuring proposal to the EC. He said the plan was to 'specialise as much as possible in the size and type of vessels that we build'. The focus lay with ferries, he said, as well as anchor handling tugs, offshore support vessels and, in a niche where the yard has already had some success, asphalt carriers.

In the last case, the larger of the yard's two slipways will be occupied into 2010. On order and under outfitting are a pair of four 9240dwt asphalt carriers, due delivery to Limassol-based Interorient Navigation, with one apiece due in May 2007 and March 2008. These 108.5m long by 18.6m wide ships, with a depth of 10.6m, complete a series of four ships for this market, with the first two vessels having already been delivered to Florida-based Sargent Marine.

The yard has also just signed up with Geno-based owner Petrolmar in a one plus one option deal covering asphalt carriers, although here too a final deal is pending, subject to guarantees being issued by banks, themselves based on approval from Croatia's Ministry of Finance. If the deal does come off, delivery of the first ship is due during 2009, with the second to follow in 2010.

Mr Ostojić said that the yard's restructuring plan also envisaged it investing in a larger gantry crane to cover its first and second slipway, with the modernisation of processes also envisaged.

Work is also progressing on another two 1200 passenger and 138 car capacity, 89m-long double-ended ro-ro ferries due delivery to domestic customer Jadrolinija.

Meanwhile, over the summer, Kraljevica will see work start on the construction of two smaller car ferries for Isle of Wight operator Wightlink. The contract calls for two 62.4m long ships, to be delivered in April and May 2008, with an option for a third vessel. These 360-passenger plus 65 car capacity ships are costing around €10m apiece and will feature four Volvo D16MHs, six cylinder 552kW engines, with propulsion provided by two Voith Schneider 21 R5/135 units.

In recent weeks, sea trials were also conducted for *Šipan*, the second of two 1650dwt multipurpose ships for Dubrovnik's Atlantska Plovidba, which in May was due to follow *Mokošica* into service, the latter having been delivered in December 2006. These 67.1m long, 12.4m wide, by 6.1m deep ships feature capacity for 102 containers, 44 in the ship's hold, and 58 on deck.

What Shipyards Kraljevica is really waiting for, though, is progress over talks with French naval shipbuilder DCN to participate in the joint French/Italian FREMM multipurpose frigate construction project. Discussions have been going on for over two years on the subject of Kraljevica's possible contribution of sixteen 70m by 20m bow sections to this massive project, with work expected to occupy the smaller of its two slipways as far in advance as 2018-2019. However, it is known that DCN has also held talks with Polish shipbuilders and in Bulgaria on the same topic. ☺





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## Rising star Aker Tulcea

TO get a flavour of the position occupied by Aker Tulcea today, it is necessary to consider the progress made by this rising yard through turbulent years, writes *Ivan Berenyi*.

Founded upstream of 100,000-strong Tulcea city on a 75ha area on the Danube banks in 1974, 39.5km from the Black Sea in the Dobrogea region of south-eastern Romania, the Tulcea Shipyard commissioned a 150m x 26m Syncrolift launching/docking system from Pearlson Engineering Co Inc of the US in 1977, with 6500t max lifting weight and 22cm/min lifting speed, the seventh largest in the world at the time. The yard started production in 1978 as the most modern shipbuilding facility in Romania.

By that time, the outfitting hall and the 130m x 180m longitudinal and transversal transfer platform on rails were completed, with the yard adding a prefabrication hall in June, 1979, a wet dock loading pier in July, 1982, a small vessel mounting dock in autumn 1984, and a 15,000dwt vessel mounting dock in November, 1985. Then, a year later, came the wet dock outfitting pier.

In its initial years Tulcea Shipyard built only simple steel structures and small vessels such as 1000dwt coastal fishing vessels and 1000dwt bunkering tankers, mooring pontoons and 1600dwt-3000dwt barges, but these soon gave way to more complex 1600cm/h-3500cm/h dredgers and 7500dwt/8700dwt general cargo units and, eventually, to 15,000dwt cargo carriers.

In due course, the yard was operating along 1000m of quays - 800m inside its basin and 200m on the Danube - with eight production halls, plus nine building areas and 15t-50t cranes.

Troubled years were to follow, however, as the regime switched from communism in 1989 to democracy. No completions were made at all in 1990 and in 1991. The workforce slimmed from 4200 to 2600 in that period, but 1995 marked the first export to western markets and 1996 to Norway.

A strong relationship developed with the Norwegian Aker Yards, which subsequently



**Under Aker's guiding hand, Aker Tulcea has increasingly become involved in more complex building projects.**

acquired 69.99% of Tulcea's shares in 2000 - the yard's year of weather change, when it was renamed Aker Tulcea Shipyard. The transaction left 23.6% of 25,000 lei shares in the hands of investment fund SIF Moldova, and 6.4% in those of the workforce.

In 2000, the yard suffered the indignity of building at a loss for a spell, and had to break contracts and enter into troublesome renegotiations. The cause was its heavy commitment to build for German owners, at a time when the deutschmark was plummeting 30% against the US dollar.

However, following privatisation, a farsighted, properly conceived investment programme ensued involving some \$20m of spending from 2000-2005 and €5m in 2006, with all areas requiring upgrade taken into account, including the acquisition of new equipment and tools, to IT hardware/software and licences, the improvement of working conditions, social progress, and the development of a store and transport system, etc.

Among the prime investments realised were a blasting and painting hall, a panel line, new cutting kit, a pipe bending machine, an autotransporter of 270tonnes capacity, and the latest welding tools.

From \$8.5m in 1995, annual turnover had increased to \$32.5m by 2001, with profit at \$3.2m.

Vessel designs originated, to start with, from Icepronav of Galati, and in due course came via customers and Aker Projects, with Tulcea's own, 125-strong design department concentrating on working designs and some technical designs.

Deliveries from 1992 till privatisation in September 2000 tallied 42 units, 12 of them (seven supply vessels, three trawlers, an 11,500dwt chemical tanker, and a support vessel) for the Aker Group and 30 (five barges, eight pontoons, seven general cargo/container vessels of 2500dwt, six general cargo ships of 8700dwt, two coastal fishing units, and two ships for transporting live fish) for others.

By comparison, from September 2000 until end-March 2007, 83 units were delivered, of which 72 were for the Aker Group (47 supply vessels, 11 anchor-handlers, one 16,000dwt chemical tanker, six ferries, and seven other types), with 11 units delivered to other owners (two general cargo/container ships of 2500dwt, three boxships of 800TEU, and three barges).

By year, the yard delivered four units from September to the end of 2000, 11 in 2001, 13 in 2002, 10 in 2003, nine in 2004, 12 in 2005, 20 in 2006, and four so far in 2007. The vast majority of the completions were hulls, and only a few were finished ships.

Even so, there have been landmark projects. The world's first gas-powered ferry hull, *Glutra*, was delivered from Tulcea in 2000. Five other gas-powered ferry hull newbuildings and *Glutra* were outfitted at Aker Brattvaag's yards in Norway, representing an environmentally-friendly solution using new technology, Aker Yards declared.

Volstad Shipping AS, meanwhile, contracted the delivery of two 93.4m x 19.2m platform supply vessels with Aker Yards, for which Tulcea supplied the hulls. Tulcea is also to build two anchor-handling supply vessel hulls for Norwegian shipowner DOF ASA. ☺

## Aker Tulcea in its own words

FACE to face with Dumitru Ivanov, with the Tulcea shipyard since 1977, and in the director general post since 1991. *Interview by Ivan Berenyi*.

**Q: What is the size of the workforce, and the plans related to it?**

A: Presently it numbers 2875, 80% of them in production, but we will round the total up to 3000 by the year's end. With the 2220 subcontractors we employ, that makes 5220 - which is the staff size we aim to keep constant in 2008/2009, simultaneously raising productivity by 8%-10%.

**Q: What is the orderbook situation?**

A: In total we have 42 contracts, 12 vessels are already under construction, and we have delivered

four so far this year. We have built complete vessels in the past, but now we are building only hulls, mainly of supply vessels for Aker, albeit with a very high, 80% grade of outfitting. There are hulls for outside customers, too, similarly kitted-out. The orderbook is full for 2009.

**Q: Turnover and profit for 2005 and 2006, projection for 2007?**

A: In 2006 the turnover was €123m, with €4.8m profit. For 2007 the turnover projected is €125m with €3.5m profit; for 2008 it is €135m with €5m profit; for 2009 it is €140m, with about €6m profit. 2005? Well, the steel production [costs] rose by over 20%, from

19,000tonnes to 25,000tonnes-26,000tonnes. But due to the strengthening of ROL (old lei) and the rise in steel prices we had losses. We had €2.8m deficit on €100m turnover.

**Q: Romania's EU membership - how is it affecting Tulcea and Braila?**

A: Ukrainian steel plates are 8%-10% cheaper. But now we won't get them in quantity. A lot of people left Galati, Constanta, and Mangalia for Western Europe. We did not lose too many in Tulcea and Braila. Quite a few will be back after a few months though. They might have to work much more there. But, to be on the safe side, we are increasing wages by 17.5% + inflation this year. We want to

keep our employees. We also try to improve work conditions; give holiday gifts; some bonus if a ship is delivered on time, with profits. Make them say to themselves: 'I will work for this company for many years, and I will have a job in the future.' Abroad, they may earn more, but just for a shorter period.

**Q: Steel utilisation in 2005/2006, projection for 2007?**

A: In 2005, 25,700tonnes; in 2006, 42,100tonnes; in 2007, expect 46,200tonnes. Try to keep it 20% more each year. Big change though. Until now, 60% came from the Ukraine, the rest local. Affects our costs.

**Q: Aker ASA is selling 40% shares in Aker Yards. Will this affect Tulcea and Braila?**

A: Yes, it did sell the last 40.1% of Aker Yards on 16 March. But Aker Yards re-purchased - and now has - 2%, and changed the chairman of the board. The sell-off may cause some cosmetic changes in Norway, but it won't affect us.

**Q: What are the biggest recent - and future - investments at the shipyard?**

A: One of the biggest was the sand blasting and painting hall for big blocks of 1600tonnes, each ready in 10 days after final blasting and painting. This cost €3m. Another was the panel line put into operation last year: it was €3.5m. There were a lot of other important investments, costing less. We are finished now, for example with the enlargement of the syncrolift, which lifts and launches vessels, for €600,000; and with the enlargement of the doors in the erection



Dumitru Ivanov, director general, Aker Tulcea.

hall, allowing the building of the breadth of vessels to reach 27m, costing around €1m. Future investments? We have ordered special trucks for internal transportation for €500,000, and plan to change our transfer system for vessels, since we are moving big blocks around, and our transfer system is quite old. This may cost up to €5m in my estimate.

**Q: Aker Yards is reported to refer orders to the 'Romanian Yards' now. Why?**

A: It signals a one-level step-up. We come directly under AkerYards now, and I am the co-ordinator. Before, Tulcea belonged to Aker Brattvaag, Braila to Aker Brevik. Now I report directly to Aker Yards, and decide how Tulcea and Braila share orders. This takes a lot of reorganisation. ☺

# Plying the Seven Seas



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VIGO - SPAIN

## Orsova 'never had it so good'

'WE have never had it so good as this year,' declared Dr Eng Constantin Badoiu, director general of Santierul Naval Orsova, writes *Ivan Berenyi*.

'Not in any of the 19 years I have been director general here, at Orsova Shipyard,' he goes on. 'Not even in the years prior to Orsova, when I worked as chief engineer for neighbouring Severnav Shipyard in Turmu Severin.'

He added that the times were not only so favourable for SNO, but also for the whole Romanian shipbuilding industry, with every single one of its yards bristling with orders as a result of the global shipbuilding boom, hatching ambitious plans, and looking forward to four to five more positive years.

At SNO, where the orders have been rolling in unabated, the orderbook is already full till the end of 2008, and the boom has allowed yard management to be selective with bookings. Building on its position of strength, the yard has been making arrangements to buy a small shiprepairer on the Black Sea coast and use it for the building of seagoing vessels.

Plans are afoot, furthermore, to put some more money on the Bucharest Stock Exchange, (Bursa) in order to let it accumulate added value, as well as to concede 15% equity to a new investor. Dr Badoiu was a bit cagey in divulging the investor's identity, but he indicated that it was to be a Romanian investment fund.

The yard, whose present value the director general is put at 80m lei (\$33m), could undoubtedly do with new investment.

As things stand, the yard is having to try and pull itself up by its bootstraps, while saving bit by bit to be able to afford new equipment and technology to increase productivity and reduce costs.

'Our last investment was a big crane, and now we can make sections up to 100tonnes. Altogether now we have 400tonnes lifting capacity, which is a big change compared with the past,' explained the long-serving director general. 'The next investments will include an automatic welding machine, a sand-blasting machine, and CNC plasma cutting equipment.'

Orsova Shipyard can produce up to 18 vessels/hulls per year of up to 135m length, 12m width, and 3400dwt, with annual steel utilisation in the region of 13,000tonnes.

All of its current production is destined for export, and to customers primarily in The Netherlands, and Germany to a lesser extent, VeKa, Rensen Beheer, Hendricks, and Oosse being the top customers.

Newbuildings represent 99% of the activity programme, with shiprepair down to one per cent and the 86m x 40m, 800dwt floating dock now in disuse. It could handle building work, but only with difficulty.

Traditionally an out and out hull-builder, the yard is expected to build almost exclusively complete vessels next year, once it has fully integrated the Black Sea facility it is about to acquire by the end of this year into its operations. Chemical and gas tankers and containerships will form the mainstay of production.

'We have been making €20m-€27m turnover annually in recent years,' said Mr Badoiu, 'and, with 18 contracts for this year, we expect much the same. As for the orderbook, till 2009 our capacity is exceeded.'



Santierul Naval Orsova – awash with orders and currently being selective over the orders it takes on.



Santierul Naval Orsova: apparently, they never had it so good.

Asked about the effect of Romania having become an EU member, he shrugged a shoulder. 'We started shipbuilding 15 years ago, mainly for the European market,' he said, 'and I think that EU membership won't bring much change for the shipyard. Over the past years, we have had good connections with Dutch and German customers in particular, and have built 185 vessels and hulls for the European Community. We have the right tradition and ample experience. What can be new?'

SNO kicked off its hull-building programme in 1992, installed €4m worth of new equipment from 1991-95, and in 2001 it invested 30bn old lei into a steel fabrication hall and another batch of new equipment.

The yard built its *piece d'resistance* so far in 2002, in the shape of the chemical tanker *Texas Star* - a hull of 110m long by 11.4m across, with integrated stainless steel tanks. It followed up with two identical units.

From 1992 till 7 November, 2006, Orsova built 172 units, the vast majority of them hulls, including 16 boxships, 11 barges, six tankers, and two pontoons. It also delivered hulls for 77 container vessels, 33 tankers, 12 barges, six pushers, four hopper barges, and a yacht.

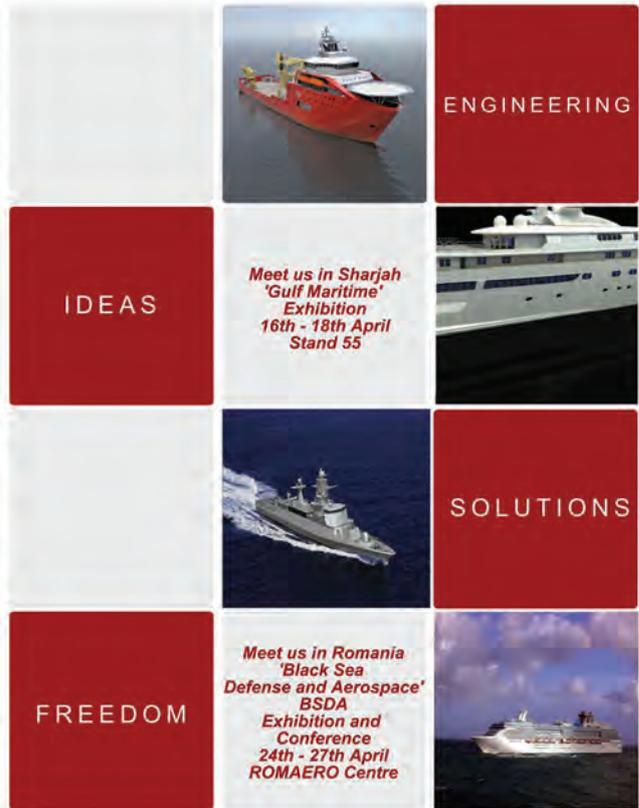
In the first-half 2006 the yard made a loss of 600m lei, which led to Rensen Beheer selling its stake. However, it ended the year in profit, and set aside more than half of the net, 3.5mlei/\$1.4m, to pay dividends. Ⓜ

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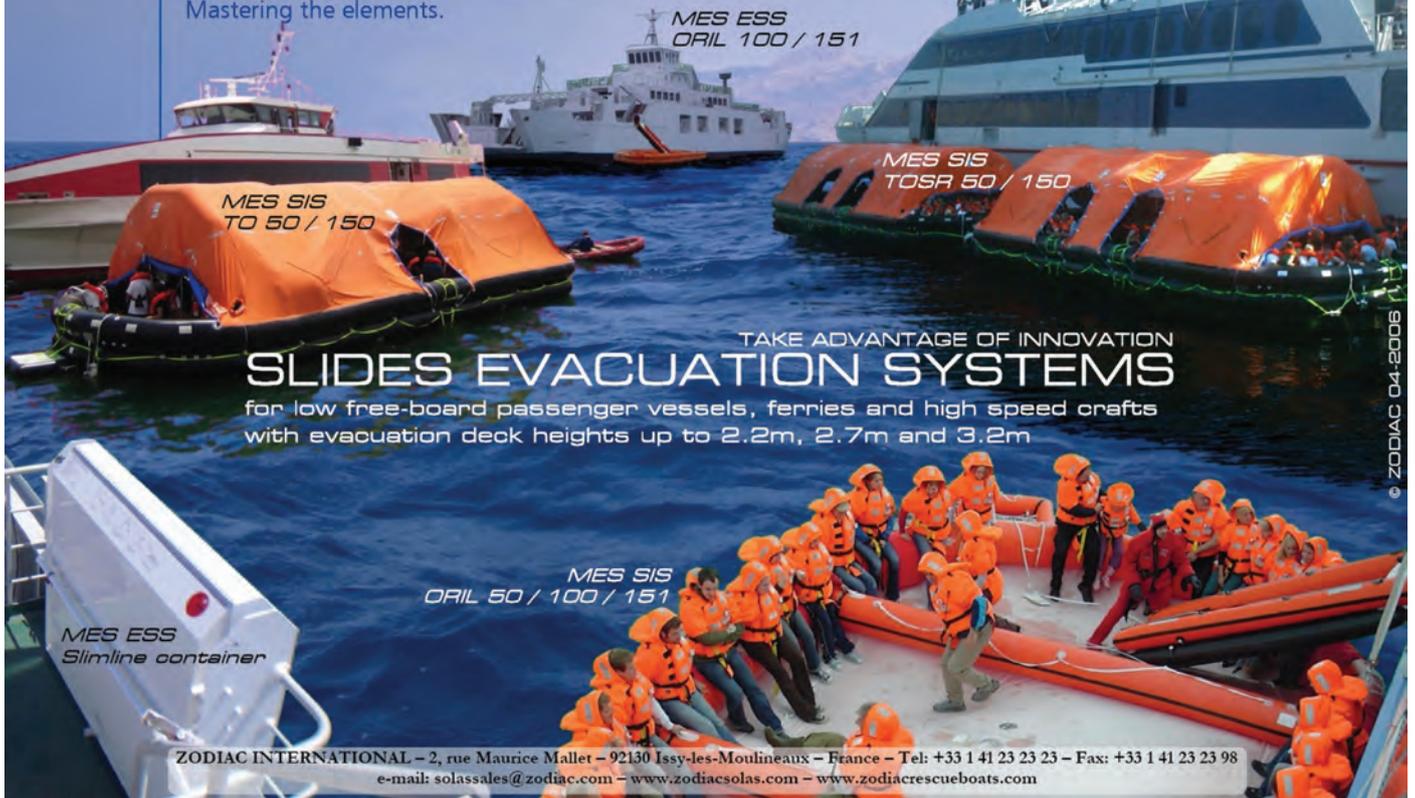
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## The charge of the Korean heavy brigade

**D**AEWOO Mangalia Heavy Industries celebrated its tenth anniversary on 22 January, 2007 by delivering on its very last hull only project, writes *Ivan Berenyi*. From then on, the company said it would only accept orders involving full ship construction.

The journey to this position has involved a builder that was the penultimate of Romania's major shipyards to be launched in the mid-1980s, 45km from Constanta on the Black Sea coast and 4.5km from the Bulgarian border, when 2 Mai had the largest, 103ha, operating area, with ample room for expansion.

A natural deep-sea facility, with a 1.5km berthline, it was equipped with two 300m x 48m drydocks for building, complete with two 480t gantry cranes and a 360m x 60m repair drydock. Furthermore it was served by jib cranes up to 120t capacity, three laboratories, and 13 workshops. The three labs were well kitted-out for the time and the yard was capable of building/repairing vessels of up to 200,000dwt.

Yet, typically for the Ceausescu period, the yard proved to be just a heavily deficit-prone repairer, which built a mere handful of bulk carriers and tankers that needed instant supplementary work in Constanta.

In January 1997, however, the Ministry of Economy & Commerce sanctioned the creation of a joint venture, with 2 Mai holding 49% and the remainder held by what was then Daewoo Heavy Industries, spawned as Daewoo Mangalia Heavy Industries.

Having provided a \$53m cash contribution, boosted the joint venture's total capital by \$103m, and pledged to maintain employment levels at 3300 for three years, the Koreans arrived with a bang, primarily dedicating the initial years to a repairs-only learning curve and the adoption of the Daewoo subculture.

While also pouring in \$15m worth of new equipment in the process, they provided 'on the job training' courses for 6000 within four years. Over the ensuing three years, further investments of \$8.3m, \$1.1m, and \$1m were made, steel processing climbed from 7500t to 16,000t, 25,000t, and 38,000t a year, and the building/repair split changed from \$1m/\$25m (4%/96%) to \$24m/\$17m, \$24m/\$29m, and \$22m/\$44m. DMHI hit the black in 2000.



According to its president, DMHI is behind South Korean yards in terms of sophistication, but ahead of those in China.

Meanwhile a fullscale Tribon system was introduced in 1999/2000.

In 2001 \$2.2m more was invested in the operation, 53,000t steel was processed, the build/repair split was \$30m/\$54m (35%/65%).

Between March, 1998 and August, 2002 deliveries totalled 77 hulls and vessels altogether, including one 42,500dwt juice-carrier of 42,500dwt (203.85m long x by 32.2m wide x 11.4m high), four barges, three pontoon barges, four pontoons, a coupling pontoon, two supply and four inland waterway vessels, 17 coasters of up to 3900dwt, three combi freighters, four chemical tankers, nine multipurpose container carriers and river varieties, five boxships of 2500TEU capacity (211.42m long by 29.80m across by 16.7m high), two general cargoships, and six combi-coasters.

Progressing exponentially, in 2004 the shipyard posted €5.7m net profit on €109.1m turnover, with facilities now able to build ships of up to 100,000dwt, and production capacity for eight Aframax and repairs of 40 vessels per year.

In 2005, an €18m deficit ensued, however, although turnover leapt by 46% to €169.2m, as the price of steel soared. Closing contracts four years ahead, yard management had counted on steel prices rising from €250/t to €510/t, but in fact it ballooned to €700/t.



Jae-Bong Lee, DMHI president.

Operationally, however, things were progressing steadily. A contract for a 228m long by 32.20m wide by 13.60m high, 69,000dwt crude tanker, contracted on 1 October, 2003, was delivered in June 2006 to LMZ Transoil Shipping, and four contracts signed with German builder J J Sietas covered 1700TEU containerships of 178.67m long by 27.60m wide by 19.85m high, starting in 22 July, 2004, produced a stream of work. Three further units, to be fully built, and six (ice class) hulls were added.

Significantly, German ship finance company GEBAB/Conti Holding's 2004/5 orders for 12 +2 complete Panamax container carriers of 4860TEU (275m long by 32.2m wide by 21.5m high) were sisterships of units previously built in Korea - and the largest-ever built in the Black Sea region. With the first delivery in mid-2006, this series is set to run out in October, 2009.

But then, in April 2005, Otker Group subsidiary Hamburg-Süd contracted five 5600TEU capacity (272m long by 40m wide by 24.20m high) ships and, on 23 January, 2007, the same customer returned for six 6300TEU (300.9m long by 40m wide by 24.2m high) boxships. Deliveries of the series are scheduled to finish in June, 2010.

DMHI is expected to take its annual turnover above \$500m in 2007, to \$1bn by 2012, and to become the very top European shipyard by 2010. ☺

## '2 x 1' converts to building

**S**INCE its formation in 1992, the company now operating as 2 x 1 Holding Cape Midia Shipyard has harboured dreams of adding to its repair capability and becoming a building yard, writes *Peter Majoros*.

Finally now, after ownership and (repeated) management changes, the switch from repair to newbuild is happening, according to president Radu Iulian.

Mr Iulian claims that several would-be investors - Greeks in particular, but also Italians and locals - have been calling from the start of this year, offering to buy equity and to fund the changeover, but finding the right formula for such participation has proved elusive.

'Moving to become primarily a shipbuilding yard is a must,' he says, 'but letting new owners in for a big

slice of the yard involves an important decision with long-term effects, which cannot be taken lightly, in haste.'

Even so, the yard is already actively seeking newbuilding work. The majority owner of the yard since 1999, which this year, like last, employs 300 regulars, plus up to 300 subcontractors, is local tycoon Ion Dumitrache. It was he that renamed the yard, tagging on the '2 x 1 Holding' to the Midia Shipyard, it being a hallmark that extends across considerable other interests - the country's biggest taxi operator, a haulage company, four pharmacies, a clutch of petrol stations, a big bakery, and a publishing company.

Asked if the rich man is also an executive of the shipyard, Mr Iulian says: 'I am the boss here, Dumitrache is only the owner, albeit he is behind the move to shipbuilding at long last, too.'

So far there are five newbuilding projects underway, according to Mr Iulian, although no further details were given, while 70 ships are expected to be repaired in 2007, keeping all three floating docks busy.

Facilities allow the building of ships up to 150m length and 12,000dwt. The yard is claimed to have been profitable in four of the past five years. Steeply rising steel prices are a problem, the president admits, but he says it is a manageable one. 'Rather odd though,' he adds, 'that steel from Galati is cheaper in Greece than here.' ☺



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## Galati rises up the Damen league

**W**ELL-organised, steady Galati Shipyard first got involved in 1993 with the global Damen Shipyards operation, becoming part of the Dutch group in 1999 as Damen Shipyards Galati, writes *Ivan Berenyi*.

The Dutch uncle has subsequently invested €45m over seven years in its Romanian arm, and the shipbuilder has risen to third place in the Damen league table that bristles with world-class yards.

The six hulls delivered in 1993 included the first hull to Damen of Holland, which was to sample several Romanian yards. In the event, this project formed the basis for the co-operation with Damen, as well as of building hulls, which was to become the yard's staple.

Damen's negotiations with state property agency FPS for a stake in Santierul Naval Galati (SNG) gradually intensified and, the government in Bucharest having decided that it was time to start selling the shipyards, a deal was struck in 1999. By this time, the yard had forwarded 45 hulls to Damen and, in fact, had already been partly privatised, with help received from the Romanian Commercial Bank and the Bucharest branch of Chase Manhattan, resulting in 34% of equity being in private, 66% in state hands.

Subsequently Damen increased its interest in SNG to 73% in April, 2001 and eventually to 94.5%.

Meanwhile the yard that could claim a delivery record of 270 ships/hulls, equivalent to 2.6m dwt, from 1960-1997, reduced its workforce to 5800 and the number of unsold ships (from 28 in 1990) to eight.

It steadied operations around a 90% building/10% repair split, working through 6000tonnes of steel per year, and received ISO 9001 quality certification in 1997.

It had also reputedly increased productivity by 50%, introducing \$6m worth of new equipment over three years, including ESAB plasma kits, automatic welding, leading-edge blasting, painting, shop-priming equipment, and three distinct production lines for hulls and complete newbuildings.

The 230m x 35m drydock, divided into a dry building/repairs, and a wet launching section, complete with a 320t gantry crane, served units up to 60,000dwt (1); two 180m x 25m building berths with a side-launching slipway and 100t cranes units for ships of up to 26,000dwt; and a 210m x 21m building berth, supported by 80t cranes, 8,000t units (3). In 1999, delivery of 29 units was completed, with nine to follow in 2000, 13 in 2001, and eight in the first-half 2002.

Delegating two Dutchmen as managers in charge of fiscals, Damen gave an initial \$15m for welding equipment, IT, the repair of buildings and for newbuildings, and it



Damen has invested €45m in its Galati yard over a seven year period.

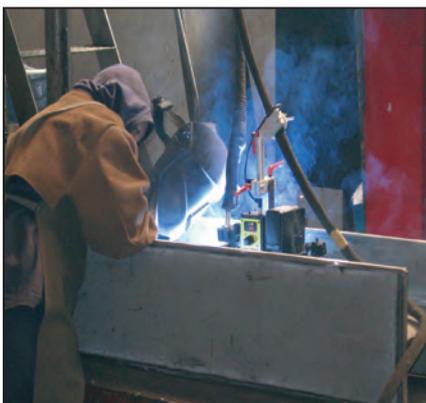


**Damen Shipyards Galati is being allowed by its parent to show a remarkable versatility.**

was decided at the 2001 AGM that profits should be ploughed back into reserves. 40% of the workforce visited The Netherlands to spend time at Damen's home yards and, by that time, 27 orders of 235,100dwt filled the order book four years ahead. Repair's share of turnovers slimmed to 5% and the workforce to 4853. Now, just two unsold units remained.

Local suppliers were prioritised whenever possible and designs tended to come from Icepronav, except when Western European customers insisted on bringing their own designs. In such cases, contact was established with their design bureau, whose demands and local options were aligned, and technical plans were converted into production plans. Local engines, paints, and base materials were used whenever possible, steel plates came exclusively from the local Ispat Sidex steelworks, and, steeped in orders, Damen Shipyard Galati passed some on to other Romanian yards.

The annual turnover advanced in four years from \$22m in 1998 to \$68m by 2003, and in 2004 the yard grossed €6m on a €70m turnover. In 2005, DSG made €6m gross profit again, but this time on a turnover of just €58m - 18% lower. This failed to include, however, production still in stock or under execution, to be delivered in 2006.



Many of the Galati workforce were trained in The Netherlands.

In 2006, turnover is estimated to have reached €106m, nearly 50% higher than in the previous year, overshooting the €100m threshold for the first time.

In 2006, the yard also entered the naval sector. Thus in February it finalised work and launched *Pelikaan* for sea trials, a support ship newbuilding due to be delivered in May to the Royal Dutch Marines for duty in the Dutch Antilles in the Caribbean.

Furthermore, Damen Gorinchem kicked over a contract from the Swedish coastguard in Karlskrona covering the design, engineering,

and construction of two 80m multi-purpose vessels for patrol duties, environmental protection, and salvage operations. An option for a third may be called within the first stage of the project. Particular attention is to be paid to the reduction of fuel consumption by applying a state-of-the-art diesel-electric propulsion system with five generator sets and azimuthing thrusters. Delivery of the duo is scheduled for 2008 and Schelde Naval Shipbuilding in Holland is to control the total contract management until final handover.

Awaiting delivery in 2007, DSG launched in 2006 the 700cm<sup>3</sup> grab hopper dredger *Gambe d'Amford* into the Danube on October 27. Ordered by Cie Dragages Ports in France, it was to be outfitted whilst moored alongside the yard, destined to carry out maintenance dredging in due course at its home port in Le Havre.

Clearly, Galati is now way beyond its apprenticeship in the Damen Group and, free of the humdrum role of hull factory, is being allowed by its parent to display its remarkable versatility. 

## Ship Design Group looks to double

VASILE Giuglea, managing director and 60%-owner of the ISO 9001 certified engineering Ship Design Group, founded in 1994, has a clear vision for his company's present and future, writes *Ivan Berenyi*.

'For the time being,' he says, 'our interest is limited to smaller ships of up to 150m length, and we are steering clear of VLCCs, big containerhips, merchant vessels in general. There are two reasons for this. One is that we are just 50-strong, too small to cut into big projects, which would soak up all our time and effort. It's not a good policy to rely on a single customer. It could prove a very costly mistake. Another is, that - from a professional point of view - it is more interesting to design ships with added value: technical ships, special purpose ships, dredgers, tugs.'

'But we have to grow to increase our scope,' says Mr Giuglea. 'We have to make a living. We're just about to start building a new HQ to be able to double the size of the company to 100. If we reach a critical mass, we can allow ourselves to get involved with bigger projects, bigger ships, and we'll be able to increase the efficiency of our activity by devoting more man-hours to a project, with a part of our costs becoming constant.'

The Galati-based company was created by unifying a number of Romanian specialist outfits in shipbuilding.

From 2000-2004 SDG, then named Vuyk Ship Design Galati, became a member of the Central Industry Group Goerigen alongside Vuyk Engineering Groningen, Vuyk Engineering Rotterdam, Vuyk Kenton Singapore, and Numeriek Centrum Groningen.



Ship Design Group is seeking new staff to match the shipbuilding boom.

But the Dutch side decided to 'restrain activities', according to SDG, and the Romanians duly bought back the shares, re-established control and the company became Ship Design Group Galati again.

Now 100% Romanian-owned, its shares are - Mr Giuglea apart - in the hands of technical director Ovidiu Ionas (30%) and commercial director Ionel Chirica (10%).

'We are able to offer a full design, ie from naval architect specialities to hull piping systems, electrical systems, everything,' says Mr Giuglea. 'It depends on the orders we get. Sometimes we produce basic design. Sometimes detail, or production information.'

The company is organised in four technical departments, and a project manager is appointed to organise communications between departments, and establish a strong link with owners, shipyards, and classification societies for each project.

The design process is fully computerised at SDG and is backed up by high level shipbuilding software, some of it developed in-house. CARENA and SURF hull definition packages are the leading products in the latter respect.

However: 'Investment is needed,' says Mr Giuglea, 'for purchasing more hardware and software, and for the recruiting of additional employees. The last one is by no means easy right now due to the boom in the shipbuilding industry, and the initial pull of the EU. A lot of people have already left Romania for Western Europe and the USA.'

SDG has, however, its own method to counter the problem; by recruiting fresh graduates from the mechanical faculty of Galati University. 'We have enough candidates,' he says, 'but we need time to train them to become proper shipbuilding designers. In the newbuilding we'll be able to employ 50 new graduates. We'll offer them good conditions, a very reasonable salary - and will try to convince them to stay home. The industry is growing very fast, and it will become more and more difficult to find skilled people' 

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## Constanta Shipyard in holding mode

**NOW in private hands, Romania's slumbering shipbuilding giant looks to serial production for sustenance, writes Ivan Berenyi.**

**E**MERGING into the sunlight after a long, dark period, Constanta Shipyard - better known in Romania as Santierul Naval Constanta (SNC for short) - made \$2.4m/68,765bn lei net profit on 947m lei turnover in 2004. It ploughed the money back into capital, paying no dividends.

In 2005, the yard achieved \$4m in profits on \$77m turnover.

Finally, the yard was on an even keel and, in 2006, another profitable year, management claimed a healthy order book. Orders included a contract for 10 x 41,000dwt IMO 3 oil/product tankers worth €300m in total from shareholder Histria Shipmanagement, of which four have been delivered, with the rest due by mid-2008.

Additionally, management reported handling five or six repairs/conversions per month.

SNC has a pretty impressive array of shipbuilding facilities dating back to the late 1970s/early 1980s. They include a graving dock of 350m x 58m x 10m, supported by two 480t and one 120t tlc frame cranes, making it possible to build/repair vessels up to 250,000dwt; and another big dock of 350m x 48m x 10m, supported by two 120t and one 50t tlc cranes, for ships of up to 150,000dwt - this duo alternates between building and repair according to workload.

Furthermore there are three building quays - one apiece of 460m, 450m, and 250m long, all with 10m draught, as well as two floating docks. There is 2800m of berthage, with vessel's draft up to 8m, fully equipped with 3 x 380V and 50Hz/3 x 440V and 60 Hz power supply, along with oxyacetylene, welding gas, sea & fresh water, and 5/9bar compressed air facilities.

But, despite available facilities, trouble brewed from the beginning of the 1990s, newbuilding activity having ground to a virtual halt from end-1989, in the down-at-heel years following regime change. There was a single delivery per year from 1990-1993 - one 170,00dwt and one 165,00dwt bulker, a 12,000dwt rail ferry for local firm Petromin, and a 170,000dwt bulk carrier



SNC has an impressive array of shipbuilding facilities.

for Safmarine of South Africa. No ships at all were delivered in 1994. With no credit available and much equipment desperately old, crippling delivery delays followed and repairs came to be favoured, needing no advance spending.

From 1995-2000, just a modicum of new equipment was received, and 10 hulls were delivered (mainly to German owners). Meanwhile, debts accumulated in earlier years swelled to a hefty \$30m load, and to top it all 10 welders died in an explosion in the yard mid-2001, while working on the hull of an 85,000dwt Maltese tanker, *Anapolis*.

Santierul Naval Constanta director general Radu Rusen.

This was the last straw. It had become painfully obvious a good year earlier that only the sell-off of the majority of equity could bring yard revival, and the APAPS privatisation agency took the task in hand, with BRD-Societe Generale acting as consultants.

But, partly due to insistence that the \$30m debt should be adopted by a new owner, one attempt after another failed, and finally a controlling interest was sold for a puny \$17.4m to previously unheard of Marshall Islands-based Resource International - controlled by Romanian business tycoon Gheorghe Bosanceanu - in October, 2002. The bidder, whose attempts at acquisition had been repeatedly waved off before, steadfastly refused to pick up the \$30m tab.

Constanta-based Histria Shipmanagement SRL and Technical Shiprepairs &





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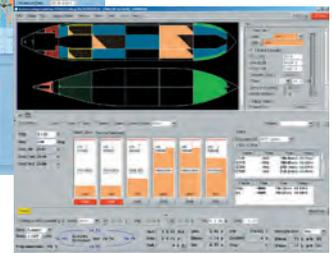
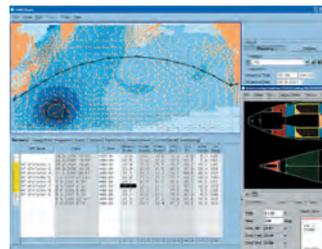
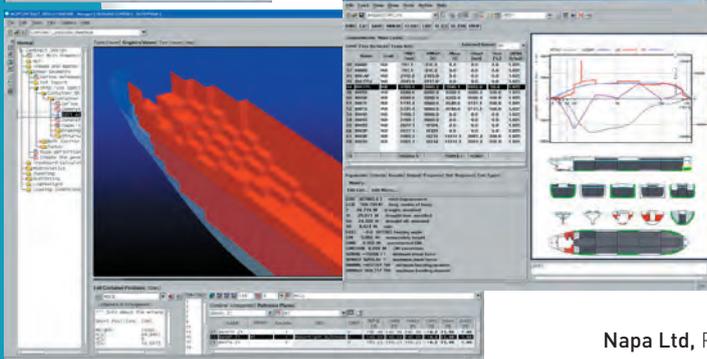
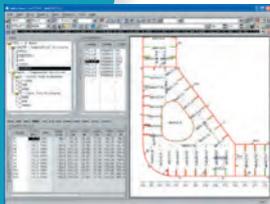
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## Constanta yard speaks for itself

An interview with Santierul Naval Constanta director general Radu Rusen.

**Q:** How is Romania's EU membership likely to affect your business?

**A:** Little, in general terms. We've been competing in the international market for 17 years, we have gathered the experience needed, and our products are competitive. Our Achilles heel is the workforce. The borders are open, the workers' pay is less than 50% of those in western yards, and they are free to go and work abroad. Some 70 of them left so far this year.

**Q:** Can you keep them by increasing wages?

**A:** Trying to maintain a direct connection between increasing productivity and wages has been for some time the logical approach, which we adopted. But now there is more pressure, so we'll have to up wages even if the rise is not covered by increased productivity. We'll strain to reverse this – to push up productivity to be able to pay them more, to get them nearer and nearer to the Western European level. It will take a few years.

**Q:** What are the numbers involved? Is Constanta being Romania's costliest city a factor?

**A:** We have 2350 regulars and 1100-1300 subcontractors over the past five years, since privatisation on October 1, 2002. We have enough in the orderbook, and don't want more, and we are aiming to maintain flexibility at the yard and to focus on business, not on managing the workforce. So we don't want more, just to keep level. Constanta is the costliest city behind Bucharest. Living costs are higher than elsewhere, up by a notch. Trying to cope, we run a training programme for young workers. How long does it take, what does it cost to train one? Difficult to calculate. It's a split between the education the worker gets from the state, and the cost of our training. We tend to train a working team before allowing them to have a go on our products.

**Q:** What's your design policy?

**A:** We develop designs co-operatively. They are conceptually done by us, and are thus owned by the yard, done for the yard. They are not the type of designs that can be made available to various other shipyards.

**Q:** How is the shipbuilding boom affecting your shipyard?

**A:** There are two separate issues. One relates to conversions, of tankers in particular, from single to double hull in line with new regulations. We have done several of these projects, and now more and more are coming. This is logical – a natural corollary to more demand for ships. The other is newbuildings. Starting with the end of 2004, there is a better market in the newbuildings sector, which obviously positively affected our yard, resulting in an order book being full until mid-2010.

**Q:** Being so full, have you refused any projects?

**A:** We did, either because we had no production capacity available, or because it was not in line with our marketing goal, which is to build a series of vessels instead of wasting time with single vessel projects.

**Q:** When did you switch to building vessels in series?

**A:** The newbuilding programme was stopped in 2003 in order to upgrade the facilities, and prepare the shipyard for serial production, and it was in December 2005 that a new period started with the next newbuilding, of the series of 17 to 21 x 41000dwt product and chemical tankers. We completed one in 2005, another four in 2006, and we will continue with them. A number of companies from Malta and Liberia, and Germany are the customers for these vessels. One of our major clients is Interorient, they ordered four vessels.

**Q:** So what happened in 2001/2002?

**A:** The shipyard suffered huge losses without projects at that time, and was involved in a painfully small series. Mostly, each project was for one vessel. What added to the losses was that financing in Romania was quite difficult and extremely costly to get organised, and the yard could not get into big projects.

**Q:** What's the building/repair split annually of late?

**A:** 85% building, 15% repairs. The conversions were dealt with by the repair division.

**Q:** For 2005, wildly differing results were published. What could cause this?

**A:** I don't have the figures, but probably it is strictly related to the fact, that at the end of 2005 the first of the product tanker series was delivered, which caused a loss due to three factors. One was that the first installment of a series had much higher expenses due to labour specifications and technical difficulties. Another was that the cost of steel increased a lot between 2003 when the contract was signed and the date when the ship was actually purchased - more than 150%, so it was 250% over what had been budgeted. A third was that the lei appreciated vis-à-vis the \$ and the €, and this affected shipyards with their lengthy production cycle.

**Q:** Aren't you afraid that SNC may get sold from under you? To DMHI, for example?

**A:** To my knowledge there is no intention of preparing the company for a sell-off. Regarding DMHI, I am not aware that they would be interested in the yard, and have not heard that they have contacted the main shareholder with an offer.

**Q:** Well, DMHI - or whoever. Marshall Islands, obscure company, Romanian moneyman, 97% stake...

**A:** It is just 94.8%, and the present prime shareholder is Resource International, which owns several other Romanian companies, too. Gheorghe Bozanceanu has an interest in some, but he is not a direct shareholder in Constanta Shipyard, and he is not a money-man but a shipping man. Not a financial investor from outside of this industry. He was a master mariner, who established a shipping company, which had a number of contacts in SNC. He performed several repairs in our yard, his group owned vessels built by us, and he had - has - a depth of knowledge about the yard. The reason why he decided to participate in this privatisation process was that he knew our situation very well, and had confidence in the workforce's skills, he hoped that he would be able to revitalise the activity of the shipyard, and turn it back to a more profitable situation.

There was an auction, and only one bidder. Strange that no one else was interested in the yard, which was looking competent, albeit it was in a difficult situation, close to bankruptcy at the time of a very low-level of the shipbuilding market. The buyer took a big risk with his money, whichever way he got it. The yard covered most of the third party debt. The debt to the state was converted to shares and resold to the buyer. Now the yard is in a sound fiscal situation, we have a good orderbook, and we expect no problems ahead. The order book is worth now \$500m-plus.



The Constanta yard has had to address the threat posed by its workforce leaving in numbers for Western Europe.



The yard prefers series production to the type of one-off orders that coincided with its troubled period at the turn of the century.



Now in production – the orderbook is full and SNC has even turned work away.

Maintenance SRL picked up the spoils. Following a \$4.4m capital hike, Mr Bosanceanu now owns 97% of SNC, a stake claimed to be worth only \$15m, although it deserves mention that the debt load, considerably augmented by massive losses in 2001/2, hangs over the yard until the present day. ⚓

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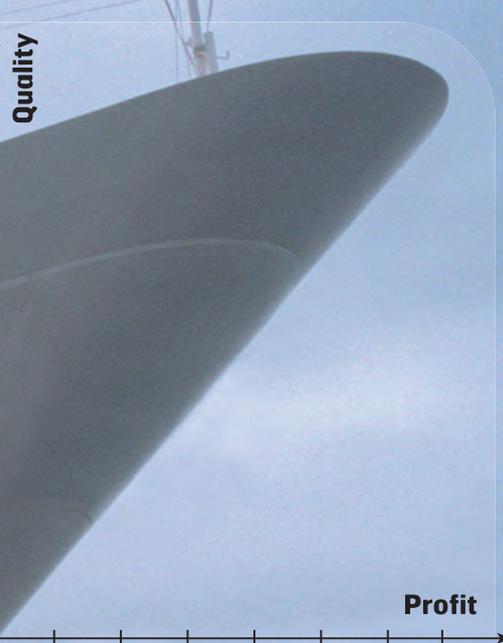


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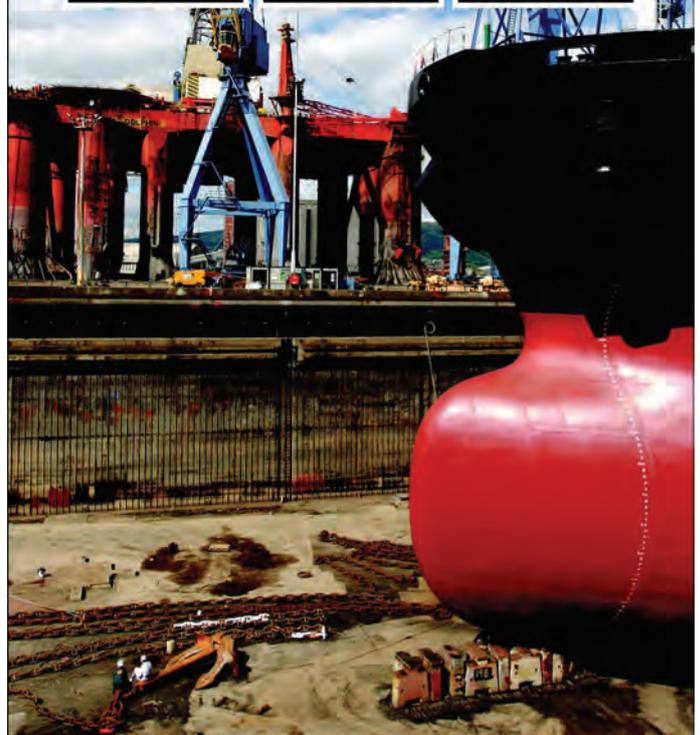
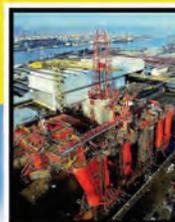
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## Aker Braila rides offshore wave



Aker Braila has orders for 40 ships, with offshore providing the mainstay.

**A**KER Braila Shipyard has no fewer than 40 vessel contracts in its orderbook, writes Ivan Berenyi. Of these, 30 orders are for partly outfitted hulls to be delivered to Aker Norway and 10 will be complete ships.

All of these hulls, which take the orderbook up to 2009, are offshore or specialised units, and are of different sizes, with lengths ranging from 75m -110m, although the yard can build vessels of up to 150m long by 22m wide by 7m draught.

Romania's entry into the EU might have been expected to have had an impact on the yard but, in general, Aker Braila director general Florinel Flor said he did not expect an excessive impact.

'As a member of the Aker Yards Group, the biggest in Europe, we can count on having orders by the score and on a bulging order book,' he said. This was 'totally unrelated to being inside the EU. The task is to increase the yard's efficiency and productivity, to become truly competitive with the Western European brethren.

'Of course, wages will escalate, because living costs will rise at the rate of knots in Romania. What to do to stop workers leaving for richer countries? In the short term, you can't do a lot. You can't double pay overnight. But in the longer run we can do things. We have an ambitious programme in the yard to hike productivity, aligned with raising wages. We'll provide a chance to our employees to better their lives step by step.'

Mr Flor admits that the drifting westwards of the most experienced is an everyday phenomenon in Romania. 'We have been lucky,

however. Our loss in the past 30 months was 50-75 people per year. Other yards like DSG and DMHI have been a lot worse affected, losing hundreds. We also do supplement in two ways. A training programme for half-skilled youngsters, and taking finishers from a Braila trade school got underway three years ago. We also delegate selectively for courses at our yards in Norway and elsewhere.'

Braila employs 2200 full-timers, but in addition also has in the yard 1600 subcontractors on average, some 300 of them foreigners. Steel usage was 16,000tonnes in 2005, 17,000tonnes in 2006 and the projection is for 24,000tonnes for 2007. The reason for the variation is that the yard has started to build complete vessels and partly to outfit hulls, so that the corresponding tonnes of steel are related to a longer period of fabrication.

In the past two years the yard suffered €5.1m and €2.17m losses on turnovers of €46.7m and €37.1m, but the projection for 2007 is a €626,000 profit on a €71m turnover.

But, unlike other shipbuilders, Braila does not pin the losses on soaring steel prices. In fact, the roots of the deficits stretch back to 2003 and earlier, the director general claims, and a time when the yard was under different ownership. 'We belatedly suffered the consequences of unperformed historical contracts coming into force prior to 2003, as a result of which the Amsterdam Court of Arbitration ruled, after lengthy consideration, that we were to pay [Dutch tanker operator] Gefonzo €4.7m compensation - which was paid to the full, turning profit into a loss for that year.'

There was also an explosion aboard a ship being built in the yard last December, injuring six welders. 'We could not decide which of two possibilities caused this,' the director general said, resignedly, 'ie, either a concentration of welding gases, or of vapours from thinners used in painting. But it occurred on our premises, and clearly something had to be wrong with the procedures we used. To prevent a similar occurrence, we have changed procedures, and have invested in devices controlling the atmosphere in vessel compartments.'

Asked how will it affect his yard, if Norwegian industrial holding Aker ASA, heart of the business empire of billionaire Kjell Inge Roske, sells its 40.1% stake in Aker Yards to free up capital for other businesses, in line with reports circulating, Mr Flor was adamant that 'it will have no effect at all. Aker Yards will retain its name, the fantastic order book existing, and contracts will continue to flood us, forcing selectiveness.'

Having supplied seven units (two 8750dwt cargo carriers and four trawler hulls, plus a 498TEU boxship) in 2000, seven again in 2001 (four trawlers, a 185TEU boxship, and two 8750dwt cargo carrier hulls), production was up to 12 units by 2002. In 2003, 13 deliveries ensued. Production dipped in 2004 to just eight units, but recovered to 10 units in 2005, with two of these being complete construction projects.

The 2007 programme calls for completion of 14 units, of which 11 will be partly outfitted ships and the remaining three will be complete IMO II 15,000dwt chemical tankers. ☺

# Icepronav researches its development

**AFTER its restructuring, Icepronav is steadily building up its workload, based on international business, writes Ivan Berenyi.**

WITH its 700 graduate naval architects, engineers of all persuasions and economists, and wealth of development and test facilities, the state-owned Icepronav SA Research and Design Institute for Shipbuilding, Galati, was a beehive of domestic activity after its formation in 1966 for two and a half decades.

However, having been the design source of 1500 newbuilding designs of up to 175,999dwt, its state support vanished coinciding with the change of regime, and it closed its doors in 1990, only to re-emerge for a precarious hand-to-mouth existence till 1994, when it turned to foreign markets and exports and gradually its earnings from abroad rose to above 80% of its income.

In 1997 Icepronav became one of the main design subcontractors of Chantiers de l'Atlantique, which commissioned it in 2002 to develop the conceptual and detail design and create a 3D Tribon Model for the fore hull part of *Queen Mary 2*.

In the meantime the company had been privatised in 2001 through a contract with the Sutton Group. The company also started a long-term co-operation with BAE Systems.

But, alongside these positive events occurred a slide into an esoteric ivory tower and talking shop until, in 2005, 97% of Icepronav's equity was snapped up by London-based Norwegian Steinar Draegebo's ICE group, with Damen Shipyards Galati as the 3% minority shareholder.

The new UK owner has instituted big changes at Icepronav in terms of structure, processes, and procedures, making everything more transparent, increasing efficiency, and integrating ICE and Icepronav in the process under a 10-member ICE Group Board, which now includes seven Romanians.

Steinar Draegebo is board chairman, while Robert Swan, who has an extensive business and engineering experience from Canada, is the president and chief operations officer. Alina Florea

**Alina Florea, Icepronav managing director.**



## Icepronav in its own words

Interview with Icepronav and ICE MD Alina Florea, by Peter Majoros.

**Q:** What is your Academic background and work history prior to Icepronav?

**A:** I am a Galati University graduate of naval architecture and I've been involved with Damen Shipyard Galati, charged with the purchase department. They supported me with a scholarship in Holland for an MBA. Earlier I had been foreign trade officer for marine equipment at Braila Shipyard and at DSG, where I was later restructuring adviser, helping to change the company. I have also completed a course at the NIMBAS graduate school of management in Bradford, and entered Icepronav as project director, the main task being to implement all routines and procedures regarding project management, but in the meantime my position changed to be the managing director.

**Q:** What has been your latest concern in your new job?

**A:** We have been through an external audit of BV, which was a success, and now a quality management system for Icepronav Engineering will be under certification audit in June. We'll see which of the classification societies will be used, we are in discussion with several companies.

**Q:** How have the big changes been pushed through so fast?

**A:** I think, having one big shareholder whose interest is to see this company running as soon as possible, and who really understands the opportunity he has in the market with this company, helped, plus the fact that Icepronav started to work in a business mindset in 2006.

**Q:** I have some negative questions to ask.

**A:** Icepronav had indeed created an external perception of a company declining for many years after 1989, perhaps mainly because the company found itself as a way of survival on the side of detail design and of the intensive use of Tribon. However, now the company has already ensured a layer of detail design contracts for 2007 just to fund all the operations of the year. We'll fill in the rest of the capacity with basic design.

**Q:** Does the company still get funds from the government? For research, eg?

**A:** No. The company is self-supporting. A small capacity of the company, up to 7% - 10% has been used for research. At the moment, our main research partners are Romanian research institutes or organisations. However we started to be careful with what capacity we allocate to what type of research projects, because now the potential of having revenue out of the rest of the market is high and we would like to see our people involved in something financially productive.

**Q:** Is your testing capacity heavily used? Or is it more the designing capacity?

**A:** Definitely the designing capacity. Last year though, we had the testing capacity quite well used, and at this moment in time we are working on an extensive marketing programme for our testing facility. We have contacted at least 100 companies at the beginning of this year, which might be interested in conducting testing, and manoeuvrability testing in our facility.

**Q:** How many people does Icepronav SA employ now? What percentage are graduates?

**A:** The number of our employees is 340, out of which 310 are direct employees - designers, engineers working directly on a project. Out of this 310 probably 280 are university graduates, the rest are technicians and draftsmen.

**Q:** To what extent do you want to increase workforce?

**A:** We are not only in the commercial market now. 2006 meant a diversification and now we are running parallel projects in commercial, navy, and offshore. Practically these are three markets with different cycles. So usually if the commercial market rises, it goes down in 4-5 years, and the others will help us to ride the wave. The forecast of the recruiting this year is that we may get close to 500 in total, which is a very bold action from our side. Last year's experience showed us that there is a large potential in our labour market. In June 2006 we hired a conference room in the Museum Of Science here in Galati - it is a large hall, somewhere around 150 seats, and we presented our company, our interest, and details about a technical career within Icepronav SA. We were amazed by the positive response we got.

- a Romanian who joined Icepronav in January, 2005 as project manager - became third in the hierarchy as the managing director in July, 2006, while Brett Martin is chief financial officer.

Big-time investment was sunk, furthermore, into Icepronav's Galati building stock, upgrading and changing it to allow the running of seven to nine-big projects in parallel involving 35-70 staff.

The 'old Icepronav' has, in fact, been restructured into three companies. Of these, Icepronav SA retains the Galati headquarters, with all the development assets and the testing facilities. These range from a model basin for developing hulls with low resistance but good propulsion and a K14-D Kempf & Remmers cavitation tunnel with four measuring stations for optimising propeller design in terms of efficiency, cavitation, vibration, and

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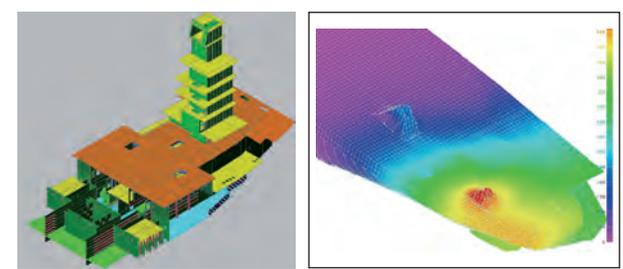
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A Nautical Institute project sponsored by Lloyd's Register Educational Trust



## The International Human Element Bulletin

**Issue 14** of Alert! focuses on the importance of effective communication, as the key to the successful operation of any ship.

The ability to properly convey information by word of mouth and/or by written communication is important not only to the safety of ships' crews, visitors and passengers, but also to the wellbeing of crews.

While the correct use of language is essential to effective communication, so also are the dissemination and exchange of information, ideas and knowledge, and the means of enabling crew to keep in touch with their families.

The centrespread feature - *The alphabet of effective communication* - offers 23 steps towards effective communication.



**Issue 14 is now available from [www.he-alert.org](http://www.he-alert.org)**

# 2007 RINA LLOYDS REGISTER SHIP SAFETY AWARDS

Nominations are invited for the 2007 RINA - Lloyds Register Ship Safety Awards.  
*Entries close 1st January 2008*

The RINA - Lloyds Register Ship Safety Awards recognise recent innovations or developments which have led to an improvement of safety at sea, or which have the potential to do so.

Entries may be submitted directly by individuals or teams from universities and industry from any country, and may cover design, construction, research, equipment or operations. Entries are judged on originality, quality of design, feasibility of production and contribution to ship safety.

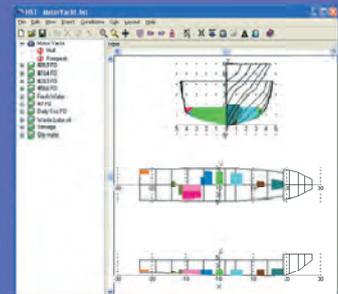
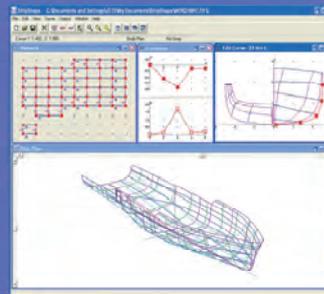
Members who are aware of recent work by a university, company or organisation which has or could lead to an improvement in safety at sea are invited to nominate them for one of the Awards, giving brief details of the achievement. The nominated university, company or organisation will then be invited to submit an entry.

There are separate categories for universities and industry. An Award of £1500 is made in each of the categories and will be presented at the 2008 RINA Annual Dinner.

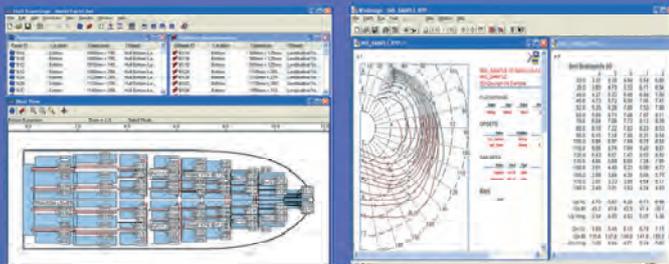
Requests for further information and expressions of interest should be forwarded to:



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strength, to a wind laboratory with a consultative function with two wind tunnels and diverse tanks and workshops.

The three tanks are a manoeuvring and offshore engineering tank with 40m x 40m x 1.50m dimensions, plus a large (12m x 6m x 2.80m) and a small (4m x 3m x 1.20m) towing tank. There is also a fire testing laboratory and mechanical, propeller, and ship model workshops. The facilities also include IT hardware that extends to a Digital Alpha 4100 and a 2100, as well as 200-plus PCs, a UNIX Internet server, and a Windows-based INTEL server for Tribon M1 and M2 applications, as well as the domestic Romanian and foreign databases. The latter, with the help of which old Icepronav increased export earnings of total turnover from 27.33% in 1996 to 89.5% in 2002, stretches from the Damen Shipyards Group in Holland, to Ferrostaal and Blohm & Voss in Germany, Aker and Chantiers de l'Atlantique in France, BAE Systems in the UK, Aker Brattvaag in Norway, and Halifax in Canada, among many others.

Among prime achievements for 2006 were the completion of an Arctic containership design for, and a framework agreement with Aker, hull design of a passenger cruiseship for Chantiers de l'Atlantique and a detailed design and technical service contract for a major Viktor Lenac conversion. Ⓢ

Hull modelling at Icepronav.



**Icepronav contacted at least 100 companies at the beginning of this year to seek out those interested in conducting testing, and manoeuvrability testing in its facility.**



## Retec works on the inside

**S**EVENTY-two staff strong Retec SA-Romanian Electro Trade Engineering & Consulting provides a full range of ship's electrical services, along with radar, radio, IT - and other - embellishments if required, starting with engineering and ending with commissioning, writes Peter Majoros.

The company has been a subsidiary of Alewijnse Marine Systems since its formation in 1995, when director general Pieter Smit - an itinerant AMS point-man - acted as midwife.

The company handles - in some cases also produces - main, auxiliary, emergency, and one-line diagram switchboards and panels, starter boxes, ECR, bridge, control, and wing desks, radio navigation, lighting, communications equipment, and alarms. It also delivers, mounts, and installs cable trays and commissions complete systems for ships and provides the after-sales service. When commissioning, all systems and devices are started up and tested, configured and phased to suit customer requirements. A main switchboard may cost as much as €150,000.

Retec is also the exclusive distributor on the Romanian market for other equipment manufacturers, including Untel Cable (electrical cable), Mastervolt (battery chargers and invertors), DOSE (lighting fixtures), Aqua Signal (navigation lighting, lighting fixtures), DEIF (measuring instruments), DHR (lighting equipment), GK (watertight penetrations), Zenitel (communication systems), Observator (tank sounding systems),



**Retec's role in supplying electrical systems for ships is an important pointer to the strategic plans of parent Alewijnse Marine Systems.**

PRAXIS Automation Systems (automation systems), ORLACO (camera and monitor systems), and TYCO (fire detection systems).

Retec staff are often delegated to carry out jobs in The Netherlands, which are AMS referrals, and so are the vast majority of domestic Romanian jobs involving Dutch owners or yards.

Mr Smit also uses the Romanian base to try and expand AMS's presence to new countries

further afield, sending Retec staffers on initial assignments. So far these efforts have led to the establishment of a Nikolayev office in Ukraine, while Bulgaria is served from Retec headquarters by 'Glamox Contact Bulgaria'.

Installation assignments are usually handled by one or two staffers, but more often than not bigger teams are delegated in cases of more exotic destinations. Ⓢ

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## Menarom's strength in depth

WITH over three decades of experience in marine products, Menarom SA, based in Galati, has developed into a solid, medium-sized manufacturing company of an impressively wide range of products, writes *Ivan Berenyi*.

Presently employing a staff of 475, the company has been raising productivity and carefully downsizing the workforce for some years, in the process generating a steadily rising income. A turnover of €4m in 2005 was followed by one of €4.5m in 2006.

The company's sizeable, 12.5ha premises were originally occupied in 1870 by German company Strousberg's Romanian Railway Workshops for making rail spares, and are unsurprisingly very conveniently situated for onward transportation of goods linked to the railway network and to trunk roads, as well as being close to an airport and just 4km from Galati port on the Danube.

In 1966, IMNG converted the site to make deck equipment for Romanian shipyards, and subsequently, in 1990 Menarom SA emerged, to become partially privatised in 1999 and thereby a Dutch-Romanian shareholding joint venture.

The company has six workshops on its premises, three assembly bays, a 75m x 75m outside test area for cranes and a platform for testing cranes and winches. The marine product line extends to anchor, mooring and coupling winches, capstans, chain stoppers, fairleads and warping rollers, bollards, anchor shackles, hatch covers and ramps, HIP-POOL and SHHP-POOL welded anchors, cruising anchors, life raft davits and cranes, special winches according to customer requirements, bespoke heavy steel construction ladders, multiple pivot and gravity pivot davits and many others – all meeting the approval of the major classification societies.

Also available are electrical installations, control panels, cable trays, marine drives and a diverse range of remote controls for marine fittings and



Menarom prides itself on the variety of products it is able to produce for the marine market.

devices, such as electrical control stations and switchboards (eg control stations for winches and main switchboards for special ships), navigating panels, control desks for the vessel's main engines, measuring and protection units for three-phase electricals, starting resistors and speed regulation boxes for AC/DC motors.

Two products have come to dominate sales, however, according to production manager Lucian Irimia, with rotor blades taking up 30% and winches 31%. Exports overall represent 75% of turnover.

On the home front, the two Aker yards, Tulcea and Braila, plus Damen Shipyard Galata are the biggest buyers of Menarom products, while The Netherlands, Germany, Norway, and France are the leading overseas markets, and the top spenders are Dutch customers Van WijkWerkendam BV, Van der Velden BV, Ship's Equipment Center, Schmitt Anchors, Chaincables BV and Veth Motoren BV. They are followed by Deck Machinery Norway, ACBI France, and Ebert of Germany. ☺

## SCM aims for shipbuilding future

CONSTANTA-based Servicii Constructii Maritime plans to become a noteworthy export earner, in its growing role as a builder of river craft and all sorts of smaller vessels, with a modicum of retained shiprepair activity, writes *Marika Ungvari*.

The company's director general, Alexandru Cindea, declared that SCM had the expertise and the facilities needed on its 57,100m<sup>2</sup> premises, which includes a 12,867m<sup>2</sup> covered production area, to match its ambitions.

Employing 195, the company is capable of building and repairing vessels up to 90m x 20m x 3.6m dimensions on its slipway and also has a small repairs drydock, plus three cranes.

The covered production area incorporates a mechanical manufacturing hall, an engine



Inside SCM's covered production area.

assembly hall, a naval equipment hall, a forge workshop and an electrical workshop, stores and warehouses.

During 2005 and 2006, SCM repaired 50 vessels per year, while the company said it had 10 under construction.

Founded in 1977 as a division specialising in maritime equipment of the Hydrotechnical Construction Enterprise in Constanta, it left the fold in 1991 together with another division, and the duo merged to become SCM joint stock company, with a board of administrators made up by three elected members and 196.3bn lei capital, in which Transilvania Investment Company of Brasov holds 97% of equity.

The company has recently booked contracts to build river barges for Romanian shipowners according to marketing manager Daniela Moroianu.

In 2005, SCM made €100,000 profit on €4m turnover, and in 2006 its turnover was €3.5m. ☺

## Resita Renk moves into gear

**R**ESITA Renk S A Fabrica de Reductoare (RRR) is the result of a collaboration between two Romanian companies - mechanical engineering firm UCM and a Bucharest trading outfit (49%) - and German propulsion technology specialist and MAN group member Renk AG (51%), of Augsburg.

Its formation came about because the Ceausescu government wanted to establish a licensed marine gearbox plant of its own on Romanian soil.

The extended licence agreement also includes the manufacture of marine auxiliary gears for an economically efficient onboard power generation with the main propulsion engines.

For gear wheel production, cylindrical milling cutters for up to 2000mm diameter cylindrical gears, milling of up to 1000mm diameter cyclo-paloid gears, and tooth flank grinding machines with a capacity for diameters up to 1600mm are available.

The grinding of tooth corrections as well as tip- or end-relief profiling are fully automatic. Tip relief provides improved mesh characteristics under load. End relief reduces the load on the tooth ends.

The market calls for minimum gear dimensions and high power transmission capacities, according to Resita Renk. This requirement can only be met with appropriately hardened toothings. A high-performance heat treatment shop is therefore a key requirement. A controlled atmosphere ensures high quality and accuracy in carburising and hardening processes. Heat treatment of parts measuring up to 1200mm in diameter is possible. Only a consistent quality assurance can guarantee the high standards and reliability of RRR products.

All raw materials and externally sourced supplies are scrupulously inspected on a routine basis. Every tool is checked time



Marine applications will generate 50% more business for Resita Renk in 2007.

and time again as it passes through the production cycle. RRR has its own design department, which adjusts products to customer requirements. On the domestic front, RRR's products have primarily been sold to Damen Galati, DMHI, and Navol Oltenita Shipyards and to the Navrom Galati river fleet, and abroad to the Dutch trio of Bodewes, IHC, and Volharding, Bourgas Shipyard of Bulgaria, and Croatia's Uljanik Shipyard in Pula.

The prime customers for Resita Renk marine gearboxes are Dutch customers, either directly, or through Romanian subsidiaries.



## Dutch foster equipment links

**F**ROM kicking off as recently as 2001 with starting capital of €7000, Dutch Marine Trading (DMT) Galati had built up a turnover of \$5m by 2006, writes Marika Ungvari.

The privately held company, founded by Dutchman Pieter Shure, is specialised in trading in a wide range of traditional marine products in Romania, but is also looking for deeper involvement in design work and production.

The company employs 26 and, according to production director Gabriel Georgescu, Mr Shure is the controlling shareholder, but the minority shareholder is Pieter Smit, another Dutchman who is also director general of Retec Galati. Mr Georgescu added that DMT was in close cooperation with fellow Romanian marine companies Menarom and Promex.

DMT Galati's fledgling design team operates under the auspices of a distinct subsidiary

company, Dutch Marine Trading Design. Its products include anchoring, towing, and mooring winches (made by DMT and delivered as complete systems with control stations), anchors, chains and steel wire, dredging equipment, custom-built valves, drag heads, suction and discharge pipes, bow thrusters, and cable trays, plus deck equipment of all sorts - capstans, fairleads, bollards, rollers, etc. All are approved by the major classification societies.

A large number of powerful towing winches, for tugs, were especially developed for the Damen Group. Other customers for deck equipment for tugs have been Smit International, British Petroleum, Bogazic Shipping Turkey, and Kazmortransflot Ukraine. Customers for deck equipment provided for equipping inland and seagoing vessels have been Dutch companies, in the shape of Rensen Beheer,

Smits Machinenfabriak, De Gerlien van Tiem, Vof Oudcomb, De Waardt Shiptrading, plus Euromaritime Shipbuilding Belgium, Nico Middle East UAE, and Aker Kvaerner Group.

Customers for dredging equipment have included four Dutch companies - Van Oord NV, Royal Boskalis Westminster NV, Shipyard K Damen, and Van der Kamp BV.

Indeed, DMT Galati claims its products are a feature of 800 inland, 180 seagoing vessels, and 250 push barges.

There are two further DMT companies of much the same ilk in Holland and in Ukraine, both of which were launched around the same time as DMT Galati and are likewise into trading, design, and production. Pieter Shure is the majority owner of both of those, too, and the three exchange products with each other, but steadfastly retain their independence.

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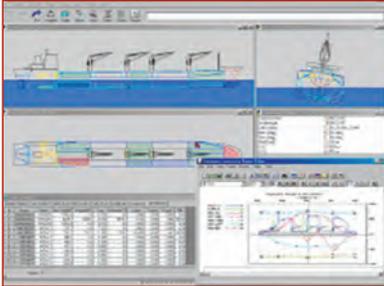
## THE INTERNATIONAL CONFERENCE ON COMPUTER APPLICATIONS IN SHIPBUILDING (ICCAS 2007)



18-20 September 2007, Portsmouth, UK

### Second notice

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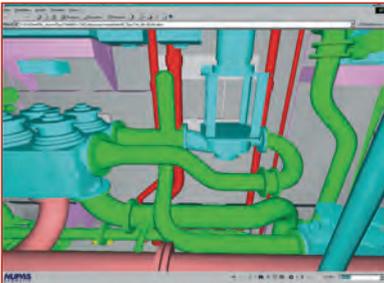
ICCAS 2007 will be the 13th International Conference on Computer Applications in Shipbuilding. The 2007 conference will be held in Portsmouth, UK, on 18-20 September 2007.

The conference will review operational experience from existing computer applications in the design and build of ships and offshore structures. It will also examine the advances in Information Technology which have contributed to increased productivity in both shipbuilding and maritime operations; including increasing co-operative working between shipyards, marine equipment and system manufacturers, engineering partners and shipping companies.

The conference will cover the full range of topics related to computer applications for:



- Concept design, tendering, initial design, general arrangement, cost and work estimation, hull form, hydrodynamic analysis and basic structural design, risk based design
- Detailed and production design
- Structure, machinery, hull and outfitting design
- Parts manufacturing and assembly
- Prefabrication, shop automation, robotics, assembly, simulations and accuracy control
- Material management
- Material control, supply chain management, Logistics and e-solutions
- Inspection and maintenance
- Life-cycle maintenance, parts and systems reliability, inspection standards and Risk management.
- Knowledge Management and Innovation Management



Papers will focus on advances made in information and communication technology with respect to methods, tools, standards and organisational adaptations in the different application sectors of the shipbuilding industry.

The conference will attract a large international audience and provide a forum and means of professional development for all parties interested in computer applications in shipbuilding.

Key dates and up to date information will be displayed on the website at: [www.rina.org.uk](http://www.rina.org.uk)



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## Trader series proves a success for Tsuji

**T**SUJI Heavy Industries has recently announced another contract for six Trader-class handy-sized bulk carriers from the Clipper Group. This takes the number of orders received by the Japanese company for this series to 30 confirmed vessels, with deliveries stretching through until mid-2011.

These vessels will all be built at Tsuji Heavy Industries (Jiangsu) yard in China, which is also the site of an extensive hatch cover and vessel block building facility.

The 30,000dwt bulk carriers will be built on land without a drydock or slipway, using the so-called APS (air pad system), that incorporates skid rails. Tsuji is also in the process of making significant investments in shipbuilding facilities at the Jiangsu yards, including additional hull section manufacturing areas, a second painting hall, and yard cranes.

Developed by GTR Campbell and its Bahamas based affiliate, Algoship Designers, the Trader class incorporates high specification machinery and equipment with safe margins, high specification coatings, including tar-free and light coloured 'surveyor friendly' paints for ballast tanks, tin free antifouling paint and



A further series of bulk carriers has been ordered by Clipper Group from Tsuji.

a 1300mm wide double hull, facilitating access for surveys and inspections. Other features include wide hatches which make up 75% of the beam, with minimum overhang, large

cargo hold tank top footprints, with small side hoppers and square bulkhead stools, and four sets of 30tonne Tsuji deck cranes, fitted with radio controlled grabs. 

## Humber Bridge sets environmental standards

**I**N October 2006, IHI Marine United delivered the biggest container vessel yet constructed in a Japanese yard from its Kure facility. The 9040TEU capacity *Humber*

*Bridge*, the first of a series of eight sisterships, has an overall length of 336m and, powered by a MAN B&W 12K98ME main engine, can operate with a service speed of 24.5knots.

A feature of this vessel is its wider beam (45.8m) hull design, which is intended to offer greater stability, and reduced ballast water requirement. *Humber Bridge* also incorporates various environmental and safety features in the vessel hull design and onboard equipment.

Electronically-controlled engines can control combustion condition under all load situations by means of adjusting fuel injection and exhaust valves at suitable timing. This conserves fuel oil consumption and contributes to reduced emissions. The new vessel has fuel oil tanks located in the bulkheads, while the hull is also double bottomed, to help prevent fuel oil leakage in the event of hull damage.

*Humber Bridge* further has a heat recovery steam generator which uses the heat from exhaust gas discharged from the main engine for the generation of electricity. This has the aim of reducing total fuel oil consumption and CO<sub>2</sub> emissions. Another feature of this vessel is the adoption of electric motor driven windlass and mooring winches ondeck. These need no hydraulic oil and this, in turn, eliminates the possibility of maritime pollution due to leakage of hydraulic oil.

Classed by NK, *Humber Bridge* has a Green Passport, and is designed in accordance with the Ship Recycling Guidelines adopted by IMO. IHI designed the ship using CFD and 3D FEM analysis, walk through simulation, and apparatus installation simulation techniques. Central to this process was the Ajsai Computer Integrated Manufacturing (CIM) system developed in-house by IHI Marine United. 

### MAIN SPECIFICATIONS *HUMBER BRIDGE*

LOA:.....	336.0m
Beam:.....	45.8m
Depth:.....	24.4m
Gross Tonnage:.....	98,800ton
Dead Weight Tonnage:.....	87,000ton
Capacity: .....	9040TEU (nominal)
Main Engine:.....	B&W 12K98ME (91,460BHP)
Service Speed: .....	25.6knots

## First in new Sanoyas bulker series

**B**ULK carrier construction remains the key focus for Sanoyas Hishino Meisho Corp, and the building of the first vessel of new panamax class bulk carrier series, *Orange Trident*, is nearing completion.

The 225m long, 78,000dwt bulker, designed to meet SOLAS safety requirements as well as new IACS rules on the forecandle deck and other design elements, is due to be delivered to a domestic owner in June this year.

Work is also now in progress on a slightly larger version of this same design, which is 229m long and has a 83,000dwt rating. The first of this new series is also now under construction at the yard and should be delivered before the end of the year.

In a significant development, Sanoyas has teamed up with the Japanese owner, MOL to develop a new type of Handy-Cape bulk carrier.

Four of these 116,000dwt vessels have been ordered, with the first due to enter service in 2009.

The design concept is similar to that employed with the eco-friendly 78,000dwt and 83,000dwt vessel types, but features a wider beam of 43m and a relatively shallow draft of 15.3m. The aim of the design is to allow owners to benefit fully from the widening of the Panama Canal by 2015. 

# ClassNK lifts its sights

**ONE of the world's leading classification societies, ClassNK is experiencing a sharp increase in workload, due to the ongoing global shipbuilding boom.**

**N**EWBUILDINGS totalling some 14.3 million gt were registered to NK class last year, surpassing the society's previous record of 12.4 million gt, achieved in 2005, by more than 15%. Most of these vessels were built by yards in Japan, but the society's influence at overseas shipbuilding facilities is growing. Around 34% of the 543 vessels built to NK class during 2006 were, in fact, delivered by yards outside Japan.

At the end of last year, NK had about 144.4 million gt of ships under its class, representing approximately 21% of the total global commercial fleet. The society is particularly strong in the tanker and bulk carrier sectors and these types of ship combined make up about 70% of the ships under NK class in terms of gross tonnage.

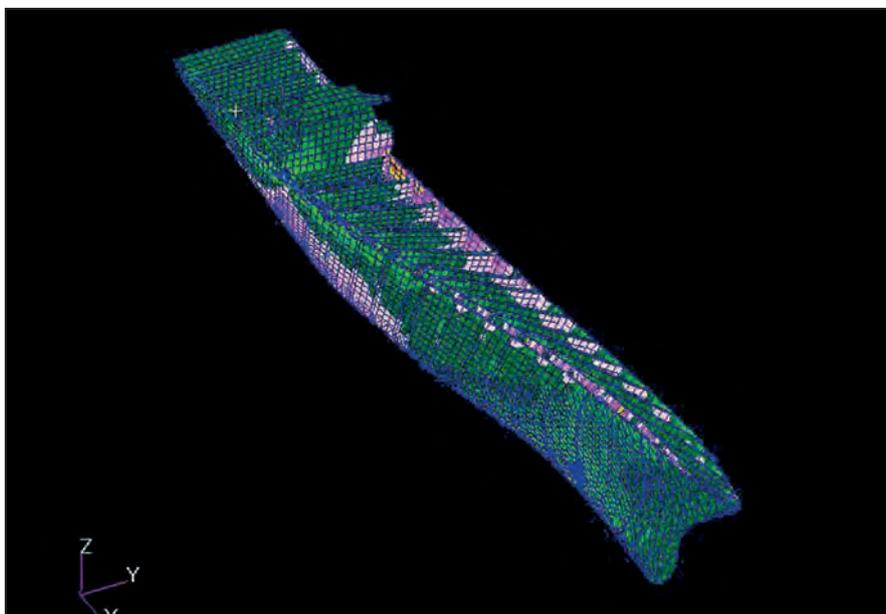
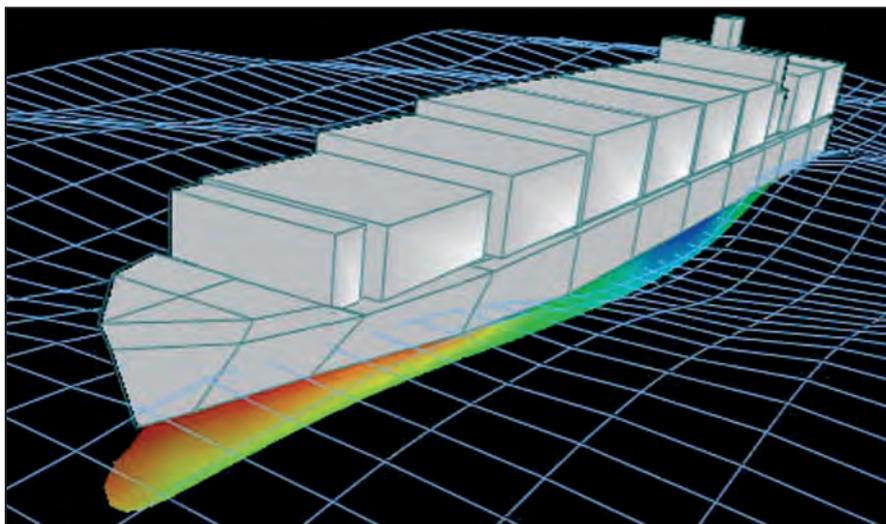
According to managing director, Hiroshige Kitada: 'These times of prosperity offer both a challenge and an opportunity to the society.' He points out that ClassNK now has to gear up to meet a greatly increased survey and audit workload, covering both the more than 12 million gt of newbuildings that are expected to enter class in 2007, as well as class maintenance surveys and various audits and inspections for those ships already on the register.

He adds: 'The challenge is not only to maintain the high standards of service that we have been able to achieve with the support of strong research and development programmes, IT systems, and services, but to continue to carry out all activities as effectively and efficiently as possible.'

ClassNK said it was committed to giving a high priority to research and development work into new vessel types, and one of the key projects that the society has been engaged with is the Super Eco-Ship initiative, under the aegis of the Ministry of Land, Infrastructure, and Transport, in Japan. This work has included assessing the safety and other aspects of a next generation and environmentally-friendly coastal vessel for domestic service in Japan, from the design stage up to actual construction.

Work is, in fact, now underway on the first, 4200gt Super Eco-Ship design tanker, *Shigemaru*, at the Niigata Shipyard, and this is due to be completed in September this year. *Shigemaru* is being built to NK class as a test ship, incorporating a 'buttock' type hull design and an electric propulsion system, using podded propulsion that is powered by a gas turbine drive generator. The vessel is also equipped with various support systems and a centralised computer system developed to enhance shipboard control efficiency and operations. The society is playing an important role in evaluating how effectively these systems function and to what extent they reduce workload onboard.

ClassNK has also this year launched eight new research projects, in addition to its ongoing work in various fields. Two of these projects relate to risk assessment of ultra large containership types of more than 10,000TEU capacity. The aim is to produce technical standards covering both hull structure and brittle crack arrest designs, to prevent cracks from developing in a ship's thick plate sections.



**FEM model for Risk Assessment of ultra large-size containerships (hull construction design).**

A further three research initiatives centre on liquefied natural gas carrier design, and include risk assessments of LNG carrier propulsion systems, including steam turbines and dual fuel diesel engines, and LNG carrier hull construction. ClassNK is also carrying out a total life assessment of LNG carriers, which aims to develop technology and systems for anti-corrosion management, fatigue strength safety management, and preventative machinery maintenance.

A project looking into automatic and remote control systems aims to establish performance evaluation techniques and classification rules for these systems, while another initiative is now underway to evaluate the environmental performance of containerships and develop guidelines for the evaluation of environmental performance.

ClassNK has also set up a further environmental project, which aims to establish an evaluation

standard for ships that introduce green technology, with a view towards awarding Certificates of Environmental Awareness in the future.

Another focus for the society in recent years has been the development of IT tools for shipowners and operators. The latest of these is a service called Primeship-CHEMISYS, which is designed to help ClassNK clients meet the latest regulatory requirements for chemical tankers. The new service is made up of three parts: a chemical cargo database, a vessel database, and a search and output system.

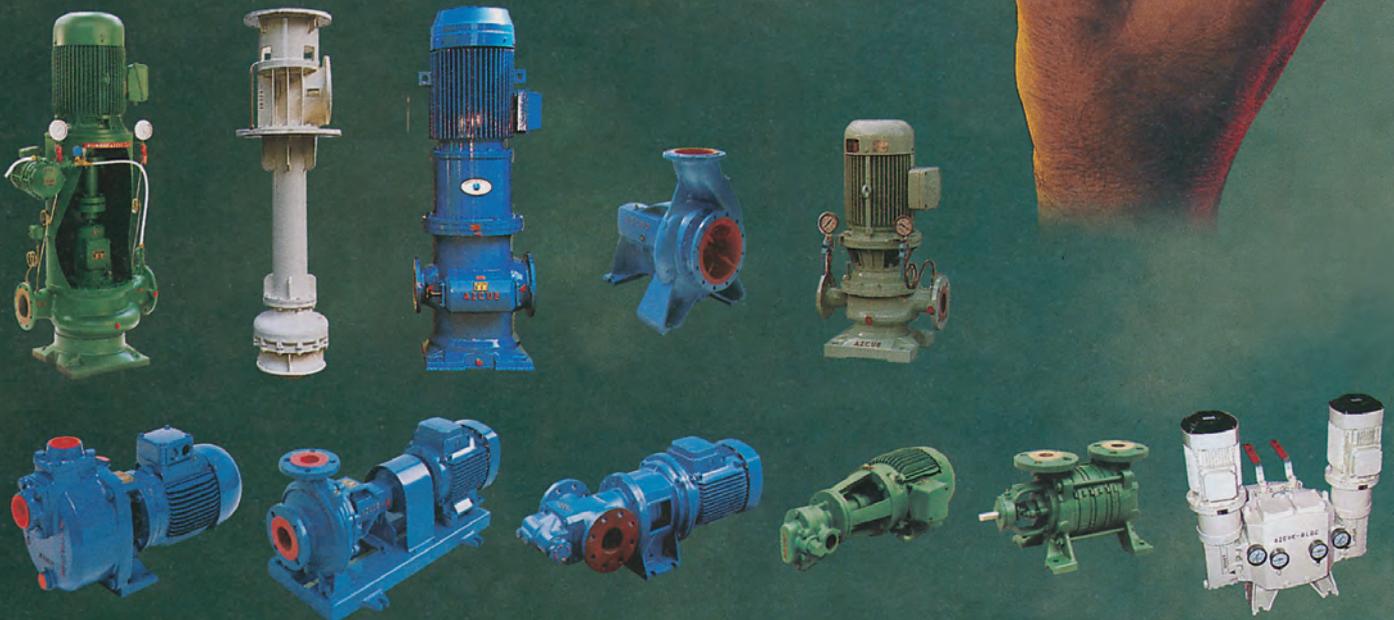
With Primeship-CHEMISYS, users can for example develop a chemical operations manual that complies with the amended IBC Code, check hull structure and installation requirements when planning a newbuilding, and confirm the requirements for listing additional cargoes in the cargo list attached to the fitness certificate.

ClassNK expects that the system will prove especially valuable in the planning of initial designs for chemical tankers.

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# Bulker business propels MES performance as 56,000dwt series passes century

ONE of Japan's leading shipbuilders, Mitsui Engineering and Shipbuilding reports that it has now received more than 100 orders for its 56,000dwt bulk carrier design. This is a remarkable milestone for a single series, and contracts for the design are still coming in. Indeed the total orderbook as of the end of March 2007 was 116 vessels, of which 55 had been delivered.

MES has long been designing and building Handymax type bulk carriers and in 1993 started series ship construction with a 46,000dwt bulker, of which 27 ships were delivered.

This was followed in 1998 by a 50,000dwt type bulk carrier, for which 33 orders were received. Based on the experience gained with these earlier series, MES developed the 56,000dwt version to offer a higher capacity, lower maintenance requirements, greater reliability, and better propulsion efficiency.

MES highlights a number of advantages of its 56,000dwt bulk carrier type. In particular, the cargo hold dimensions have been enlarged to provide a total capacity of more than 70,000m<sup>3</sup>, while the cargo hatch cover openings have also been increased to enhance cargo handling performance for a wide range of bulk cargo types.

The success of the bulk carrier product helped MES achieve a tremendous set of results in the last financial year.

Orders received by the company for new ships in 2006 amounted to ¥432.6 billion, up from ¥377 billion the year before, while shipbuilding produced a profit for MES of around ¥3 billion, compared with a ¥2.6 billion loss in 2005.

MES has also achieved very positive results from the engine factory at its Tamano

Works, where 195 low speed Mitsui MAN-B&W diesel engines were produced in the 2006 fiscal year, with a total output of 4.01 million horse power.

This is a new record for the company, but is one that will be eclipsed in 2007 when total engine production is expected to be 4.66 million horse power.

In order to cope with high levels of demand for marine engines, MES commissioned a new assembly line in November 2005, while in March 2007 a further expansion of the plant at the Tamano Works was completed and this will be fully operational by this September.

This latest extension will allow MES to achieve an annual engine production of about 5 million horse power in the 2008 fiscal year.

MES reports that it is further enhancing its marine engine after sales service through the newly developed 'e-GICS' system. This diagnoses performance and assesses the remaining life of large-scale marine diesel engines via satellite and internet connections. The system enables users to access performance information on a continuous basis, facilitating improved maintenance procedures. 

PRINCIPAL PARTICULARS MES 56,000 DWT BULK CARRIER	
Length(oa).....	189.99m
Length(pp).....	182.00m
Breadth (moulded).....	32.26m
Depth (moulded).....	17.90m
Full Load Draft (moulded).....	12.55m
Gross Tonnage.....	31,200tons
Deadweight Tonnage.....	56,000 metric tons
Main engine.....	Mitsui-MAN B&W Diesel Engine 6S50MCC
Speed (max).....	14.5knots
Complement.....	25 persons

## Series production at Kawasaki yards

KAWASAKI Shipbuilding's Kobe yard is concentrating primarily on bulk carrier production, building a long series of 55,000dwt vessels. Last year the yard completed six vessels of this type, including three for K Line, and a similar pattern is expected for 2007 as well.

The yard has recently launched *KT Venture* for Liberia-based Pine Maritime Corporation and she is the 14th in this series. The new bulker will be delivered in June 2007 after outfitting alongside the quay. The 189.9m vessel class has a flush deck with forecastle and five holds that are designed for the transport of grains, coals, ores, and steel products.

A new proprietary bow, designed to reduce wave resistance, allows the ship type to operate with reduced fuel consumption. Furthermore, a total of four 30tonnes deck cranes have been installed between the hatch covers, to allow independent working in port, and the vessel is powered by a lightweight and compact Kawasaki-MAN B&W 6S50MC-C main engine.

Meanwhile, Kawasaki's other yard in Sakaide has a more varied production run, last year completing three LNG carriers, two VLCCs, and three 185,000dwt bulk carriers.

In December 2006, the Sakaide yard delivered *Yamatogawa*, a 302,000dwt-rated VLCC that

is designed to maximise capacity through the Straits of Malacca, and can visit all oil loading berths in Japan. Fuel oil tanks and the oil pump room are protected by double hull structures and, as an energy saving feature, the vessel has a rudder bulb with fins and a highly efficient propeller design.

Moreover, in recent weeks, Kawasaki has delivered *Tenki*, a 315,000dwt VLCC for Colnago Maritima from its Nantong COSCO KHI Ship Engineering joint venture in Nantong, China. Powered by a Kawasaki-MAN B&W 7S80MC-C diesel engine, the new 333m-long bulk carrier shares many of the design features and attributes of *Yamatogawa*. 

## Hitachi Zosen picks up Wärtsilä contract

THIS March, Hitachi Zosen was awarded a contract by the Finnish Wärtsilä Corporation to build four six-cylinder RT-flex50-B engines, each of which have a maximum continuous power of 9960kW (13,560bhp) at 124rev/min. These engines will be installed on ships that will be delivered from yards in China, and the first of these will be delivered in the second quarter of 2009.

Hitachi Zosen becomes the eleventh engine builder to manufacture Wärtsilä RT-flex

electronically-controlled common-rail marine engines. The other engine builders are in South Korea, Japan, China, Italy, Croatia, and Poland.

Wärtsilä RT-flex marine low-speed engines incorporate electronically-controlled common-rail technology for fuel injection and valve actuation and are available in eight cylinder sizes, covering a power range from 5800kW to 80,080kW.

The Wärtsilä RT-flex50-B is the smallest of these, providing prime movers of 5800kW

to 13,280kW, and is ideally suited to the propulsion of bulk carriers in the Handymax to Panamax size range, product tankers, and 900TEU-1500TEU feeder container vessels.

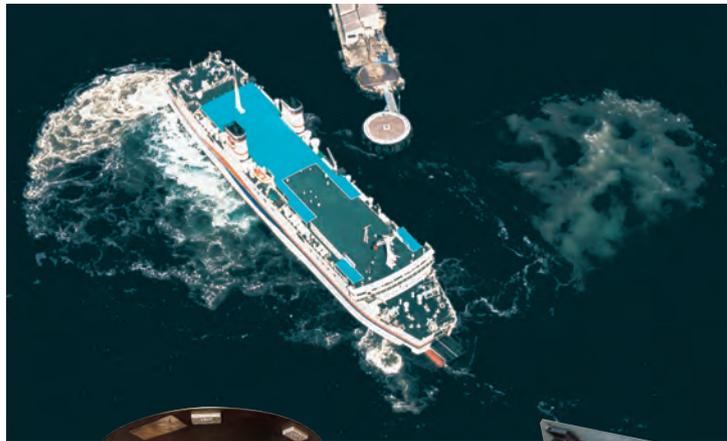
In the RT-flex common rail system, fuel oil, servo oil, and centros are delivered at regulated pressures to rail pipes arranged in the rail unit along the side of the cylinders. Electronic control units then regulate delivery from these rail pipes to fuel injection and exhaust valve operation. 



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## NHV propeller increases efficiency

**I**N response to industry demand for lower fuel consumption, and better environmental protection characteristics, Nakashima Propeller has developed a new high efficiency propeller, the Non-Hub Vortex (NHV).

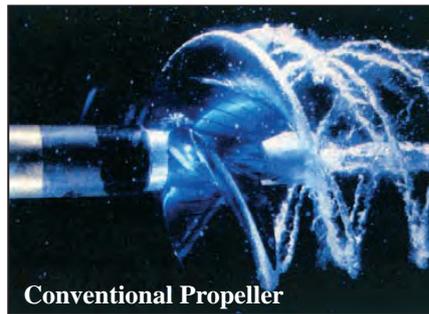
Designed both to eliminate the hub-vortex phenomenon and to optimise the load distribution on the surface of the propeller blade, the NHV propeller type has been through both extensive model tests and sea trials and these are said by Nakashima to have demonstrated the significant benefits of the new design compared with alternative propeller types.

A hub-vortex originating from the back end of the propeller cap can have a number of undesirable effects, including energy loss and rudder erosion. Through improved blade geometry, the NHV propeller is intended to reduce, or even eliminate these effects without the need for any special devices or attachments. In addition, Nakashima says it has achieved improvements in load distribution by using the latest computational fluid dynamics (CFD) analysis and propeller lifting theories.

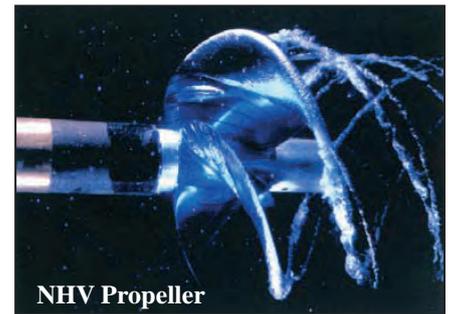
'Numerous' model tests have been carried out by Nakashima, and these are said to confirm that the NHV propeller improves efficiency by about 5% compared with other standard Japanese propeller designs, and by 2%-3% compared with Nakashima's own Pressure Accorded Improvement (PAI) propeller. In addition, in comparison with conventional propellers, the NHV propeller improves blade-surface cavitation and excitation force by similar, or even greater margins.

Sea trials have also supported Nakashima's claims for the NHV propeller. A comparative analysis of a car ferry's performance with both the NHV and a conventional propeller showed a 2.3% improvement in the propeller open test (POT), and a 5.8% improvement in inverse POT. Based on these results, the NHV's effectiveness is rated at 3.5% - the difference in improvement in propeller efficiency represents NHV's ability to eliminate hub-vortex.

Nakashima has also carried out sea trials to compare the fuel consumption of a car ferry before and after the fitting of NHV propellers. A comparison of the average monthly fuel consumption, over a six month period, showed

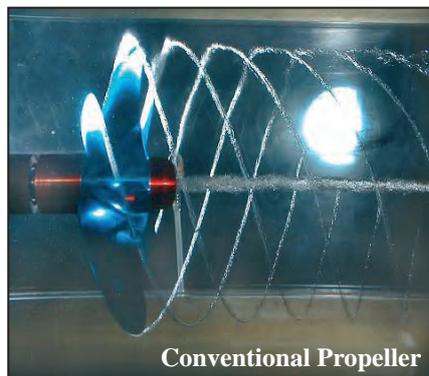


Conventional Propeller

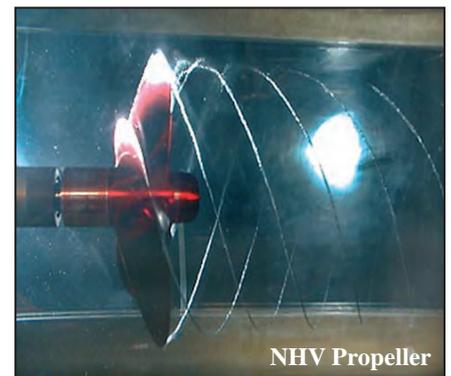


NHV Propeller

High speed vessel propellers.



Conventional Propeller



NHV Propeller

Car ferry propellers.

that there had been, on average, a reduction of 5% in fuel consumption, while there was a marked reduction in vibration as well.

A company spokesman says: 'The elimination of hub-vortex without sacrificing normal POT efficiency requires the highest level of optimisation and this has been realised thanks to our unique design methods and knowledge of propeller systems.'

Furthermore, cavitation tests comparing the car ferry's NHV propeller with the previous propeller are said to have shown reduced blade surface cavitation, as well as aft fluctuating pressure.

According to Nakashima, the new propeller is suitable for a wide range of vessel types,

from low speed VLCCs and bulk carriers to medium and high speed ships, such as ro-ro vessels, ferries, and containerships. Furthermore, as the NHV unit has a similar mass and inertia moment to existing conventional propellers, it can be used for newbuildings and retrofitted to ships already in service.

The NHV propeller has already established a strong position in the market. The company says it has received orders for more than 170 units, with the largest being a 9700mm diameter unit for a VLCC. The biggest orderbook so far is for a total of 46 x 7400mm propellers that will be fitted to a series of bulk carriers. ☺

## Niigata secures chemical tanker order

**N**IIGATA Shipbuilding & Repair, a subsidiary of Mitsui Engineering and Shipbuilding (MES), is diversifying its product range from its previous dependence on small workboats.

The company has received an order to build an 11,500dwt chemical tanker, called *NiigataMax*, that will be completed for an as yet unspecified owner in 2008. Measuring 119.2m in length overall, 20m across the beam, and 11.65m in draft, the vessel will

be powered by a Makita-Mitsui MAN B&W 7L35MC main engine that will allow for a service speed of 13.5knots. A special coating will be applied to the inside of the cargo tanks of the vessel, which will be classed by ABS.

In addition, Niigata is building a 10,400dwt bunker tanker, said to be the biggest of its type in the world. Construction is well underway, and the tanker is scheduled for delivery towards the end of this year. ☺

## CRP from IHI

**I**HI Marine United has delivered the first general cargoship/oil tanker in Japan to feature electric motor-driven contra-rotating propulsion. The 492gt *Shinei Maru*, has been delivered to coastal forwarder Nijima Bussan Kabushiki Kaisha and Japan Railway Construction Transport and Technology Agency from the Sanuki Shipbuilding & Ironworks Co, to which IHIMU subcontracted construction of the ship. In sea trials, the combined use of electric motor drive, CRP, and the energy-saving hullform reduced the fuel consumption by more than 10% compared with a conventional diesel propulsion system of the same class operating between the Izu Islands and Tokyo. ☺

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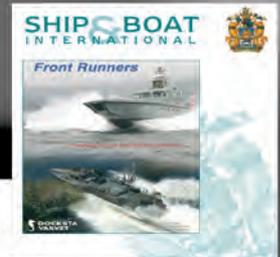
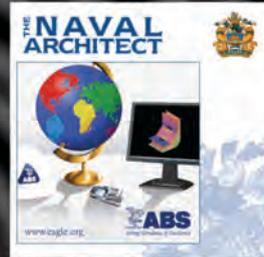
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## New Daihatsu series offers green benefits

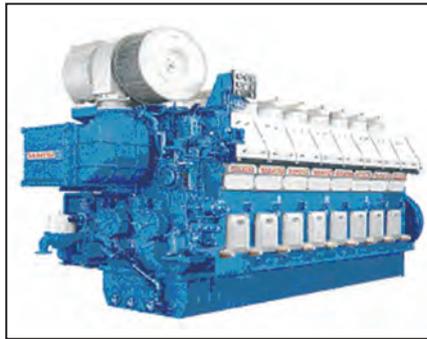
**T**HE latest new engine type from Daihatsu Diesel, a six cylinder model, the 6DC-32, will be making its market debut within the next 12 months.

The 6DC-32 will be used as the main diesel generating engine for a series of ten 6350TEU container vessels that are being built by Imabari Koyo dockyard for Zodiac Maritime Agencies, with delivery scheduled from January 2008. Four units will be placed onboard each vessel to meet the total power demand of around 10,000kW required for this type of container vessel.

Designed to cover a power range up to 2500kW x 720rev/min/750rev/min, the new engine represents an upgrade of earlier generation technology to improve environmental performance and is, in particular, an evolution of the company's successful DK series engine. The 6DC-32 engine offers reduced NOx emissions in line with IMO guidelines, reduced CO<sub>2</sub> emissions, lower fuel consumption, and reduced noise and vibration levels. In addition, the 6DC-32 has better fire prevention characteristics, as the possibility of flammable liquid splashing out has been removed.

According to Daihatsu, NOx emissions can be reduced further through optional equipment to control the fuel injection patterns in a manner best suited to the particular operating conditions, while at the same time increasing fuel consumption by the minimum factor possible.

At the design stage, Daihatsu says it made full use of up-to-date computer analysis of all major components, as well as performance simulation



The latest new engine from Daihatsu Diesel - six cylinder 6DC-32 - will be making its market debut within the next 12 months.

techniques. In parallel with this analysis, a test engine has been put through extensive trials, including endurance tests, to reveal any possible 'unknown factors'. Daihatsu also points out that great care has been taken to select the right materials for all engine parts, so that the design and test process can be supported by high quality manufacturing process.

Daihatsu also highlights the ongoing development of its oil mist detector technology, following on from the launch of its MD-SX oil mist detector in 2004, a sensor-type system that is mounted on the crank case. In order to facilitate the earliest possible detection of abnormal oil mist levels in engine rooms, Daihatsu plans to launch a new Oil Mist Monitoring (OMM) device this October. Based largely on the technologies contained in the MD-SX unit, OMM has already received type approval from a number of classification

societies, and can provide a visual display showing oil mist levels and where the oil mist is being generated from.

The OMM will feature up to 16 sensor units, and will offer a response time of less than one second. The display will also have a mist level indicator with a three-colour bar graph, that will make it easy for crew to use.

Daihatsu is currently engaged in a number of projects that could have benefits for the marine sector in time. Working with Mitsui Engineering and Shipbuilding (MES), Daihatsu Diesel has recently developed a gas engine co-generation system with a high level of thermal efficiency. At the heart of the system is a MD36G type gas engine, based on Daihatsu's model DK-32 unit, which is expected to be officially launched to the market in 2007. The test unit has undergone extensive trials at MES' Tamano works.

In addition, together with JFE Engineering Corporation and Iwatani International Corporation, Daihatsu Diesel reports that it has achieved significant reductions in NOx levels in exhaust gases from a diesel engine running on a new fuel, Di-Methyl Ether (DME). Tests have shown a NOx emission level of 30ppm (13% O<sub>2</sub>), and are said to demonstrate that operating a diesel engine on DMR can reduce harmful emissions in exhaust gases, without sacrificing thermal efficiency. ☺

## JRCS aims for single-source LNG supplier status

**J**APANESE shipboard automation systems specialist, JRCS, is positioning itself as a 'single source solution' for LNG carrier newbuildings, demand for which is at an all time high at present. In particular, JRCS has developed an Integrated Automation System (IAS) designed primarily for this type of vessel.

Called OASIS - Operationally Advanced Super Integrated System - the specialised software that has been developed by JRCS is intended to be easy to use and quickly mastered by ships' crews. As part of the service package supplied to owners, JRCS maintains the hardware, which has been primarily developed in-house, thereby helping to reduce overall total lifecycle costs for the system.

The OASIS IAS features three separate operational levels, each of which interfaces with the others. The Field level is responsible for the realtime control and monitoring of plant and equipment; the Operator level performs all control, display, and printing functions; while the Information level allows PCs in the ship's wheelhouse, cabins, or offices to access plant data via a local network.

Market response to OASIS has been very positive, JRCS reports. While not in a position

to give full details as yet, the company confirms that orders have been received for the installation of OASIS on three vessels so far.

JRCS is also aiming to produce power management, as well as automation systems, for LNG carriers. Overall, the package available for LNG vessels from JRCS as a single source includes: boiler control panel; boiler gauge board; cargo control console; automatic ballast water exchange system; engine control console; main switchboard; cargo switchboard; group starter panel, and individual starter panel.

JRCS also points out that its in-house design division has recently installed 20 new CAD units, enabling them effectively to reduce the time it takes to produce specific design arrangements. Test equipment at its factory has also been considerably enhanced as part of the company's efforts to ensure that all equipment is tested rigorously before delivery.

According to a JRCS spokesman: 'The main focus of our R&D programme is to increase the safety and reliability of both our hard and software. We are now considering how best to adapt our technology for the benefit of other vessels, increasing our production while at the same time reducing costs.'

Another focus for JRCS is the development of systems that can reduce the environmental impact of vessels. An Alternative Marine Power system (AMP) is currently under development, and the company says it aims to unveil this to the marine sector in the near future. Furthermore, working closely with the Japanese shipping company, K Line, JRCS has also developed a 'cold ironing' Shore Power Supply system, which will enable the shore-based high voltage supply of 6.6kV to vessels, where it will be stepped down to 440V to meet the ship's power requirements. All the necessary switchgear and cable reels are housed in a standard size container which is installed on the vessels. When connected to the shore-based power supply, the vessels will be able to shut down their diesel engines while alongside the berth, thereby reducing exhaust emissions.

A unique feature of the JRCS system is that the power changeover between ship and shore can be performed without any interruption of the electrical supplies and services. As well as being available for newbuildings, the system does not require any major modifications to existing switchboards, making it highly suitable for retrofitting on existing vessels. ☺

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Picture courtesy of Ulstein Verft AS Norway

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## Modelling for the Polar Queen upgrade

**FINITE element analysis assessment of the structural integrity of *Polar Queen* main deck and underlying supporting steel work, following the application of an enhanced deck loading capability, along with the installation of a proposed new multi-reel drive system.**

OVER the past few years, detailed finite element analysis has become a key element in the design process to evaluate the implications of ship structural modifications.

Powerful modelling software, combined with highly trained and experienced engineers, allows global analytical models of ships and marine structures to be created with short lead times. This allows design implications to be assessed well ahead of any proposed installation schedules. Several design iterations can be quickly assessed and steel work optimised to eliminate highly stressed areas.

MV *Polar Queen* is a 2001-built cable lay vessel, which is currently under charter by Acergy, which requires the vessel to be converted to lay flexible pipe.

The existing deck had a higher load capacity towards the stern, with a significantly lower loading capacity forward. With a new deck house being incorporated onto the main deck from frame 110 forward, the applied deck loading will be assessed from the transom up to frame 110.

The new multi reel drive system will be installed onto the new main deck with the capacity to handle five reels containing flexible pipes.

Acergy brought together engineering consultancy FEA Online and maritime engineering consultancy MAATS to provide design guidance and analysis expertise on the proposed structural modifications to *Polar Queen*.

FEA Online offers specialist engineering analysis across a broad range of fields, covering civil/structural and mechanical/offshore engineering. Its recent expansion has seen marine analysis projects growing rapidly with several complex global ship models completed.

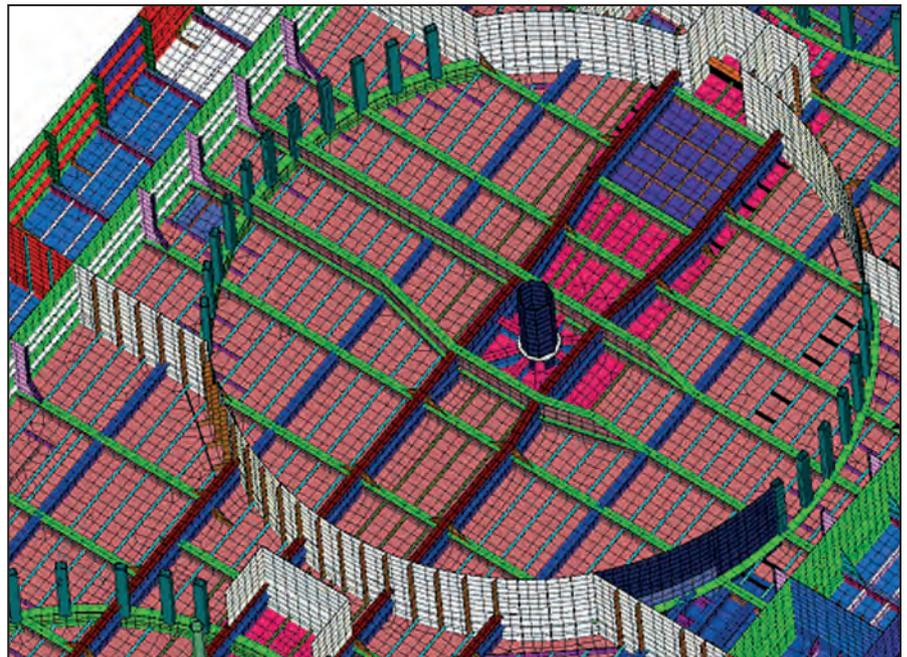
FEA Online said it prided itself on being one of the market leaders for 'online' engineering and, in particular, Finite Element Analysis services, adding that it had pioneered the use of web-based project presentation and reporting. This had 'allowed FEA Online to appeal to a larger, global market and has given clients the flexibility to work easily together as large, multi-disciplinary teams, distributed across many different locations,' the company said.

MAATS is a maritime engineering consultancy experienced in specialist ship design for new building or conversion.

The initial objective of the engineering analysis project was to construct a global finite element model *Polar Queen* running from the transom forward to frame 110. The model depth was to extend down to the next deck level at 10,000mm AB. This required detailed stress and deflection results to assess the structural integrity of the



MV *Polar Queen*, general (CAD model) view.



Detailed view, deck (shell) plus supporting columns (beam) FEA model.

new main deck and supporting steel work when subjected to a uniform enhanced deck pressure. The project would also provide detailed stress and deflection results to assess the structural integrity of the new main deck and supporting steel work, following the installation of the reel drive system and grillage.

The deck and reel grillage assembly was subjected to survival accelerations in accordance with Det Norske Veritas Ship Rules for a transit storm condition.

Then modifications were developed, in conjunction with MAATS, to reduce combined

stress values below the acceptable limit. Load cases were then reassessed to ensure the combined stresses were within the acceptable limit.

Existing ship services (eg piping and cable runs) prohibited the uniform deepening of the transverse girders. Therefore, a focused approach was adopted to target specific locations and eliminate stress concentrations in the main deck supporting steelwork. Each primary deck transverse was assessed to allow precise deck areas to be defined with appropriate deck loading capabilities.

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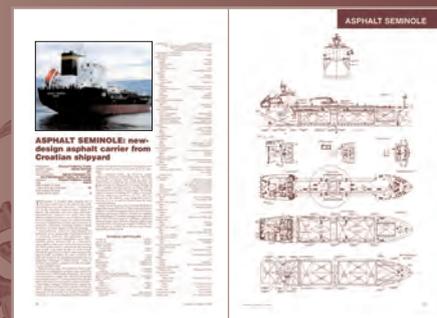
The Royal Institution of Naval Architects will publish the seventeenth edition of its annual *Significant Ships* series. Produced in our usual technically-orientated style, *Significant Ships of 2006* will present approximately 50 of the most innovative and important commercial designs delivered during the year by shipyards worldwide. Emphasis will be placed on newbuildings over 100m in length, although some significant smaller cargo ships, fast ferries and offshore vessels will be considered, including a cross-section of ship types, with each vessel being either representative of its type or singularly significant. Each ship presentation will comprise of a concise technical description, extensive tabular principal particulars including major equipment suppliers, detailed general arrangement plans and a colour ship photograph.

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### Component Geometry

The FE model was based on 250 2-D drawings and a series of inspection photographs provided by Acergy. They reflected a combination of as-built, phase 1, and phase 2 drawings. FEA Online created an online drawing library within the project web database to ensure all the engineers had instant access via hyperlinks to the correct version of the project drawings.

Three-dimensional shell elements were used to model the new deck and underlying structure. The scope of the model extended from the transom forward to frame 110 and included the main deck down to the tank top level. Beam elements were used to model the deck support columns, the reel delivery system grillage, reels and reel lift towers. Lumped mass elements were used to simulate the mass of the reels, the reel drives, and the hydraulic power units (HPU). The FE model was created in FEMAP version 9.2 and solved using Nastran V4.0. The element density was sufficiently refined to highlight stress concentrations in the critical areas. Despite the total number of degrees of freedom - 500,000 - the analysis solved within 10 minutes, allowing numerous design iterations to be assessed interactively with Acergy and MAATS engineers.

The following modelling assumptions were made during the development of the *Polar Queen* FE model:-

- The analysis considered in-service performance only.
- Isotropic material properties were assumed.
- The effect of temperature was not considered within the scope of this project.
- No 'inertia effects' were modelled.

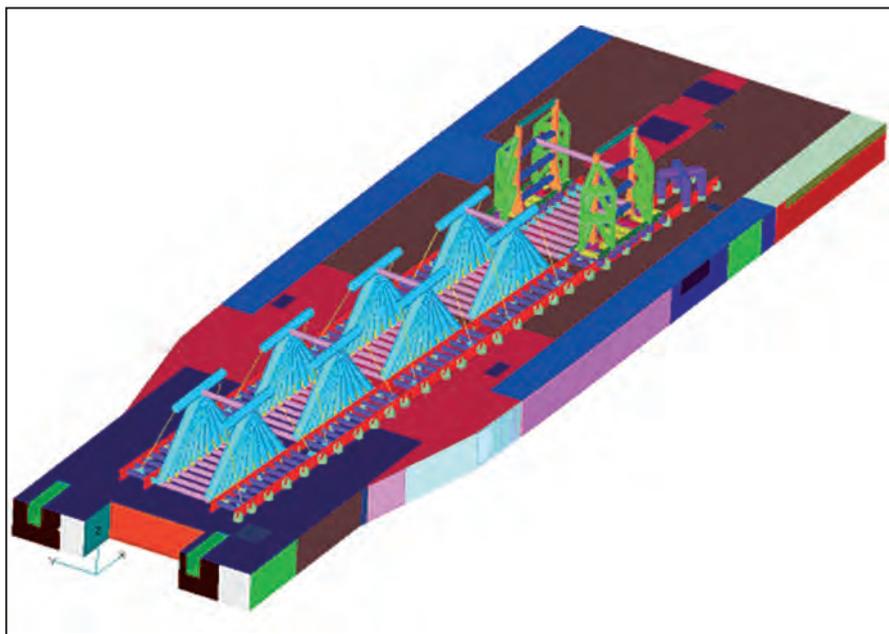
Dynamic effects were simulated by the application of the 'survival' acceleration loads.

The reel delivery system grillage outboard rails were modelled on the respective beam centre lines and connected to the new main deck by 'stiff', mass-less beams at the positions of the sea fasteners. A similar approach was used to connect the inboard rails to the deck, but the vertical beams' end releases were modified to ensure they only transferred vertical load, ie no transverse (shear) load and no moments.

The reels were simulated by stiff mass-less beams in a radial spoke arrangement, connected to the end of the short rail transverse beams, in conjunction with a longitudinal arrangement of beams, representing the reel seats.

The cable stays were simulated by two inch diameter beams with the moments released at either end. Those cables subjected to compression forces during the transverse loading were artificially softened by reducing their modulus. This ensured they could not provide any additional support to the reel assembly.

The mass of the reels plus product was simulated by a series of lumped mass elements positioned at the reel COG. The mass of the reel drives was also simulated by two lumped mass elements positioned either end of the reel centreline.



Deck (shell) plus RDS (beam) FEA model.

All the supporting columns, modelled as beam elements, were assumed to form moment connections to the adjoining shell elements representing the plate work. The same beam elements were assumed to be pinned at their lower ends ie at the 10,000mm AB level.

A uniform enhanced pressure load was applied to the entire top surface of the main deck. For this load case only the reel delivery system grillage was omitted.

Det Norske Veritas Ship Rules were used to derive ship motions and accelerations for a transit storm condition.

A series of combinations were assessed assuming all three of the individual accelerations occur simultaneously. This ensured the most onerous conditions were applied to the FE model.

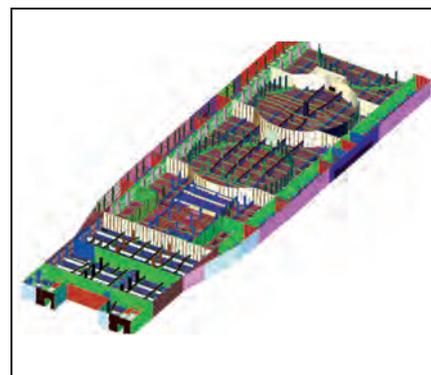
A series of translational spring supports were applied to nodes on the perimeter of the FE model. Their stiffness was tuned to represent the support provided by the adjoining structure beyond the scope of the model.

The finite element model input and output data was checked in accordance with established quality assurance procedures. This includes but is not necessarily limited to the following checks:-

- Undesired coincident nodes, which can result in structural cracks in the model.
- Geometry.
- Property assignments (material properties, plate thickness, beam sections, etc).
- Load application and reaction force balance.
- Appropriate boundary conditions, e.g. restraints.
- Element distortion and orientation.
- Deformed shape and stress continuity etc.

FEA model dimensions were compared with the drawings supplied by MAATS.

An analytical assessment of *Polar Queen*'s main deck was completed within the



Deck (shell) plus supporting columns (beam) FEA model.

extremely short lead times and provided invaluable information for Acergy structural engineers.

The proposed deck pressure and survival load cases were considered. The proposed new main deck was confirmed to be satisfactory for a uniform enhanced deck loading.

The reel delivery system and ship assembly has been assessed for the onerous DNV storm transit conditions. With the application of finite element analysis, the under-deck steel work has been strengthened to eliminate all stress concentrations and optimise the transfer of load into the girders and supporting columns.

The close collaboration between FEA Online, MAATS, and Acergy focused on the design and analysis aspects with critical results and reports available to all parties via the project web database. The *Polar Queen* FE model is currently being revised to assess further structural modifications. This emphasises the interactive design tool provided by finite element analysis in the hands of experienced engineers. ☺

## Tomorrow's tankers today

**LINDENAU has delivered the third in its series of innovative 40,600dwt, double hull tankers, in the shape of Seasprat.**

LINDENAU'S newbuilding S 274, with capacity for 47.443m<sup>3</sup> of oil and oil products is built to Ice Class E3 standards and has been delivered to Seasprat GmbH & Co, care of German Tanker Shipping. She is a sister vessel of the already delivered *Seatrout* (see *The Naval Architect*, February 2007, p65) and *Seacod*, and representing an optimised version of the 32,000dwt-class ship delivered to the same ultimate customer.

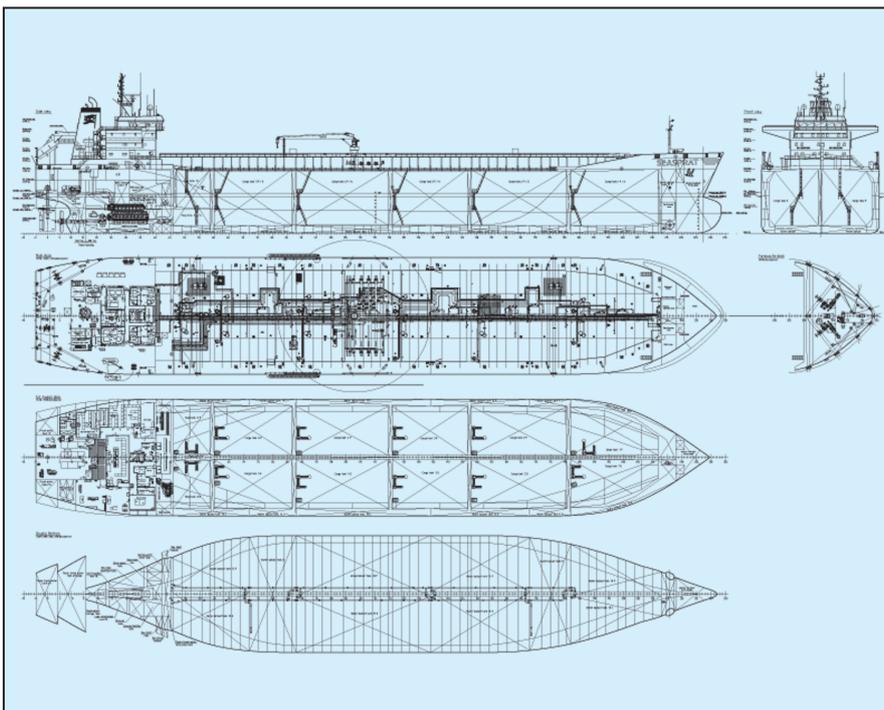
The newbuilding sets new standards for the safe, environmentally-friendly, and economic transportation of oil and oil products at sea.

Together with the shipowner the yard has optimised the lines of these ships, which show a load/volume relation at a maximal draught of 11m and PanMax-breadth of 32.20m. Extensive line developments with CFD-methods were undertaken. On this basis model tank tests were realised, where not only resistance and propulsion were measured, but also sea-keeping and ice-keeping tests.

The builder adds that these ships have an extremely favourable speed/power ratio, resulting in low fuel consumption at relatively high speed.

Their fore-ship also features optimised sea-keeping capability, both in relation to structural stresses and loss of speed in a seaway. 'Compared to the smaller newbuildings, the number of deck-wetness events was reduced significantly for the new design,' says Lindenau. 'Furthermore, the structural stresses on the fore-ship were reduced by almost 40% by optimising fore-ship lines, compared to previous newbuildings'. The new type is thus also able to operate at high speed in ice.

Good manoeuvrability is claimed due to the efficient and powerful bow thruster and the highly efficient full-spade profile rudder.



Type sketch, *Seasprat* – the latest delivery from innovative tanker builder Lindenau.

The newbuilding fulfils new national and pending international rules for the exchange of ballast water, while the main engine and the three auxiliary engines, of course, fulfil the demands of the Marpol Annex VI regulations concerning the emission of NOx and SOx.

However, other notable features from the 'green' perspective include a vapour return system, an environmentally-friendly (ie not ozone-depleting coolant) waste treatment, environmentally-friendly fire fighting agents, and compliance with minimum of bilge water oil residues.

Also notable is the fact that the cargo space of the double hull tanker consists of 2 x 5 cargo tanks as well as three slop tanks which are separated from each other by volume longitudinal and volume transversal bulkheads. This leads to absolutely smooth tank surfaces with short discharge times and only minimal cargo residues, as well as creating 'double' safety against cargo contamination, and resulting in short tank cleaning time.

The newbuilding is also equipped with a computer-based cargo monitoring and indication system in the cargo control room and on the bridge, taking account of cargo- and slop-tank level indication with tank radars, cargo temperature indication and monitoring with three sensors arranged at different heights, cargo tank pressure monitoring with given alarms, manifold pressure monitoring with given alarms, draught measurement system with four sensors, and temperature monitoring of the cargo heating system.

Cargo tank heating is achieved by individually adjustable heat exchangers for each tank with temperature indication in the cargo control room. Meanwhile, a central, electric-hydraulic operated remote control system for the cargo pumps, cargo valves, ballast pumps, and ballast valves is installed in the cargo control room.

The powerful electric driven deep-well pumps enable a total cargo separation, very short discharge times (approx 12 hours) and – combined with the high efficient tank washing system – very short times at the terminals. The newly developed separate, fixed installed emergency discharge system enables the complete emergency discharge of the cargo under closed condition in case of a cargo pump failure.

These newbuildings are also equipped with an online loading computer which is connected to the integrated cargo monitoring and indication system, as well as to the tank level measurement system for ballast and engineroom storage and consumable tanks. This loading computer enables the crew to control online the longitudinal strength and intact stability during loading and discharging. Furthermore it is possible to simulate the loading and discharging procedure, to calculate loading conditions for pre-planning, and to check each loading condition.

The installation of an integrated bridge-system with two anti-collision radar systems in combination with the chart and track pilot represents the highest standard of safe navigation and enables easy pre-planning of the course and constant monitoring of the same. An integrated communication system (SATCOM-System) which meets the most modern and technical demands is installed for the internal and external communication. 

### TECHNICAL PARTICULARS

Classification:	GL100 A5 E3 OIL/PRODUCT TANKER ESP VEC COLL 3 ERS MC E3 AUT INERT
Length overall:	approx 188.33m
Length between perpendiculars:	179.50m
Breadth moulded:	32.20m
Depth to main deck moulded:	17.05m
Draught (draft):	10.00m
Draught:	11.00m
Deadweight:	40,600t
Cargo tank capacity 100%, incl slop tanks:	47,443m <sup>3</sup>
Main engine output:	11,200kW
Speed at 10.00m draught and 8200kW:	15.50kn



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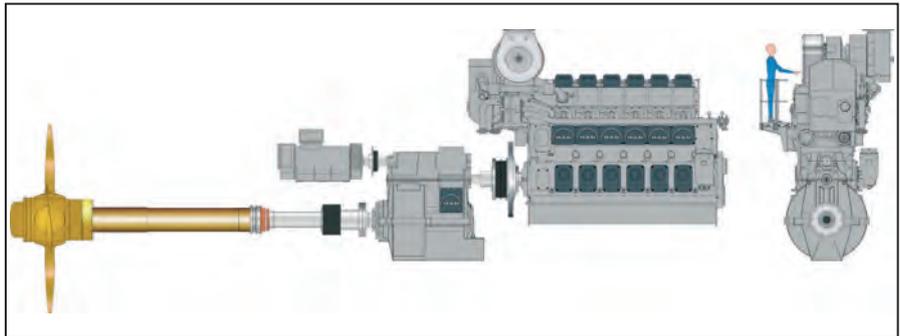
# Yildirim Tankers choose MAN

**T**WO 7000dwt chemical tankers ordered by Yildirim Dis Ticaret Pazarlama AS, Turkey, will have MAN Diesel's new L32/44CR engine installed aboard. The vessels are to be built by Marmara Shipyard in Turkey, and the first ship set of propulsion equipment will be delivered in December 2009.

This brings the total of recent 32/44CR orders to 20, with the engines destined for a variety of marine applications. Vice president of MAN Diesel's marine medium-speed propulsion and engineroom systems division, Jan Hondelink, noted: 'For the new Turkish vessels, MAN Diesel is matching the entire package of own designed propulsion equipment with the main engine and ship's hull.'

The L32/44 common-rail engine develops 3360kW in its six-cylinder version, and will now debut as a power source for a diesel-mechanical propulsion system. A MAN Diesel AMG55-type reduction gearbox will also be fitted aboard the tankers, specified for the drive of a VBS1180-type controllable pitch propeller of 4.2metres. All propulsion equipment is Bureau Veritas classed, and ice strengthened to class 1C.

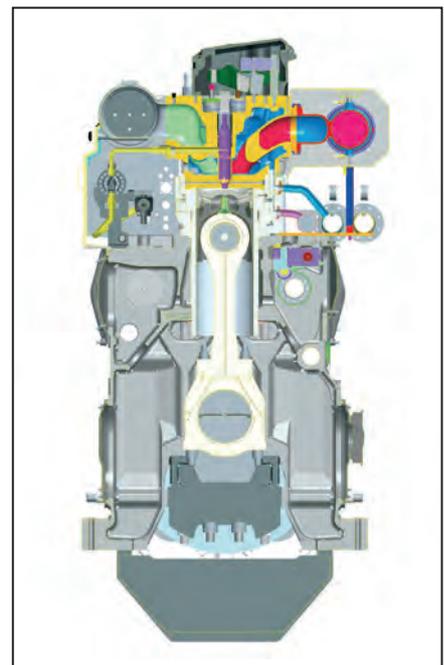
Additionally, for securing the ships' propulsion redundancy, the gearbox will be equipped with a power take off/power take home (PTO/PTH) for a 1250kW shaft alternator/motor. The auxiliary engines will start-up to power the gearbox and propeller via the shaft motor with the start transformer, while the main engine is disengaged in PTH mode.



Side-view of the complete L32/44CR propulsion package. End-view of engine and reduction gear.

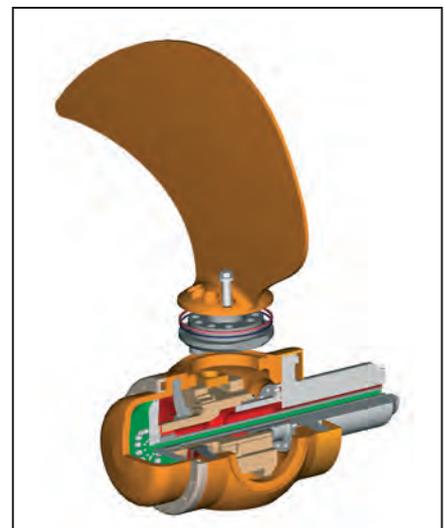
In the PTH mode, ship speeds of up to 10knots are estimated, compared to 14knots at 85% main engine output in ordinary propulsion mode. Mr Hondelink added: 'For these single screw vessels requiring a cost-efficient solution with a certain level of propulsion redundancy, the AMG55 range of gearboxes with PTO/PTH equipment matches the L32/44CR engine.'

The overall propulsion control will be managed by MAN Diesel's Alphasonic 2000 PCS system, with propulsion control stations located at the main bridge, bridge wings, and in the engine control room.

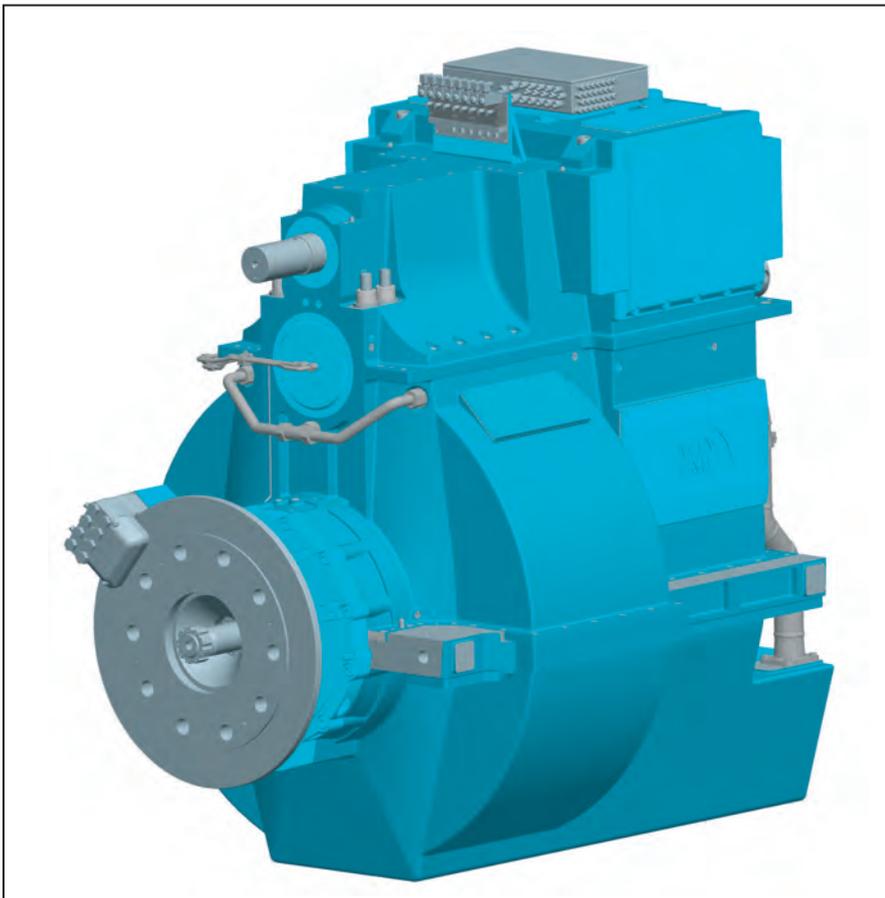


Cross-section of the MAN Diesel L32/44CR common rail engine.

Cut-away of MAN Diesel's 4.2metre CP Propeller type VBS1180 with high skew propeller blade.



MAN Diesel's AMG55 gearbox with PTO/PTH for 1250kW at 1800 rev/min.



## Sloshing and structures by design

**L**IQUID Natural Gas (LNG) carriers have to guard against their LNG liquid cargo coming into contact with the vessel's steel structure, or else face catastrophic damage to structural integrity. The motion of a ship in waves generates liquid movement inside the tank, and this sloshing can generate high impact loads on the containment system.

The sloshing loads of the  $-163^{\circ}\text{C}$  LNG pass through the containment system into the hull structure, in a membrane-type LNG ship. As the size of tanks becomes ever larger, the dynamic effect of liquid motion is steadily increasing in importance.

The combined containment system/hull structural response is difficult to model correctly, however. Therefore the challenge of sloshing load prediction is being met by several projects.

One such project is being undertaken by Lloyd's Register (LR), which is initiating a large-scale dynamic finite element (FE) analysis, including the whole transverse bulkhead and a portion of the containment system. It is aiming to review the effect of sloshing impacts while taking into account the local hull flexibility.

Nigel White, hydrodynamics coordinator, research and development department, Lloyd's Register, explains: 'The review of the resulting dynamic responses of the containment system and the local and global hull structures will allow the procedures presently applied for this aspect to be refined.'

LR is also beginning a combined computational fluid dynamics (CFD) and FE analysis to review fluid-structure interaction (FSI) effects. The aim of the study is to better understand FSI, and to optimise the use of FE analysis, CFD, and combined FE/CFD tools.

LR published its 'Comparative sloshing analysis of LNG ship containment systems' in 2005, and intends to allow the procedure to be improved, taking into account current research and industry developments. The comparative approach to sloshing uses existing ships as the design basis. Assessments of new designs are carried out while taking into account the design-load-to-strength ratios, ensuring they are no higher than existing ships. Additionally, LR announced that this research will feed into a new procedure which will be issued later this year.

Another current undertaking is Bureau Veritas' HydroStar software. It is a numerical model for dynamic coupling between motions exerted by liquid in tanks and rigid body motions of a vessel. Based on the potential theory of wave diffraction and radiation in frequency domain, it has been tested using in situ measurements on FPSO *Glas Dowl*, within the 'ROLL' joint industry project. It is claimed to be an efficient tool to evaluate vessel motion and the dynamic effect of liquid motion in tanks.

At ABS, the SafeHull programme is thought to be an advanced gas carrier design evaluation system. It is claimed to be able to consider the full range of dynamic loads that the structure will encounter, and establish net scantlings that are specifically tailored to meet these loads.

Hoseong Lee, ABS project manager for LNG SafeHull development commented: 'Membrane systems are proving the most popular with owners at present, yet this system places the greatest stress on the hull structure, particularly on the bulkheads and inner bottom. We have developed SafeHull

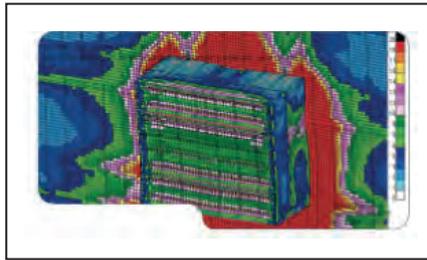


Figure showing the deflections and stresses due to a sloshing load applied to a containment system box.

applications for both LNG carriers and tankers, and we have been able to rapidly correlate this experience with our understanding of LNGCs.'

An absolute approach to address all aspects of sloshing is very complex in that it demands

better knowledge of the sloshing loads and the containment system load capacity. In particular, sloshing loads from model tests could be subjected to additional processing to review the type of impact, and the appropriate scaling laws to derive the full-scale impact pressure.

The projects undertaken to understand sloshing, and measures to combat it are necessary for the approval of new containment systems. It could also assist with optimising filling levels in both new and existing membrane LNG ships in the future. 



# RENK INSIDE.



Double marine gears from Rheine plant for the LNG tanker called "Gaz de France"

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# Next generation naval tankers

**TANKER designs are already available that 'pull through' commercial practice into the naval environment.**

THE impact of the single hull phase-out programmes of MARPOL Regulation 13G and OPA90 has been slow to appear in the world's navies, with few double hull replenishment tankers entering service and replacement programmes likely to extend beyond the 2010 deadline.

Even so, today many navies are facing more scrutiny of their operations, particularly with respect to health and safety and environmental protection. So it is that many of the Navies currently operating single hulled tankers have come to the conclusion that they should seek compliance, if not by 2010, then at the earliest possible time thereafter.

Many of the existing replenishment tanker designs are expensive due to the limited numbers that are built, and they are often designed by naval design teams with limited experience of modern tanker practises.

The longer life of the naval tanker and the extended procurement timescales compared to the short lived commercial tanker also leads to the adoption of innovation in tanker design being driven by the commercial sector.

Ship designers Skipskonsulent and naval designers BMT Defence Services have developed a family of designs for the next generation of replenishment tankers that offers to 'pull-through' the best commercial tanker design practise into the naval environment. This forms the foundation of the AEGIR design concept, named after the Norse god of the sea.

Four designs have so far been developed. They feature stream type tensioned span wire rigs for the transfer of fluids. The larger AEGIR 18 and 26 designs feature locations for up to four rigs, and the small AEGIR 10, locations for two rigs. The equipments for the replenishment system (hydraulic or electrical power systems, air systems for the tensioning system) are located in the deck house below the replenishment control station. The latter is conventionally arranged between the rigs with maximum visibility for the operators.

The typical service speed and propulsion power is significantly higher for a replenishment tanker than for a commercial tanker, although the commercial tankers' service speed has increased over recent years. The difference has now become relatively small and an increasing percentage of tanker new-buildings are constructed with a propulsion system similar to that adopted for AEGIR.

To increase the ship speed and installed power with a conventional single propeller propulsion system, the propeller diameter must be increased significantly, which may be difficult due to hullform and draught restrictions. If the propeller diameter is not increased, it will lead to a lower propulsive efficiency, due to higher revolutions and a higher loading on the propeller.

For this reason, it is very appropriate that the power is divided between two propellers that can then have a larger diameter, low revolutions



Design for a new generation of replenishment tankers.

	AEGIR 10	AEGIR 18	AEGIR 26
Overall Length, metres	145.6	175.0	196.6
Moulded Breadth, metres	20.8	25.0	28.3
Design Moulded Draught, metres	7.65	9.2	10.45
Deadweight, tonnes	10,000	18,000	26,000
Cargo Capacity, cubic metres	8000	16,000	24,000

compared to the propeller load, and reduced power density. Hence, propulsive efficiency will be significantly improved.

The hullform should ideally be arranged as a twin-skeg hullform as this would contribute positively to the propulsive efficiency, because of a higher hull efficiency due to higher mean wake and also a higher relative rotative efficiency compared to an open shaft twin screw system.

A twin skeg hullform will also allow for a fuller hullform in the aft ship, compared to an open shaft aft ship hullform, ie the longitudinal centre of buoyancy can be shifted towards aft, without having a large negative effect on the ship resistance. It can instead improve the ship resistance characteristics because the foreship hullshape can be made more slender. The increased service speed of a replenishment tanker with a maximum speed of about 18knots will of course also require a more slender hullform than for a commercial tanker with a service speed at about 15knots.

The propulsion plant for the AEGIR is arranged with medium-speed diesel engines, and controllable pitch propellers driven via reduction gearboxes, as this allows for optimum propeller revolutions to be selected because reduction gearboxes are fitted. The sustained operating speed of 18knots is achieved with two 7500kW engines. Shaft generators are provided on each shaft in addition to dedicated diesel generators.

Finally, bow thrusters are fitted, which is now common place on commercial and increasingly naval tankers.

In all normal operation, one or both of the shaft generators will be used to supply the ship with electrical power, and during discharge operations, one of the plants can be used to supply power to discharge cargo.

During manoeuvring operations, the shaft generators may also supply power to the bow thrusters. This means that installed auxiliary power can be reduced to a minimum, whilst maintaining safety and emergency response.

The shaft generators/electromotors can be sized to be up to half the power of a main diesel propulsion engine. The power take out from one main engine can be divided to two propellers by using the shaft generator as a generator on one side and electromotor on the other side. The main engine will be disconnected from the reduction gear where the generator is acting as an electromotor.

In addition to the full redundancy achieved with a twin engine/twin screw plant, this allows the propulsion plant to be arranged in a way such that both propellers can be driven with one engine, thereby providing full manoeuvrability, even with the failure of one main engine.

In short, according to BMT Defence, AEGIR offers the potential to introduce new vessels which exploit the latest commercial design practices and may be considered low risk due to the maturity of these features within commercial vessels. Ⓢ



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## Major reliquefaction contract for Cryostar

**A**N order for onboard boil-off gas reliquefaction plants for five liquefied natural gas carriers has been placed by Samsung Heavy Industries. The contract, thought to be worth over US\$50 million, was awarded to The Linde Group subsidiary, Cryostar, and is the first major supply contract for the company.

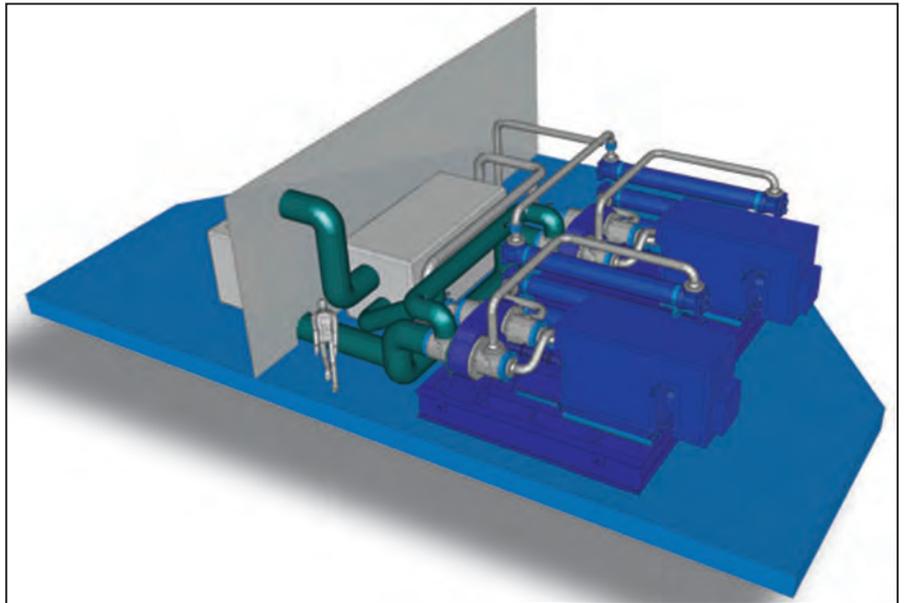
French-based Cryostar specialises in cryogenic equipment, including pumps, turbines, compressors, heat exchangers, and automatic filling stations. It is claimed that two out of three LNG carriers have Cryostar equipment aboard. However, all previous reliquefaction contracts have been won by competitor Hamworthy, while another recent Samsung commission, for onboard vaporiser systems for shuttle regasification vessels serving the Neptune LNG deepwater terminal, also went to the UK firm.

The tankers to feature the first Cryostar reliquefaction plant are due to be built by 2008, and will be of the membrane containment type, with a cargo capacity of 265,000m<sup>3</sup> – said to be the largest ever constructed. They are designated for LNG trade between Qatar and the USA.

In what is seen as a breakthrough contract for Cryostar, the company will provide the reliquefaction process design and the majority of cryogenic equipment for this system, using its EcoRel brand, and has developed low power consumption technology for the plant. Dr Aldo Belloni, member of the executive board of Linde commented: 'We are now active in this field as suppliers of base-load liquefaction technology, of onboard equipment to LNG shipyards, and of specialised re-evaporation systems at the receiving terminal.'

LNG is usually stored onboard tankers at a temperature of -163°C, in order to maximise the efficiency of boil-off gas management, delivering the largest amount of cargo possible. Onboard reliquefaction of boil-off gas in combination with slow-speed diesel propulsion is claimed to be economical for long distance travel.

Compared to conventional steam propulsion, where the boil-off gas is burned together with heavy fuel oil in boilers, the propulsion concept is more environmentally-friendly. This is due to low CO<sub>2</sub> emissions. 



CAD diagram of the EcoRel reliquefaction plant.



Construction of Cryostar's EcoRel reliquefaction system.

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## LNG collision study makes an impact

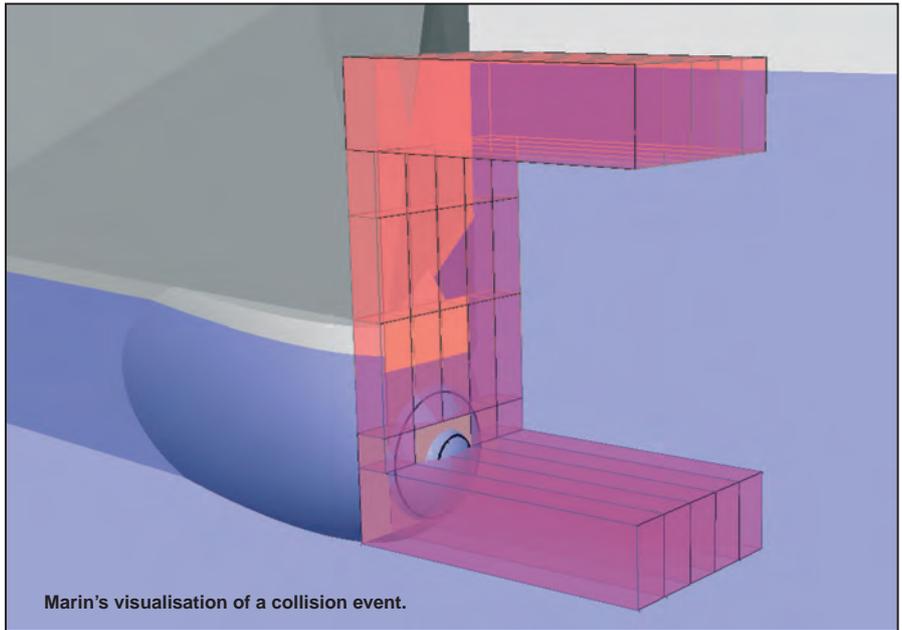
**D**UTCH research organisation Marin has developed a numerical model to simulate collision impacts and their consequences in the case of liquefied natural gas carriers, as part of risk assessment work it is doing covering LNG terminals.

Based on a given length and deadweight, and an assumed hull and plate thickness, the 'Marcol collision model' takes into account ship structures by class of ship, and looks to compute collision impact on the basis of simulated incidents involving ships operating at different speeds and on different courses close to LNG terminals.

Such data would prove valuable in a case where a terminal operator was assessing what ship speeds should be permissible in the vicinity of the terminal, or whether LNG carriers should only be allowed access during non-peak hours - at night, for example.

The model is designed to establish the hull penetration without deploying sophisticated but time-consuming Finite Element Modelling. It has involved the development of a new analytic software tool that can calculate as many as 10,000 scenarios of different simulated collisions per day, to establish the probability of a given LNG carrier's hull being penetrated in the case of an incident.

With Marin delivering risk of collision data and the penetration data modelling, engineering



Marin's visualisation of a collision event.

company Haskoning calculating the consequences of LNG leakage and, in particular, the potential fire and explosion risk.

Marin said that it had already performed its calculations covering two Dutch terminals and

had orders lined up elsewhere in Europe, and in Canada. In the case of the proposed terminals in The Netherlands, a port authority had used to the calculations to support its case for development.

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## Structural integrity system for LNG carriers

THE first ship operator to install Lloyd's Register's Hull Integrity system onboard one of its managed vessels is Shell International Trading and Shipping Company. *LNG Rivers*, a 134,487m<sup>3</sup> Nigeria LNG gas carrier, owned by Bonny Gas Transport (BGT), has already had the software installed, and will be closely followed by its sister ships *LNG Sokoto* and *LNG Bayelsa*, also owned by BGT.

Hull Integrity is a new service that helps owners and operators to manage the structural integrity of their ships, enabling them to demonstrate that sound structural inspection programmes are being employed. There are three elements to the service:

- Training for senior ship's officers and superintendents on how to carry out inspections.
- Ship-specific hull inspection guides.
- Software for recording and analysis.

The software has two components: a desktop application for ship-based users, and a web-based application for shore-based users. The ship-board system is intended to facilitate preparation for structural inspections by reviewing previous inspection results. The results are then recorded by the

system before being sent ashore for review by superintendents. Any comments subsequently made by the superintendents can also be reviewed with the software.

Users of the shore-based system are able to review the inspection reports received from their ships, produce drydock repair lists, and analyse the stored data to identify recurrent issues.

Prior to the installation of Hull Integrity aboard *LNG Rivers*, Shell staff received training from Lloyd's Register (LR). Locations where fatigue may potentially be more likely to occur, and other areas requiring particular attention during inspections, have been included on ship-specific inspection guides, produced for the three LNG carriers. Shell is also employing LR's Hull Planned Maintenance scheme, with the inspection reports generated by the Hull Integrity software feeding into the survey regime.

Chris Holland, Hull Integrity product manager, LR, commented: 'We recognise that ship's staff are in the best position to monitor the condition of the ship's hull on a daily basis. By providing tools to assist Shell with its own inspections, backed up by regular surveys, we can improve confidence in structural



The LNG carrier *Sokoto*.

integrity.' Alan Davey, general manager of ship management at Shell added: 'The system supports our staff in the performance of onboard hull inspections, contributing to our overall operational efficiency, and helps us to achieve continuous improvement in the maintenance of ships under our management.'

Hull Integrity was launched last year and is applicable to all ship types, though claimed to be especially advantageous for tanker and LNG carrier operators. It is not a class requirement, and so can be used by owners and operators of fleets classed by any classification society. 

## Aegir; eco- and economy-friendly



© BMT 2007. Aegir-18R image credit: DefenceImaging.com

The Aegir family of fleet support ship designs offers double hull protection of the marine environment. Its low risk, new build designs are an attractive alternative to tanker conversion. Designed to commercial rules, Aegir auxiliary oilers and replenishment vessels may be constructed by any commercial yard.

The Aegir family of designs is the creation of independent design specialists BMT Defence Services and Skipskonsulent.

Skipskonsulent designs commercial tankers and furnishes Aegir with a mature and low risk double hull, twin skeg hull-form. BMT has supported fleet auxiliaries for many years, conferring Aegir with the design flexibility to meet a wide range of military operational needs.

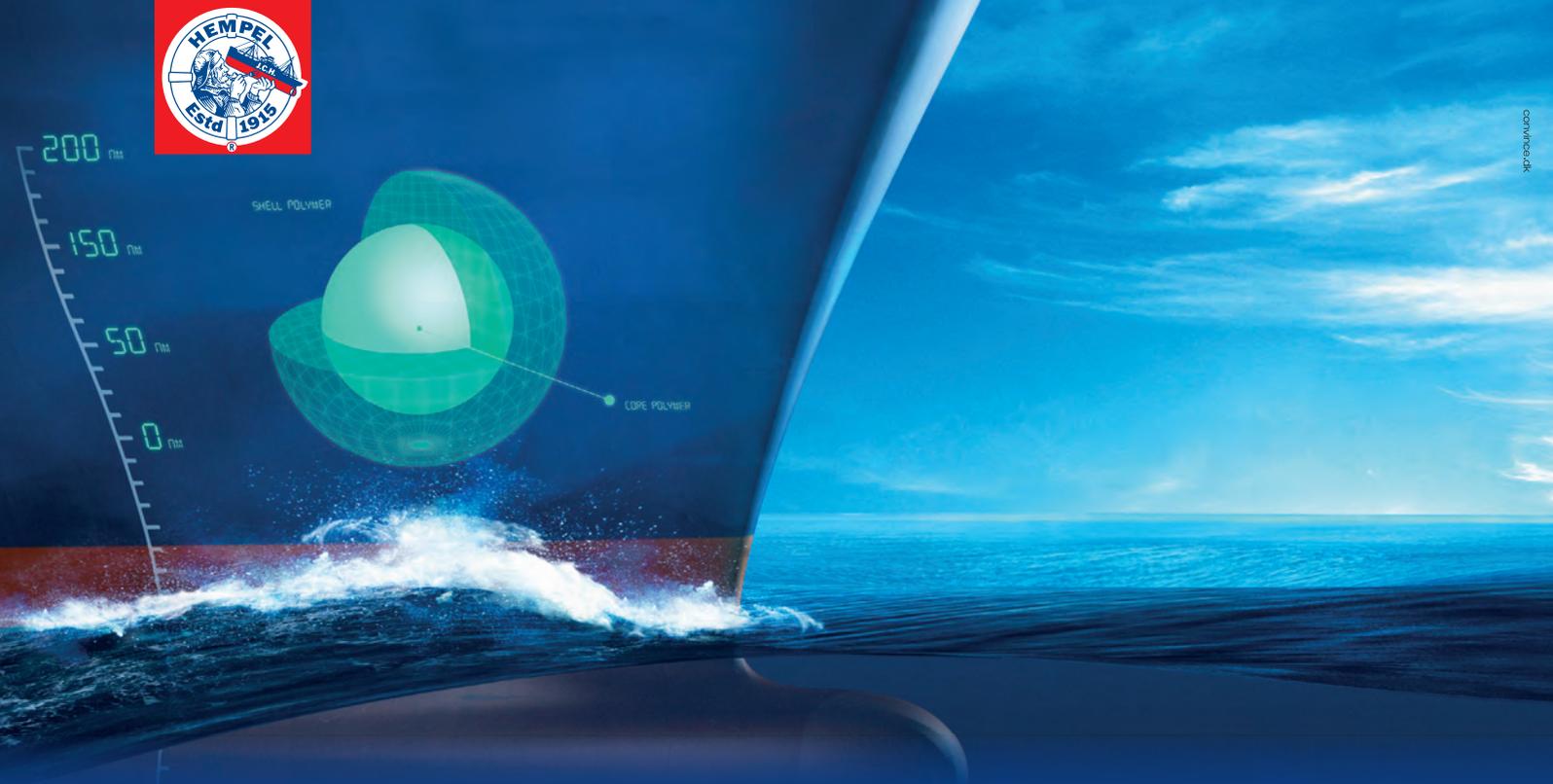
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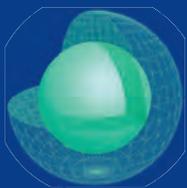
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# HEMPEL

## Tank lining gains critical mass

**T**HE presence of biodiesels in fuels is putting the case for lining tanks with epoxy phenolic linings, according to leading coatings manufacturer PPG Protective Marine & coatings.

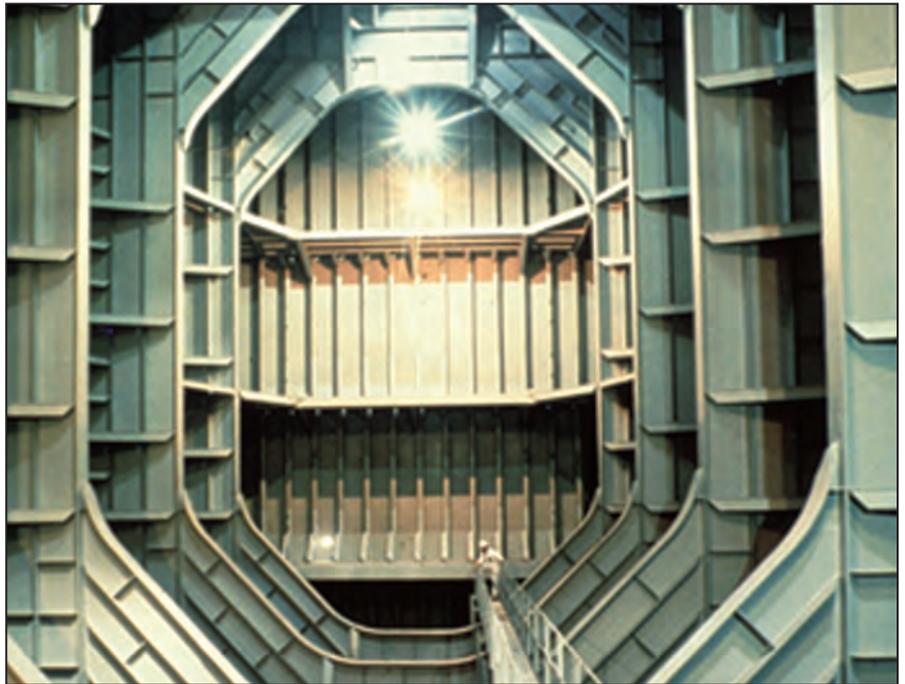
The Dutch-based manufacturer of marine coatings, formerly Ameron but now part of the US-based PPG group, markets two epoxy phenolic linings, in the shape of Amercoat 252 and Amercoat 90HS/905. The former is designed to withstand higher temperatures and pressures than normal air dry tank linings, and exhibits a performance comparable to baked systems, according to its supplier. Meanwhile, the latter is a high solid content, general purpose epoxy lining, typically used for tanks holding solvents, fuels, petroleum products, potable water, ballast water, non-acidic aqueous products, and caustics.

Rudi de Rijcke, PPG manager technical service and engineering, said: 'These types of coatings are becoming very important with the introduction of biodiesels into the market, because such intermediate products are acidic, which means they can only be transported using an epoxy phenolic lining which has a good resistance to ethanol and methanol. At the moment, biodiesel content may be around 2%, but we know from the latest EU Directive that this will be 10% within five or six years.'

Also of interest in the changing regulatory scenario is Amercoat 240 - the multi-functional epoxy coating from PPG that is as useful as a universal primer as it is as a protective coating for ballast tanks.

PPG said its ultra-high solids but low VOC product exhibited film properties that allowed use in coating systems with a choice of primer and finish coats, depending on specifications and requirements. The volume of solids content of 87% resulted in a low VOC of only 145gr/L, whilst the applied film could be varied between 100microns and 300microns per coat.

The paint could be used as a self-priming epoxy in one or two coats and, when specified it could be combined with any zinc-rich epoxy or zinc silicate shop primer.



PPG says the rise of fuels with biodiesel content is making its case for epoxy phenolic linings more persuasive.

With a low temperature cure down to -18°C, Amercoat 240 could, in addition, be used to protect the inside of water, oil, and ballast tanks.

Mr de Rijcke said the product had been three years in the market, but had come into its own as new regulations had developed. 'With the IMO ballast tank regulations coming in, shipyards will suffer the most, so if we want a new and successful product we have to make one that keeps both shipowners and shipyards happy,' he said. 'That means a product that offers 15 years service, but one that is also easy to apply for shipyards, so that's when we decided that a ballast water product should also be able to operate as a universal primer system.'

He said that, as well as being appropriate for all areas of the ship, Amercoat 240 was approved for ballast tank application to B1 class.

'This is a product for hulls, decks, and interiors,' said Mr de Rijcke. 'Often, mistakes are made at the application stage, when the wrong product is put on the wrong section, so the solution is a universal primer. This product is a one grade product for all applications and climates.' He said Amercoat 240 was an 'edge retentive' product whose performance had been verified by the strict approach taken by the US Navy. 

## International Paint wins Queen's Award

**F**ELLING-based coatings manufacturer International Paint has won the Queen's Award for Enterprise in the Innovation category 2007 for its marine and protective coatings business unit with a product it has already augmented.

The award recognised the development of Intersleek 700, a silicone-based foul release coating designed for use on the underwater hull of ships with service speeds between 15knots and 30knots. Intersleek 700 does not use biocides to control fouling on the ship's hull, relying instead on a slippery, low friction surface onto which fouling organisms have difficulty settling. Any that do settle, normally do so only weakly and can usually be easily removed by simple wiping/washing or by the vessel moving through the water at speed. Performance and environmental benefits include reduced fuel consumption,

reduced carbon dioxide emissions, no leaching of biocides into the sea, and reduced wash water treatment costs at drydock.

Intersleek 700 has recently been complemented by the introduction of the next generation of foul release technology, Intersleek 900, a product also manufactured on the Felling site. Setting even higher performance standards with improved fuel efficiency and reduced emissions, Intersleek 900 is a unique patented fluoropolymer foul release coating which represents the very latest advances in fouling control technology, significantly improving upon the performance of even the Queen's Award winning system Intersleek 700.

Intersleek 900 is exceptionally smooth with unprecedented low levels of average hull roughness, has excellent foul release capabilities and good resistance to mechanical damage. For

the very first time all vessels above 10knots, including scheduled ships, tankers, bulkers, general cargo ships, and feeder containers can now benefit from foul release technology.

In terms of fuel efficiency and reduced emissions, Intersleek 900 offers predicted savings of 2% in comparison to Intersleek 700 and 6% in comparison to self-polishing copolymer (SPC) antifouling. The potential exists for even greater savings in comparison to controlled depletion antifouling. For a single VLCC currently coated with an SPC antifouling this could mean savings of over 4500tonnes of fuel, a reduction in carbon dioxide emissions of over 14,000tonnes and US \$1.2 million over a five year period. Since launch in February 2007, Intersleek 900 already has track record of 20 vessels. 



# Faster and further with Ecospeed

**E**cospeed is an extremely durable hull coating that will save on fuel costs and give increased speeds. It is expected to last for up to 25 years and is guaranteed for 10.

Amongst recent applications are a 275 metre, 5000 TEU container ship, several ice-class cargo vessels and a major cruise liner—with more of each category planned for the near future.

The Belgian Navy have been using Ecospeed on a number of their vessels since 2004 and have committed to applying it on the remainder of their fleet as the time comes for repainting.

The growing appeal of Ecospeed comes down to a number of key factors.

The final hull surface has very low roughness levels. This, together with its corrugated surface, gives fuel savings through reduced consumption and increased speed.

The strength and impermeability of the coating provides a very high degree of protection against mechanical impact and corrosion. The endless cycle of hull repainting every two to five years can therefore be dispensed with. Even after being tested under extreme Baltic winter and ice conditions it has proven to

be an effective protection against mechanical impact.

In addition, the coating has no adverse effect on the environment as it is entirely toxic-free.

Ecospeed can be used on most ships, offshore vessels and structures. It has proven to be ideally suited for fast moving container and cargo ships, cruise vessels and ice-going ships. Its use can remove major headaches for ship superintendents. With no repainting necessary, yet protecting the hull surface against corrosion, there will be many additional advantages such as significant savings on repair and maintenance costs.

## Rising to the regulatory challenge

**COATINGS** supplier Hempel gives an insight into the work going on to keep pace with demanding regulators.

**R**ISING to the challenges posed by ever tightening environmental and safety regulations in the marine sector is by no means easy but, despite steep increases in materials costs that have eaten into profits, suppliers of coatings and certain of their sub-suppliers are obliged to invest heavily in meeting new and impending legislation.

The European Commission's developing Biocidal Products Directive has called for an assessment of the co-biocides, or 'active ingredients', used in antifouling paints. By 30 April, 2006, data packages supporting 10 biocides used in anti-fouling had been submitted to the Commission by a number of active ingredient suppliers. For the record, these were Irgarol, DCOIT (SeaNine), Zineb, Dichlofluanide, Tolyfluanide, zinc pyrithione, copper pyrithione, copper thiocyanate, and dicopper oxide.

Data requirements for approval of an active anti-fouling ingredient under the Directive are estimated as being between €7m-€10m, although the rewards may be great: these substances are being evaluated for their possible inclusion within Annex 1 of the Directive, as approved substances for use in the marine environment. The entire process is likely to take another two years.

Paint manufacturers themselves do not submit data on active ingredients under the Directive. However, they have submitted data to support product evaluation of antifouling products containing one or more active ingredients.

In the meantime, individual manufacturers are pushing forward with research and development as they look to abide by, and in some cases anticipate new regulations, but at the same time to develop a competitive edge.

Hempel, for example, most recently introduced a new TBT-free anti-fouling product – Globic NCT – which uses 'nanocapsule technology'.

Globic NCT is based on an acrylate binder in the form of nanocapsules, where the acrylic shell-core balance of the nanocapsules is designed to give the optimum control of self-polishing and biocide leaching under all service conditions up to 60 months, inclusive of idle periods such as outfitting.

Hempel says that, over a nine month period, Globic NCT has yielded a 14% reduction of average hull roughness when compared to forerunning products, equating to a 3%-5% saving on fuels.

There are ways of circumventing the whole active ingredients debate altogether, of course. Hempel said it saw an increasing demand for its alternative foul release system, where its silicone-based topcoat Hempasil is used in conjunction with the patented tiecoat Nexus to ensure that organisms and slime are shifted from the hull through the ship's motion. Uptake



**Hempadur Fibre 4760** – certified according to the latest requirements set down by the IMO for ballast tank coatings.

demand was a 'self-accelerating effect as more and more operators realise there is financial benefit in fouling release technology'.

The price gap between copper-based self-polishing coatings and their silicone-based fouling release counterparts had 'to some extent' narrowed, as copper prices had remained at record levels.

The company said it had guaranteed a 10 year performance for Hempasil on the containership *APL Jeddah*, while it was also now offering a special version of its foul release technology for vessels operating down to 8 knots.

Regulation has also come to the fore in the case of ballast tanks, where the December 2006 session of the International Maritime Organization's Maritime Safety Committee adopted Resolution MSC.215(82), laying out a mandatory performance standard for protective coatings of dedicated seawater ballast tanks on all new ships and of double-side skin spaces of bulk carriers. As part of revisions to Solas, it is expected to enter into force on 1 July 2008 and the performance standard will apply to ships for which the building contract is placed on or after 1 July 2008; or, in the absence of a building contract, the keels of which are laid on or after 1 January 2009, or the delivery of which is on or after 1 July 2012.

Accordingly, Hempel's newest product for the ballast tank challenge is Hempadur Fibre 4760, which is also recommended for hulls, decks, superstructures, and cargo holds, as well as other complex structures. It will cure down to temperatures of 10°C.

As the name implies, fibres are used within the epoxy to create a flexible, crack resistant ballast tank coating. The supplier points out that several sources of stress may lead to

cracking of internal protective coatings, which leads on to corrosion and structural weakening. These may include mechanical stress related to higher tensile steel and the reduced thickness of plate now used by shipyards – new ships flex more.

Also material will be thermal variations during the loading and unloading of ballast water, the wet/dry cycles related to its loading and unloading, and the impact of towage, fenders, collisions, ice trade lanes, or the loading of adjacent cargo holds.

While stress of the coating may occur on any surface of a ballast tank, Hempel points out that it will typically be more pronounced along edges and in corners. In many cases the problem is aggravated because the coating has been applied in higher dry film thickness than was specified. Excess film thickness greatly increases the propensity to crack.

Hempadur Fibre 4760 is certified according to requirements set down in the new IMO regulations, which thus implicitly recognise that fibre reinforcement reduces the risk of cracking and demonstrates an anti-corrosive performance that can be extrapolated as extending the lifetime of a vessel and lowering the need for maintenance.

Its low curing potential means that shipyards can apply one coat in one day, even during winter. It can be applied by standard airless equipment, and by roller and brush.

For good measure, in another context, Hempel indicated that it had a new solvent-free benzyl alcohol-free potable water tank coating in the pipeline, to be launched in the third quarter of 2007, as part of continuous efforts to develop and augment its range of tank lining coatings. ☺

## Glass flake breakthrough for Ecospeed

**E**COSPEED is now claimed by supplier Subsea Industries as representing one of the paints and coatings market's most promising developments.

The non-toxic yet durable coating is expected to last for up to 25 years and is guaranteed for 10.

Since its launch four years ago, the coating is becoming more and more widely used, with more recent applications including that onboard *APL Agate*, a 275m-long, 5000TEU capacity containership. Ecospeed has also been taken onboard by one of the major cruise lines, which is looking for ways to develop its environmental responsibility, with the coating already in use on one cruiseship, and another planned for the near future.

The Belgian Navy has been using Ecospeed on a number of its vessels since 2004 and has already committed to applying it on the remainder of its fleet as the time comes for repainting.

As well as being toxin-free, Ecospeed is given a one-off conditioning right after the initial application (which requires only two fast drying coats on bare steel) that brings hull roughness to very low levels. This, its supplier says, together with its corrugated surface, provides fuel savings through reduced consumption and increased speed levels.

As more and more customers are becoming aware, Ecospeed consists of a glass-flake reinforced vinylester coating. As a natural barrier to water, glass's properties are transferred to protecting ship hulls. In glass flake lining technology, this property has been utilised by incorporating glass particles into a matrix of tough carrier resins. When applied in the form of paint, these cure to create tough, glass-like products, which form a powerful bond with a host of diverse substrates.

The supplier concedes that its solution is more expensive at the outset than using conventional coatings, mainly due to the



Before first coat, after first coat, to final coat.



Ecospeed was recently applied to *APL Agate*, a 275m-long, 5000TEU capacity containership.

limited availability of shipyards able to grit blast the previously used paints off the hull. However, it says costs are recuperated quickly through expected gains in fuel consumption and speed, and especially over the longer term, as no repainting will be needed. 'This obvious saving also translates into fewer off-hire days in drydock.'

The supplier also points out that, when using conventional paints, the vessel's hull roughness will gradually increase as a result of the multiple layers of conventional paints as well as the leaching characteristics of these kinds of paints. Ecospeed, however, is a 'once in a lifetime' coating, designed to maintain its smoothness throughout its lifetime.

The only thing to be taken into further consideration is that Ecospeed is not, strictly speaking, an anti-fouling paint as it contains

no poisons that leach into the environment to kill marine life. However, it has anti-fouling properties in that the smooth surface makes it almost impossible for marine life to burrow into it and so take a firm hold. 'So, once travelling at speed, initial fouling tends to be released', says Subsea Industries.

'Underwater hull cleaning will be necessary when the vessel is at rest for any length of time and, depending on different operating environments and length of stop-overs, a fast hull cleaning operation may be necessary to clean off accumulated fouling – all can be done within normal operations or at anchor.'

Even so, the supplier of Ecospeed has calculated that even with regular hull cleaning, savings are still 'very significant', with fuel savings initially thought to be in the order of 10%.

Although comprehensive results from different fuel consumption and speed trials are still pending, Ecospeed also has the blessing of the European Union's Life Project as one of the 'promising solutions' to deal with a major source of planetary pollution.

Using Ecospeed, says Subsea Industries, can significantly cut back the 960m tonnes of CO<sub>2</sub> and the 9m tonnes of SO<sub>x</sub> that ships emit every year. 

## KACE keeps pace with coatings rules

**L**LOYD'S Register has certified the Korean Association of Coating Engineers (KACE) as the first institution qualified to train marine professionals to meet the requirements of the new Performance Standard for Protective Coatings (PSPC) for vessels.

The certification gives KACE a first-mover advantage on offering courses to third-party coatings engineers as the industry, under the recent guidelines from the International Maritime Organisation (IMO), acts to increase vessel longevity by preventing hull corrosion.

'The IMO PSPC shows us the important role coatings play in the fight against corrosion and in maintaining the structural integrity of a vessel, thereby improving safety,' says

David Howarth, global technology leader for metallurgy, materials, welding, and NDE for Lloyd's Register. 'It is important to recognise the tremendous contribution that organisations such as KACE bring to the industry through training and education.'

LR cites industry experts as saying that the new PSPC, which came into force for tankers and bulk carriers being built to the Common Structural Rules (CSR) in December 2006, are likely to have the largest impact on the way vessels are built since the CSR themselves.

'While shipbuilders had time to prepare for the CSR, the new coating standard came into force as soon as they had been agreed, leaving some shipbuilders fielding requests from owners to sign contracts for new vessels before

they fully understood the impact of the PSPC on their production processes', the class body says.

'Lloyd's Register's approval of our advanced coating inspector training course is very meaningful, not only for KACE, but also for the overall Korean marine industry,' KACE director Je Choon Moon says. 'This will definitely help the Korean shipbuilding industry to prepare for the PSPC requirements with their coating inspectors' qualification.'

Mr Moon says inspectors certified by KACE will now be recognised by leading class societies such as Lloyd's Register, in accordance with IACS PR34, as equivalent to those who provide coating inspection services with NACE Level 2 or FROSIO Level III qualifications. 

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## Prime case of the universal

**IMPROVED** shipyard efficiency, reduced drydocking time and optimised vessel protection are all claimed for MCU PowerBond-Z HS, described by MC Technology's Morten Sørensen and Anthony Verbergh as the first true universal primer for newbuilding and maintenance.

**I**NTEREST in 'universal primers' has increased in the marine coatings market over the last few years, particularly for newbuilding projects. An increasing number of shipyards are requesting paint manufacturers to offer specifications based on universal primers, and shipowners are now also inquiring about the use of them for newbuildings.

Environmental regulations have increased the costs of painting dramatically. Numerous shipyards identified the development of 'true universal primers' as the best solution to offset these increased costs, because the simplification of the painting process would lead to tremendous efficiency gains in the total shipbuilding process. This trend has expanded now to shipyards all over the world.

In the development of its primer, MC Technology sought to make a user-friendly coating while also providing a high-end long-term performance anti-corrosive product. The result is what is claimed to be a unique primer, combining a high grade quality of zinc and a specific high lamellar grade of micaceous iron oxide (MIO) in a high solids polyurea coating.

The MCU PowerBond-Z HS is a single component moisture cure product, curing with the slight presence of water molecules - roughly 6% of relative humidity (RH). This coating can be applied in temperatures from -12°C to 50°C and in humidity levels from 6% to 99%.

The polyurea resin offers many advantages over the one component and wide application range, which was later discovered. The adhesion is said to be exceptional and long-term testing showed the adhesion values actually increased over time exposed to the elements, where typically coatings adhesion values will be significantly reduced.

Long-term flexibility is another attribute claimed for this coating type. As it is chemically and physically inert after curing, it will not change its characteristics by becoming brittle and cracking. However, the resistance to impact during third party testing showed better impact and abrasion resistance than both ceramic filled and glass flake epoxy systems, according to the supplier.

The zinc is encapsulated and thereby insulated by the resins, thereby no zinc salts are formed and the coating has an unlimited re-coat time. A simple degreasing and cleaning of any surface contamination and the coating can be completed in weeks, months or even a year-plus after the initial PowerBond-Z application. As required by a universal primer, the coating system which can be applied on this product is quite wide.

The product can be used as a primer for almost all coating systems including MCU, epoxy, alkyd, polyurethane, polysiloxane, and polyaspartic. It is also said to offer excellent adhesion to existing shop primers.



Good wetting out properties in pitting areas.



PowerBond-Z directly on flash rust after UHP Hydro-jet on a Wagonborg vessel.

The wetting out characteristics were said to be particularly good in the lower solids version and were necessary to maintain in the high solids version in order to retain some of the wetting out and adhesion characteristics.

In making the high solids, a development of a resin binder with roughly the same viscosity as the thinner was utilised. The result is a product with the same viscosity as the low solids version, with no

extenders or the thixotrops often used to make high solids coatings. All the beneficial characteristics remain unchanged.

MCU PowerBond-Z H has been tested over several years and applied on numerous high profile newbuild and maintenance marine projects. Owners such as BW Shipping, BW Offshore, Hoegh Shipping, Wagonborg, Spliethoff, Transatlantic, and Swedish Orient are regular clients.



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Sigma Coatings is a brand of the SigmaKalon Group



MC Technology says that independent test results have shown:

- Superior anti-corrosion (passes 10000hrs salt spray testing without blistering or undercutting)
- Very good abrasion and impact resistance (< 30mg loss on ASTM D4060-CS 17 Wheel, 1000cycles/kg load & resists 150lbs on Gardner impact test: ASTM 2794)
- Flexibility and crack resistance, even after long term exposure (passes ASTM D 522, 180° bend 1/4-inch mandrel) and resists more than 30% elongation)

It adds that the PowerBond-Z coating application has a wide tolerance. The general dry film thickness recommendation is 75microns. The reason for this is to cover the peaks and valleys of a newly blasted profile usually being 55microns. If applying over pitted areas this thickness may need to be 150microns. The dry film thickness of the product is 350microns and mud cracking will generally start to appear at 400microns – 450microns. There is only one grade that can be brushed, rolled, or sprayed (conventional or airless).

According to its developers, MCU PowerBond-Z is considered to be a 'true' universal primer because it is ideal for both new construction and maintenance work. Being surface tolerant, it can be applied on surface preparation from ST 2 to SA 2.5, it is also ideal to use with hydro-jetting and wet abrasive blasting.

According to MC Technology: 'All-round: suitable to be applied as the anti-corrosive primer all around the vessel, for areas such as underwater hull, water ballast tanks, cargo holds, topsides, decks, superstructures, internal areas, and drinking water tanks. This zinc rich primer is recommended for immersion and is also compatible with zinc anodes.

'All year: can be applied 24 hours a day and 7 days a week in most geographical regions and within the tolerance of: 6% to 99% humidity and -12°C to 50°C temperature range. It is tolerant to damp surfaces and will resist damp, rain, or immersion within 30min of application.

MCU PowerBond-Z is claimed to offer corrosion protection for up to 15 – 20 years of the vessel's life time, (even in ballast tanks) and maximise the return on the investment of a new vessel, but also shipyard production efficiency because of its simplicity and speed of application. Substantial savings flow from using one primer for the whole vessel, no mixing, no pot-life limitation, and one thinner, the supplier



Finished primer.

points out. 'There is less product waste, one thinner, significant reduced downtime, reduced curing and re-coat time, reduced potential risk of premature failure and subsequent claims, unlimited over-coat window which reduces additional procedures and costs, and a reduced material stock.'

Other materials can be used to finalise the coating systems or a total MCU system can be used that the supplier says limits the total number of coatings required on the whole vessel to five or six one component products, pointing out that a limited amount of products increases painter's familiarity with the products.

'Using a universal primer instead of 10 to 15 different primers, total paint process costs will be reduced on average by 5% - 10%. Even a higher priced primer will give substantial savings by reducing the overall painting cost and time.'

For maintenance purposes, the product is claimed as offering excellent adhesion to existing coatings such as alkyds, lead-based coatings, epoxies, most coal tars, and urethanes, as well as an ST 2 a standard of surface preparation. 'It offers good wetting conditions and is one of the most moisture-resistant coatings in the industry. It will remain flexible, while having a hard impact and abrasion-resistant surface thereby extending the vessel life,' according to MC Technology.

'It can be applied at most all weather and temperature conditions and can be subjected to immersion, rain, or snow within 20minutes-30minutes after application.'

Even though the supplier concedes that there is no academic approach of estimating the exact savings by using a universal primer, 'it has been demonstrated on numerous projects that a significant time savings can be utilised as well as virtually eliminating the risk of premature failure.'

MC Technology said that, as one of the most widely tested products in the industry, PowerBond-Z had demonstrably reduced the total paint costs and improved yard efficiency, reducing delays caused by coating applications.

In the case of a heavy duty application for ro-ro decks used to transport of heavy containers for Storaenzo, the deck was prepared by UHP Waterjetting. The surface-tolerant zinc primer was applied to a flash rusted surface with deep pittings. This is not possible with traditional zinc primers. Afterwards, non skid was thrown into the second coat. The third coat was an aluminium primer. The total dry film thickness did not exceed 150µm. The performance after one year is said to be excellent and better than any other system – whether two component ceramic epoxy, glass flake epoxy, etc. Ⓢ

## New certificate for MarineLine

ADVANCED Polymer Coatings recently secured a certification of design assessment for its patented MarineLine coating system, developed to line and protect tanks in marine chemical tankers and related offshore uses.

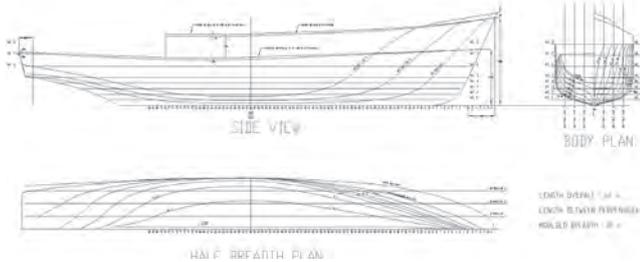
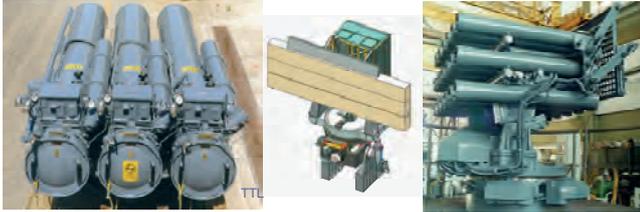
The Certification is representation by ABS as to the structural and mechanical fitness for a particular use or service in accordance with the organisation's rules and standards. Documentation was provided

to and reviewed by ABS on product specifications, performance data, standard of compliance, engineering analyses, and other data.

The latest certification comes some 13 years after MarineLine was introduced to the marine industry. Since then, more than 100 chemical tankers, each with numerous tanks and slops, have been coated and are carrying a wide range of hazardous chemical cargoes worldwide.

APC chairman Donald Keehan said the significance of the ABS Certification was far-reaching. 'We have conducted more than 5000 chemical and physical tests to ensure that MarineLine can resist 98% of all corrosive acids, alkalis, solvents, and other chemical and liquids,' he said. 'It has proven to far outperform stainless steel tanks, and other linings such as Phenol Epoxy and Zinc.' Ⓢ

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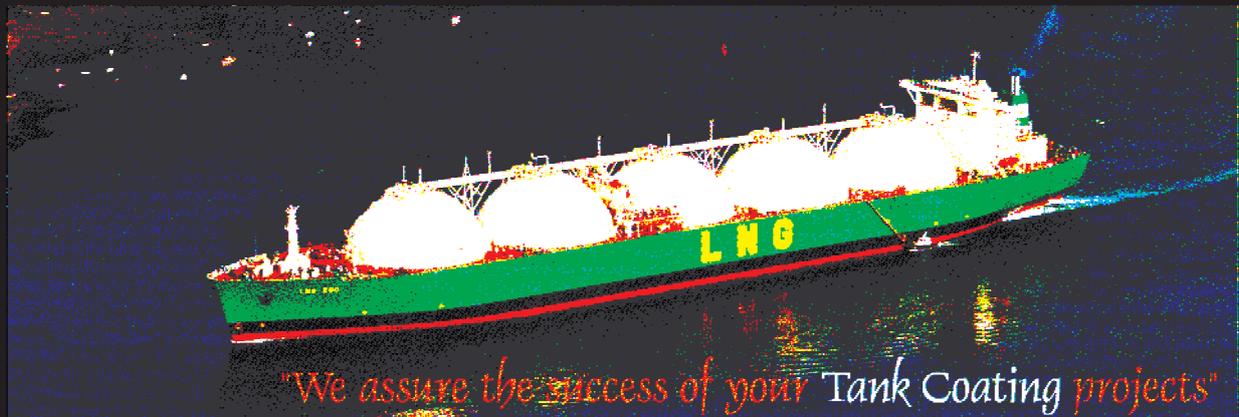
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## Military Support Ships

13-14 November 2007, RINA Headquarters, London UK

### First announcement and call for papers



In an increasingly uncertain world the modern navy needs to be able to respond to a wide range of operational commitments and missions anywhere in the world. Logistic support ships are essential in providing these forces with greater reach and endurance, and allow self-reliance and sustained operations to be conducted away from a supply base. These ships may be involved in supplying fighting ships bulk consumables, supporting land based forces from the sea, provide forward aviation support and humanitarian relief.



With the implementation of new technologies, changing operational and regulatory environments new methods need to be investigated to make logistic support ships more flexible and economical. This conference will bring together all those concerned with the design, construction, equipment supply and operation to consider recent developments and discuss how they impact on the design of such vessels.

Papers are invited on the following topics:

- Ship to Shore Replenishment Craft
- Replenishment Ships
- Strategic Sealift Vessels
- Forward Repair Vessels
- Hospital Ships
- Disaster Relief Vessels
- Underway Replenishment (RAS/UNREP/VERTREP) Systems
- Ship to Ship Interface
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## Beyond polysiloxane to the next generation

**POLYSILOXANE technology has not proved to provide a risk-free technology for 15-20 years service. Gerard de Vries, SigmaKalon Protective Coatings, Amsterdam, relates how one manufacturer has developed highly durable systems beyond polysiloxane.**

TWO of the major driving forces in the protective coatings industry over recent years have been the demand for highly durable systems and for systems with low environmental impact. Corrosion engineers and coating specifiers in the offshore and oil & gas industry have been asking for systems with a durability of up to 20 years. Coating suppliers have developed new products based on new technologies to address these issues.

As a result, coatings suppliers have launched polysiloxane topcoats onto the market as highly durable systems, with a vaunted durability of 15-20 years. The polysiloxane systems also meet stringent environmental criteria, in being high solid and hence reducing VOC emissions. These systems have to be used in highly corrosive environments with high salinity and UV exposure.

The claims for such highly durable coatings are of great interest where maintenance access is difficult, or in cases where shut down costs for maintenance are high.

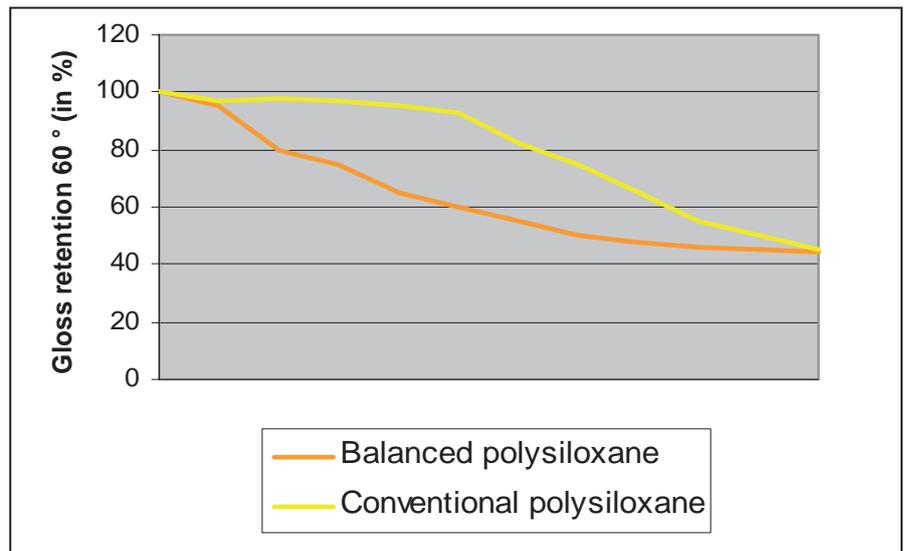
Polysiloxane topcoats have been used in several coating systems in onshore and offshore applications. Typical systems that have been introduced in the market are:

- Two coat systems with zinc silicate or zinc rich epoxy as first coat.
- Three coat systems.
- Topcoat in a maintenance system that is applied on partly aged coating and prepared substrate.

Instead of the traditional three coat systems with an epoxy primer, epoxy build coat, and polyurethane, two coat polysiloxane systems have some benefits that make them an attractive choice. The higher cost of the two coat polysiloxane system is offset by the savings in labour and time to coating contractors. In many projects where only short durations are available for the application to be completed, it makes sense to use a two coat system. Because coating costs are only a small portion of the total new construction or maintenance project, end-users are inclined to specify coatings that will last longer.

However, severe coating failures with a polysiloxane topcoat have been reported after a relatively short time (2-5 years) in the offshore sector. The main damage appears as a breakdown of the polysiloxane topcoat in a two-coat zinc epoxy/polysiloxane system. To a lesser extent flaking or delamination with three-coat systems has also been reported.

The damage within three-coat systems raises concern as this system has been used as a replacement for 'metallizing' on the underside of decks facing the sea where maintenance



Accelerated WOM (ISO 4892-2) testing of balanced polysiloxane and conventional polysiloxane.

work is difficult and costly. A combination of internal stress, lack of flexibility, and decreased adhesion are considered to be the possible cause of failures.

Generally, in fact, polysiloxane technology has not proved to provide a risk-free technology for 15-20 years service.

To understand what might be the cause of this, a deeper insight into the chemistry of polysiloxanes will be helpful. Polysiloxanes are hybrid coatings, which mean that they have a configuration consisting of an organic part, typically acrylic or epoxy, and an inorganic part - siloxane. The most common catalyst that is used to cure these hybrids is the (cyclo)aliphatic amine. Because of the combination of an organic part and an inorganic part the final properties can be tailored.

In the polysiloxane paradox it becomes apparent that by increasing the amount of polysiloxane in the formulation, the better the colour and gloss retention of the product. However, increasing the polysiloxane amount reduces flexibility and increases the cohesive strength. This could be one of the possible reasons why we observe after a short period of time (2-5 years) the severe coating failures in on- and offshore installations.

It is therefore of vital importance that a correct balance is chosen between the amount of epoxy or acrylic and polysiloxane in a coating formulation. This requires extensive testing to find out the required balance between aesthetics (colour and gloss retention) and system integrity (flexibility) to meet the durability expectations.

Polysiloxanes that have a balanced ratio of epoxy or acrylic and polysiloxane show after accelerated testing in a WOM (ISO 4892-2) the gloss retention curves exhibited in figure 2 when compared with a conventional polysiloxane (high polysiloxane amount).

The gloss of the balanced polysiloxane after exposure in the WOM goes down faster

than the conventional polysiloxane. This is understandable, since the amount of siloxane in the conventional formulation is higher. Although the gloss goes down faster, it will level after a period of time at the same level as the conventional polysiloxane.

This was just one part of the polysiloxane paradox; the other part concerns flexibility. Flexibility is related with the build up of internal stress (ASTM D6991-05) is determined in the case of the balanced polysiloxane and a conventional polysiloxane after the following cycle:

- 4 weeks curing at 20 °C.
- 4 weeks demineralized water immersion at 20 °C.
- 24 hours at 60 °C.
- 2 cycles of ISO 20340 (UV/condensation).

The balanced polysiloxane has an internal stress that is only 20% of the internal stress of a conventional polysiloxane. This means that this balanced polysiloxane is less sensitive to cracking.

The flexibility can also be determined by Mandrel (ISO 1519) testing and the result is shown in Figure 4.

When both parts of the polysiloxane paradox are taken into the equation it becomes obvious that the balanced polysiloxane offers less risk and, over time, shows a comparable performance to a conventional polysiloxane.

Despite the introduction of polysiloxane, progress has also been made with the more traditional used topcoats in offshore and oil & gas, polyurethanes. Every traditional polyurethane resin consists of a building block, which is a copolymer of styrene and an acrylate in a certain ratio.

Unfortunately the styrene building block is the part where we find weakness. The problem with the styrene part is its aromatic nature that becomes an issue when it is exposed to ultraviolet (UV). This:

# The Royal Institution of Naval Architects

## Warship 2007: The Affordable Warship



20 - 21 June 2007, Bath, UK

### Second Notice



This conference, the 27th in RINA's successful Warship series, will look at the 'Affordable Warship'. The conference will be held in Bath on 20-21 June 2007.

The ever increasing cost of warship procurement, upkeep and operations, whilst at the same time meeting the need for ever more capable and sophisticated platforms; a dilemma faced by most navies today. This conference will consider how advances in design, construction and operations can contribute towards lower through-life cost ownership whilst maintaining fleet capability.



RINA invites papers on the following related topics, covering all types of warship:

- Procurement models for warship acquisition
- Cost reduction
- Through life support
- Innovative design
- Designing to cost and capability
- Build in friendliness
- Technology insertion
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- Recoverability
- Management of risk
- Damage control, fire fighting, situation awareness and reconfiguration of systems.
- Innovative support solutions
- Regulation & legislation: concept to disposal



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- Reduces gloss retention over time.
- Results in yellowing and discoloration over time.
- Results in chalking over time

The styrene in the resin will contribute to a very slow progressive degradation of the top surface of the polyurethane when it is exposed to UV. This surface degradation results in a slight yellowing of the film as well as the release of the degraded resin and some of the film pigment. This process is known as chalking. The rate of chalking varies considerably with the exposure, the type and quantity of pigments and fillers in the film, and the coating properties. This process will obviously reduce the gloss and colour retention.

SigmaKalon represents a means of eliminating the weakness in the resin of polyurethane. The building block consists of branched vinyl and acrylate. The resin is 'styrene free' and will result in a longer durability when exposed to UV:

- Enhanced gloss retention over time.
- Reduced discoloration over time.
- Enhanced chalking resistance over time.

This Vesatic-9 technology is embedded in SigmaKalon's SigmaDur 1800. This is a quantum leap forward in the technology of polyurethanes.

Due to the nature of the polymeric polyurethane technology it is possible to formulate a high solid durable finish to meet latest VOC requirements.

This next generation polyurethane based on polymeric polyurethane technology has been tested in accelerated testing in a WOM (ISO 4892-2) and compared with conventional polyurethane and polysiloxane.

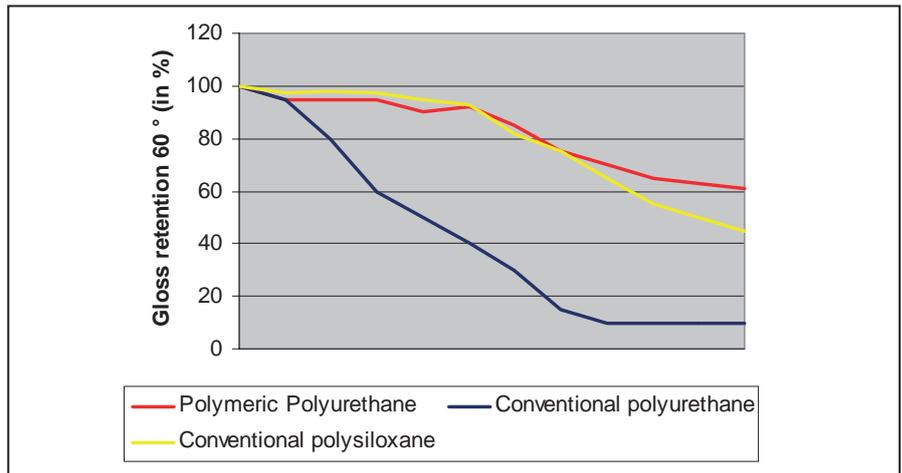
While in the beginning the gloss retention follows a similar pattern in the WOM exposure, polymeric polyurethane outperforms conventional polyurethane and polysiloxane over time.

The severe coating failures with a polysiloxane topcoat that have been reported after a relatively short time (2-5 years) in offshore raise the question of how the next generation 'polymeric polyurethane' performs in terms of flexibility. In these reports the main damage appears as a breakdown of the polysiloxane topcoat in a two-coat zinc epoxy/polysiloxane system. To a lesser extent flaking or delamination with three-coat systems has also been reported. A combination of internal stress, lack of flexibility, and decreased adhesion are considered to be the possible cause of failures.

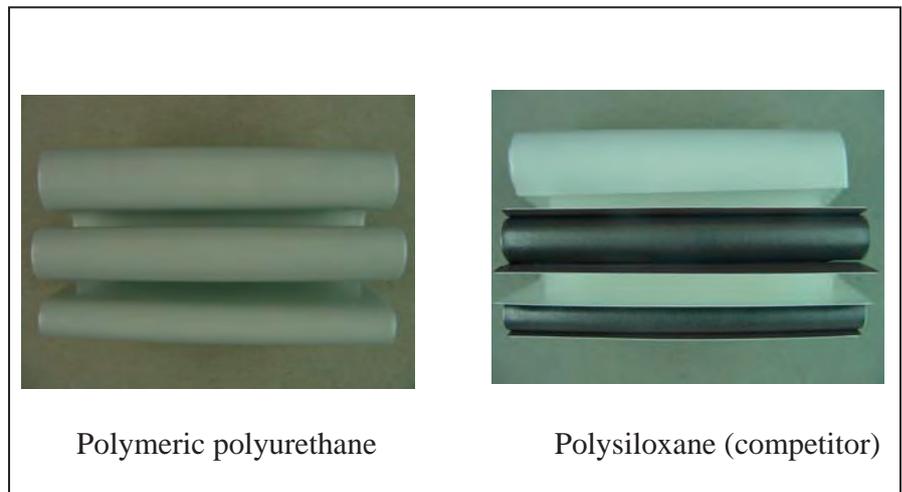
The build up of internal stress (ASTM D6991-05) is determined of polymeric polyurethane and a conventional polysiloxane after the following cycle:

- 4 weeks curing at 20 °C.
- 4 weeks deminwater immersion at 20 °C.
- 24 hours at 60 °C.
- 2 cycles of ISO 20340 (UV/condensation).

The polymeric polyurethane builds up only 16% of the stress that is built up in a



Accelerated WOM (ISO 4892-2) testing of polymeric polyurethane, conventional polyurethane, and polysiloxane.



Polymeric polyurethane versus polysiloxane.

polysiloxane that is available in the market, and hence is less sensitive for over application and thus cracking and delamination.

A similar result has been observed from Mandrel testing (ISO 1519) of polymeric polyurethane and conventional polysiloxane.

Also here it can be seen that the polysiloxane delaminates from the surface, which is also been reported to be the case in some offshore installations.

Typical systems that can be used with polymeric polyurethane are:

**- System 1:**  
Zinc rich epoxy, 150microns  
Polymeric polyurethane, 75microns

**- System 2:**  
Zinc silicate, 75microns  
Polymeric polyurethane, 75microns

**- System 3:**  
High solid epoxy, 150microns  
High solid epoxy, 150microns  
Polymeric polyurethane, 75microns

These typical systems are complying with international standards like Norsok M501, ISO 20340, and ISO 12944.

Generally, polysiloxane technology has not proved to provide a risk-free technology for 15-20 years service. The majority of polysiloxanes are hybrid coatings and by using the polysiloxane paradox it has been explained how polysiloxanes can be formulated regarding gloss retention and flexibility. When both parts of the polysiloxane paradox are taken into the equation it becomes obvious that the balanced polysiloxane offers less risk and over time a comparable performance as conventional polysiloxane.

The next generation of highly durables beyond polysiloxane, providing unrivalled durability in the most demanding environments, are based on polymeric polyurethane. This next generation overcomes the severe coating failures like flaking and/or cracking that are reported with polysiloxane on offshore installations. These new generation polyurethanes show a better gloss retention, flexibility, and less internal stress than polysiloxanes. It outperforms conventional polyurethanes in colour and gloss retention. With this new technology it is also possible to formulate high solid coatings that meet the requirement to reduce VOC emissions. There are two- and three-coat options available that meet the latest international standards. ☺

## Shipyard licensed to use CAD/CAM software

AN agreement has been reached between India's ABG Shipyard and Spanish company Sener Ingeniería y Sistemas SA, allowing the yard to use the FORAN CAD/CAM system permanently.

In 2006, ABG staff received on-site training for the hull and piping sections of the software, and this knowledge was immediately used in the design of an 18,800dwt bulk carrier for M/S ESL Shipping of Finland. The structural and piping drawings were successfully produced for this vessel.

During April this year, ABG completed the FORAN training with an electrical subsystem module, which has enabled the company to cover the entire ship design process.

ABG management feels that the system has been demonstrated to be suitable over the year in which the training took place, and expects to make FORAN a tool for the reduction of costs and improvement of productivity.

Contact: *Mirko Toman, naval architect, MBA*  
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*Ingeniería y Sistemas SA.*  
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*E-mail: mirko.toman@sener.es*  
*www.sener.es*

## Kone lifted by new contract

THE largest single cruiseship contract for elevator and escalator manufacturer, Kone, has been signed with Aker Yards. Kone will be supplying all the elevators and escalators in two luxury cruiseships with a capacity of 4200 passengers each, to be built for Norwegian Cruise Line. The vessels will be 150,000gt post-panama size, 325m in length, and 40m wide.

The ships will be built at Aker Yards's shipyard in Saint Nazaire, France, and due for delivery in 2009 and 2010 respectively. The contract also includes an option for delivery to additional identical ships.

60 custom designed elevators and 12 escalators tailored for passenger and service use will be designed, supplied, and installed by Kone. The contract is valued at about €15 million, and Kone hopes this collaboration will strengthen its market position in the cruiseship sector.

Contact: *Minna Mars, senior vice president,*  
*corporate communications & IR, Kone Oyj,*  
*Keilasatama 3, PO Box 7,*  
*02150 Espoo, Finland.*  
*Tel: +358 (0)50 384 9440. www.kone.com*

## MacGregor Bulk in cement deal

ALREADY a regular MacGregor customer for cranes and hatch covers, Intership Navigation has now ordered three shipsets of Nordströms cement-handling gear.

Intership Navigation Co Ltd Cyprus has ordered Nordströms self-loading and discharging cement-handling systems for a series of three bulk carriers of 7500dwt-9000dwt. The vessels will be built at Shandong Huanghai Shipbuilding in China and are scheduled to go into operation during 2008 and 2009.

This is Intership Navigation's first order for cement-handling systems from MacGregor Bulk, extending a long relationship as the company has been a customer for cranes and hatch covers from other MacGregor divisions for many years.



VTA turbochargers from MAN diesel feature a nozzle ring with adjustable vanes.

The rated capacity of the Nordströms equipment is 1000tonnes/hour for mechanical loading and 2 x 300tonnes/hour for pneumatic loading. Discharging rate is 2 x 300tonnes/hour pneumatically.

Preparations are also being incorporated for a 300tonnes/hour mechanical discharge arrangement to be installed later.

For further information, please contact:  
*Jan Karlsson, director, self-unloading systems,*  
*MacGregor Bulk (AB)*  
*PO Box 4113, SE-400 40,*  
*Gothenburg, Sweden.*  
*Tel: +46 171 23275. Fax: +46 171 23299.*  
*E-mail: jan.karlsson@macgregor-group.com*

## VTA turbocharger debut

NEW variable turbine area (VTA) technology will be developed for all models in MAN Diesel's TCR series radial and TCR series axial turbochargers. A TCA axial turbocharger with VTA technology is already being tested on a medium bore, two-stroke, low-speed engine, intended for marine application, with results suggesting there is potential for reductions in specific fuel oil consumption at part-load, combined with significant improvements in load acceptance.

Dr Alexander Rippl, head of turbocharger development at MAN Diesel, reckons that by using the VTA system, the volume of charge air can be more precisely matched to the quantity of injected fuel at all points on an engine's load profile. Taking into account both future emissions legislation and customers' expectations of overall engine performance and fuel consumption, flexibility of air and fuel management could result in reduced specific fuel consumption. This could occur in combination with reduced hydro carbon and CO emissions, and improved dynamic behaviour of the engine-turbocharger system.

The VTA system consists of a nozzle ring, equipped with adjustable vanes, replacing the fixed vane nozzle rings fitted in MAN Diesel's standard TCA turbochargers. This means the VTA technology can easily be retrofitted to turbochargers already in the field.

The pressure of exhaust gases can be regulated by adjusting the vanes' pitch, and the compressor output can be optimised at all points on the engine's performance map. In order to minimise thermal

hysteresis and improve adjustment accuracy, each vane has a lever which is directly connected to a control ring. This ring is actuated by an electric positional motor with integrated reduction gear, the development of which was an integral part of MAN Diesel's VTA solution.

Recently completed shop tests on a six cylinder, 46cm-bore 6S46MC-C engine, built by Croatian MAN licensee Brodosplit, have indicated that the inclusion of VTA technology on an axial TCA55 turbocharger allows up to 0.5bar in variation in compressor output pressure at part-load. The tests included NOx certification of the engine, and the results also showed improvements at part-load in terms of fuel consumption, as well as considerable reductions in emissions of soot and unburnt hydrocarbons.

The engine is one of two due to be installed aboard a 70,000tonne shallow-draught tanker, under construction at the Brodosplit shipyard for Stena Concordia Maritime shipping. It will now be tested aboard the tanker during its sea trials and first voyages, and compared with a second 6S46MC-C with a conventional turbocharger. This set of tests will include a simulation of emergency running, by operating the engine with the VTA turbocharger at high torque with the second engine shut down.

Commercial deliveries of MAN Diesel's TCA and TCR turbochargers with VTA technology are scheduled to start at the end of 2008.

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*www.manbw.com*

## S-VDR deadline looms

IN the run up to International Maritime Organization (IMO) regulations requiring installation of simplified video data recorders on existing merchant ships by 1 July 2007, more than 60 units have been ordered from Northrop Grumman Corp's Sperry Marine business unit by SRH Marine Electronics, of Piraeus, for Greek shipowners.

Sperry Marine will supply the S-VDR systems and will assist SRH Marine to oversee installation, integration, commissioning, and annual performance testing of the systems through its worldwide service network.

The S-VDR orders include 23 ships owned by a Greek containership operator, with the remainder distributed among a number of other Greek shipowners.

Similar to an aircraft's 'black box' cockpit recorder, the S-VDR downloads data from the ship's navigation instruments and voice recordings from the bridge and radio communications, which can be retrieved and analysed following an accident at sea.

The IMO carriage requirements state that all existing ocean-going ships over 3000gt must be fitted with an approved S-VDR at the first scheduled drydocking after 1 July 2007, but no later than 1 July 2010.

Contact: *Northrop Grumman Sperry Marine,*  
*1070 Seminole Trail, Charlottesville,*  
*VA 22901, USA.*  
*Tel: +1 (434) 974 2656.*

Fax: +1 (434) 974 2259.  
 E-mail: sales\_commercial@sperry.ngc.com  
 www.sperrymarine.northropgrumman.com

**VDRs for ferries**

RADIO Holland (Vancouver) recently won the competitive bid to provide BC Ferries with VDRs manufactured by Rutter Technologies. Many domestic operators worldwide are beginning to retrofit their fleets with VDR (Voyage Data Recorders).

With a fleet of 36 ships, BC Ferries is one of the largest and most complex domestic ferry fleets in the world, transporting over 21.7 million people and 8.5 million vehicles in the fiscal year ended 31 March, 2006.

The BC Ferries' requirements for this project are more demanding than a standard retrofit S-VDR installation according to IMO standards. The objective of the BC Ferries is to include – wherever practical – many other inputs. These include rudder order and response – engine order and response.

Five of the vessels in the fleet are double-ended ferries that have two separate bridges – one on each end of the ship. Radio Holland's bid included two VDRs for each of the double-ended ferries. This decision was largely made to avoid the installation of long cable runs through many fireproof bulkheads. It also avoided various interfacing and changeover issues caused by two sets of device inputs. The current planning of BC Ferries is to complete the entire project before November 2008.

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 Westerlaan 1,  
 3016 CK Rotterdam, The Netherlands.  
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 E-mail: info@radiohollandgroup.com

**Sunscreen to cover BP**

A SERIES of 105,000dwt Aframax crude oil tankers from BP Shipping will be supplied with Solasafe anti-glare roller sunscreens by Solar Solve Marine, for all bridge windows.

The first ship of the series, *British Oak*, is a TSU 1236 Tree class vessel, built in Japan and delivered in April 2003. Its Green Award certificate was recently due for renewal, and so before the audit, a decision was made to install the screens in order to reduce air conditioning costs.

It is claimed that the screens effectively reject heat which would otherwise accumulate in the wheelhouse and would have to be counteracted by air conditioning. Solasafe is also intended to create more comfortable working conditions within the navigation bridge, considered to be a positive advantage with regard to crew fatigue management systems.

Solar Solve has been supplying BP vessels with anti-glare roller screens for more than 15 years, and in the near future, another five Tree class vessels will be outfitted with Solasafe.

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 South Shields NE33 5SQ, UK.  
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 Fax: +44 191 454 8692.  
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*British Oak* is to have Solasafe screens installed on its bridge windows.

**Upgraded sailor**

THRANE & Thrane has announced an upgrade to its Inmarsat Fleet series, entitled Sailor Fleet+. Based on the Nera platform, the Sailor 77 Fleet+ has a 128kbps connection as standard, double that of the previous Fleet 77 range. Sailor Fleet+ also includes an ISDN handset.

Fitted with Nera SatCom's established technology, the series integrates the Nera SatCom network into Thrane & Thrane's own network of onboard service centres. The terminals receive global support, and service is also available for the original Fleet programme, even though it will be phased out over time.

Norwegian-based Nera SatCom was recently acquired by Thrane & Thrane, with the Norwegian offices now being responsible for the Sailor 77 Fleet+, Sailor 55 Fleet+, and Sailor 33 Fleet+ series, including all future updates.

This means that capacity is released in Thrane & Thrane's Danish outfit, to concentrate on FleetBroadband, the next generation of Inmarsat terminals. Development of Sailor FleetBroadband is at an advanced stage and is due to launch in the fourth quarter of 2007.

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 Fax: +45 39 55 88 88.  
 E-mail: info@thrane.com www.thrane.com

The Sailor Fleet+ series from Thrane & Thrane.



**Emission compliant Cummins**

AN upgrade has been carried out on the Cummins Inc KTA38-M0 to ensure it meets Tier 2 emission levels. The new K38-M Tier 2 is designed for use in areas covered under US EPA Tier 2 and EU Stage IIIA emissions regulations.

The engine is thought to be suited for high-hour, high-load markets, such as offshore supply, inland waterways transportation, tugs, and towing, where the previous model has already been successful. The new 38l, V-12 engine is similar to the existing version, sharing the same footprint, mount, and ratings, which simplifies installation for the upgrade.

The K38-M Tier 2 will be manufactured on the same production line as the current model, and will be offered at 850hp at 1800rev/min. It will also be covered by a one year warranty at authorised Cummins service outlets worldwide.

Emissions compliance is achieved by minor modifications in air handling, fuelling, and timing, with the addition of low temperature aftercooling. Featuring the Cummins PT fuel system, enhanced by Centry electronic governing, the engine is claimed to be one of the few high horsepower Tier 2 certified engines with a mechanically controlled fuel system.

The Centry electronic controls and protective shielding are reckoned to create a safer and more responsive operation. In addition to reduced emissions, the engine also features improved air handling and fuel system optimisation. It has similar fuel consumption but reduced smoke, compared to the Tier 1 product.

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 http://marine.cummins.com

**New Tritex gauge range**

UK-based Tritex NDT has developed a new range of triple echo ultrasonic thickness gauges, designed for robustness, simplicity of use, and accuracy. Included in the range is the Multigauge 5500, supplied with a belt clip for hands-free use when climbing on staging, ladders, scaffolding, or when accessing by rope during ship's surveys.

The keypad is said to be easy to use to allow operator interface, with a bright LED display to

enable usage in all light conditions. Made from moulded rubber, the surround is designed for comfort, and provides extra protection against knocks and scrapes.

All probes have intelligent probe recognition, which automatically adjusts settings in the gauge at the same time as transmitting recognition data, claimed to result in a perfectly matched probe and gauge for enhanced performance.

Other features available are an automatic measurement verification system, to ensure only true measurements are displayed, even on the most heavily corroded metals; triple echo, intended to reduce preparation time by ensuring that coatings are entirely ignored, without requiring zeroing; and coating plus, which allows measurements to be taken through coatings up to 20mm thick, depending on the coating type.

The gauges can be calibrated for all types of metal, and all products comply with RoHS and WEEE directives, omitting the use of hazardous substances. Typical applications include the inspection of hulls, deck plates, hatch covers, pipes, boilers, and boiler tubes, as well as dockside machinery.

Contact: Patrick Meech, Tritex NDT Ltd, Unit 10, Mellstock Business Park, Higher Bockhampton, Dorchester, Dorset DT2 8QJ, UK. Tel: +44 (0) 1305 257160. Fax: +44 (0) 1305 259573. E-mail: sales@tritexndt.com www.tritexndt.com

**Factory opening for Hatlapa**

IN April, a new factory for the South Korean division of Hatlapa Marine Equipment was opened. 150 guests from shipyards and shipowners attended the ceremony at the Busan Science Park, situated in the Busan-Jinhae free economic zone.

With an area of nearly 8000m<sup>2</sup>, the site contains an assembly shop and an office building. The factory was completed in a very short time, following the signing of the shareholder agreement to establish Hatlapa Korea. The new company is intended to combine the best of two continents; products, design, and knowledge from Germany, with sales and management expertise, as well as market access from Korea.

During the next three years, parent company Hatlapa Marine Equipment, and its Korean partner, Dong Sung, will jointly invest US\$4 million in the company.

A few days after the ceremony, production was completed on the first steering gear, model R4ST 650-35, with 2 x 125kW for a 4250TEU container vessel. 22 more steering gears are scheduled for production at the plant this year, for shipyards in Korea and China. Orders totalling €9 million are slated, with deliveries continuing to 2010.

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**Greece welcomes mat for ships**

ENTRANCE matting for boats, ferries and cruiseships has been recently introduced by



The Multigauge 5500 from Tritex, designed for robustness, simplicity of use, and accuracy.

Plastic Extruders Ltd. Fronrunner Plus, part of the Fronrunner entrance flooring system, has been installed on Anek Lines' vessels in Greece, in order to reduce cleaning and maintenance costs.

The mats are positioned where passengers board the ships, and can complement slip-resistant matting laid on the gangways. Matting modules are able to be quickly laid, are stable, and can be easily removed and stored when a ship is at sea. Chamfered edges are designed to prevent tripping, facilitating the passage of trolleys, wheelchairs, and wheeled suitcases, and the mats are surface-laid with no need for matwells.

Fronrunner Plus has integral absorbent insets within a vinyl grid to clean and dry shoes, as remaining dirt falls through the grid without being

**Fronrunner Plus entrance matting module keeps ships clean, manufactured by Plastic Extruders Ltd.**



transferred. Other options include 100% vinyl for external use, or brush insets for particularly aggressive cleaning. Standard module sizes are 80cm x 120cm, 100cm x 150cm, and 110cm x 200cm, with larger areas covered using a special snap track joining strip for rolls up to 10m long in various widths.

Contact: Plastic Extruders Ltd, Russell Gardens, Wickford, Essex SS11 8DN, UK. Tel: +44 1268 735231. Fax: +44 1268 560027. E-mail: sales@plastex.co.uk www.plastex.co.uk

**Fire safety for yacht carrier**

A YACHT-carrying vessel, *Yacht Express*, has had a firesafe sealing system fitted by Beele Engineering, The Netherlands. The RISE system was used in the construction of firesafe seals for all penetrations carrying cables and plastic pipes.

The seals are fire-resistant, smoke-, gas-, and water-tight, with enlargements or modifications of cable sets able to be performed without detriment to fire safety. The system is designed to cater for both cable and pipe penetrations, and a single system is sufficient to seal all types of transit openings.

**Beele Engineering's RISE system has been used for sealing cable and pipe penetrations onboard *Yacht Express*.**



*Yacht Express* was built by Yantai Raffles Shipyard, China, for Dockwise Yacht Transport, and was due to enter service in May, operating across the Atlantic Ocean. It is 209m long, 32m wide, and has a service speed of 18knots. The vessel's semi-submersible design enables it to accommodate yachts of any size by means of a float-on/float-off loading bay, with a total deck area of 5115m<sup>2</sup> and a carrying capacity of 5000tonnes.

Contact: *Beele Engineering, Beunkdijk 11, 7122 NZ Aalten, The Netherlands.*  
 Tel: +31 543 461 629.  
 Fax: +31 543 461 786.  
 E-mail: [info@beele.com](mailto:info@beele.com)  
[www.rise-systems.com](http://www.rise-systems.com)

### Latest anti-slip surface

A NEW anti-slip gritted surface has been developed by Fibreglass Grating Ltd for its range of fibreglass grating flooring panels. Angular quartz grit is now embedded into the top surface during the manufacturing process, resulting in



**Fibreglass grating flooring panels by Fibreglass Grating Ltd.**

what is thought to be a hard-wearing, durable, chemical-resistant finish.

The grating has high slip resistance for wet, oily, and icy work areas, with maintenance-free operation, and lightweight properties. Ranges of heavy duty 316 stainless steel hold-down clips, panel-to-panel joining clamps, and optional hold-down clamp systems are also available.

Contact: *Fibreglass Grating Ltd, Unit 14, Telford Road, Gorse Lane Industrial Estate, Clacton On Sea, Essex CO15 4LP, UK.*  
 Tel: +44 1255 423601.  
 Fax: +44 1255 435426.  
 E-mail: [info@fibreglassgrating.co.uk](mailto:info@fibreglassgrating.co.uk)  
[www.fibreglassgrating.co.uk](http://www.fibreglassgrating.co.uk)

### Welding assistance for shipyards

HEAVY-duty MIG/MAG welding in shipyards could be assisted by the new ESAB Origo Mig 400t and 500t thyristor-controlled power sources. The 400t model delivers 400A/34V at a 45% duty cycle, and the 500t delivers 500A/39V at a 60% duty cycle.

Both models can be used with interconnection cables up to 35m long, and function with a three-phase electricity supply, with a setting range from 50A/16.5V to 400A/34V for the 400t, and 50A/16.5V to 500A/39V for the 500t. A rugged



**The ESAB Origo Mig 400t and 500t are thyristor-controlled power sources for heavy-duty MIG/MAG welding.**

galvanised casing and special software are intended to deliver high reliability, while large wheels, sturdy lifting eyes, and an undercarriage designed to be lifted by a fork lift truck are included, to make the machines easy to move.

The wire feeders, models Origo Feed 304 and 484, can be mounted on the power sources or separately, depending on the application requirements. The TrueArc Voltage system ensures that the correct arc voltage is maintained regardless of the length of the cables used, and three inductance outlets enable operators to optimise the settings for different applications.

For applications where water cooling is required, ESAB's LogicPump automatically starts the integral water pump when a water cooled gun is connected to the wire feeder. This is intended to eliminate the risk of the gun overheating, and avoid the need for costly repairs.

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 Tel: +44 800 3893152.  
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 E-mail: [info@esab.co.uk](mailto:info@esab.co.uk)

### Copper-nickel's new features

THE Copper-nickel Task Group, formed by alloy specialists, has created a new website that includes in-depth information regarding in piping systems used in a seawater environment, and their performance in relation to corrosion and biofouling.

A new Fittings section has been introduced within the System Design pages, which describes the multiplicity of fittings that have been developed for the alloys. It looks at bends, reducers, and various types of T-pieces. Joining methods are also addressed, covering welding and brazing, flanged connections, threaded unions, press joints, and pipe couplings. The advantages and disadvantages of each type of joining method are listed so that the user can make a practical comparison between them. Relevant standards are included as well as typical properties.

Insight is provided into the effect of various fitting geometries and production methods on seawater flow conditions. This is particularly relevant to copper alloy systems since avoiding turbulence is important. There is also a description of several types of metal sealing and soft sealing designs for threaded unions. Metallic seals are normally applied for higher temperature and aggressive media.

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 Tel: +44 1442 275705.  
 Fax: +44 1442 275716.  
 Email: [bryony.samuel@copperdev.co.uk](mailto:bryony.samuel@copperdev.co.uk)  
[www.cda.org.uk](http://www.cda.org.uk)  
 & [www.coppernickel.org](http://www.coppernickel.org)

# The Royal Institution of Naval Architects

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3rd-5th October 2007

Dr Kenneth W FISHER, FRINA

The RINA is pleased to announce another opportunity to attend Kenneth Fisher's highly successful three day training programme. The course is primarily designed for project managers who handle day-to-day relations with other parties, people who form contracts and senior managers who monitor contract-related cash flow for marine related projects. Those attending the course will be better able to identify the pitfalls and traps experienced within the industry, and be more prepared to identify all the costs, schedule changes and to properly assign responsibility for those changes and effects. This will save companies considerable sums in each major contract.

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Registration fee: RINA Members: £1020+VAT (Total £1198.50) Non Members: £1100+VAT (£1292.50) Group Fee (3 delegates or more): £1000+VAT (£1175.00)

## BMT has it covered

**BMT Group chief executive Peter French explained the fast-rising company's strategy to *The Naval Architect*.**

FOR the second successive year, the acquisitive BMT Group has been able to post a remarkable set of results and, with an ongoing target to increase turnover by 10% per year, there is little sign that the intellectual capital company is slowing in its ambitious growth campaign.

Last year, the group saw its turnover grow by 11%, to £85m, and BMT Group chief executive Peter French expressed expectations that, this time next year, that figure would be approaching £100m.

Trading profit across the group in 2006 rose by £3.3m, to £7.6m, with growth particularly strong in the energy sector, as oil prices buoyed performance. Ten years ago, BMT's turnover amounted to below £10m, and revolved around the activities of just two companies. The group's reach now extends to 30 diverse companies, employing a combined staff of 1077. Its interests take in maritime transport, defence, ports and logistics, risk and insurance, energy, and environmental services.

Last year's acquisition of Techmar, of Belgium, saw BMT extend its reach in marine surveying and consultancy. Techmar's expertise centres on brown water surveying. The company, rebranded BMT Techmar, is enabling BMT to offer a Belgium-based naval architecture service in the complex salvage and warranty survey and case sectors. It is also now able to offer a local liquefied natural gas and liquefied petroleum gas vessel surveying capability.

In 2006, BMT also took over the 150-staff strong company WBM, in Australia, active in flood modelling, and water surge



Peter French, BMT Group chief executive.

analysis and software. The company, whose main focus centres on the mining and bulk materials handling sector, also has a small naval architectural operation, centring on structural analysis, salvage work, and providing expert witness services.

Its most recent acquisition saw BMT take over Singapore-based IT specialist BrightFire Engineering and its 20 staff, a company which is the developer of a web-based system used by pilots to forecast currents in detail. Mr French said that experience in the Malacca Straits pointed towards this product being applied more widely as a tool to enhance ship-routing, and that BMT was currently considering

how best to integrate the product as part of a wider ship routing offering that already includes Argos – a product using satellite data to analyse currents, waves, and environmental conditions.

Mr French emphasised that, while remaining focused on the maritime and defence sectors that still contribute more than 50% of its turnover, BMT has been actively seeking to diversify, and to look at ways of transferring the skills it has in its existing markets to new areas.

'Our strategy to diversify has been to ensure we can ride out cyclic changes in any given market and any geographic location,' said Mr French. 'Our aspiration is for people to look at BMT as a source for deep knowledge and insight in all things maritime and as a company looking at new ways to meet customer needs.'

According to Mr French, where much effort has been expended on growing BMT's interests in the port sector, growth has also been particularly strong in energy and environmental services. BMT's defence portfolio, meanwhile, had 'held up rather better than expected', as work from Canada and Australia had started to come through, and the Royal Navy's long awaited 'CVF' future aircraft carrier project and its new submarine project had begun to generate revenue for BMT Defence.

'The idea of independence is becoming increasingly important in the defence sector in particular,' said Mr French, 'specifically in the light of the Defence Review, where the idea of the "tier zero contractor" has emerged.

'We believe we have an important role to play in defence strategy, acting as an independent critical partner to the Ministry of Defence in their warship acquisition programme. For example, we recently completed a balance of investment study in the case of the Future Service Combatant warship for the Royal Navy and looked at future investments in procurements of this size and risk. This could only have been done by a company that is independent of manufacturing interests but which has the necessary understanding.'

Elsewhere, Mr French said the company was still 'under-represented' in the ports and logistics sector, but the intention was for this area of business to 'become more prominent'. BMT was looking to acquisitions to develop this business, where acquisitions in the environmental services sector were also of interest. Energy sector acquisitions, too, may provide opportunities, but were 'at the moment unaffordable'.

Time and again, Mr French returned to the way BMT was able to transfer skills gleaned in one market to another.



BMT has acquired Techmar, expanding its role in marine surveying.

## PROFILE

For example, he cited the case of the development of the JH143 warranty by the Joint Hull Committee and BMT subsidiary The Salvage Association. The organisation has now provided warranties and advice to around 200 shipyards. Mr French said that this service is now being extended to the ports and terminals sector.

Again, skills and solutions developed as part of BMT Nigel Gee's role in developing the 'ModCAT' hullform for the X-Craft project vessel *SeaFighter*, for the US Navy, had rubbed off in the commercial sector, with the first merchant marine variant of the design ordered – a 57.8m-long inter-island high-speed, aluminium catamaran for New Caledonia routes in the South Pacific. The resulting ship would be built by Aboitz-owned FBMA, in the Philippines, for SAS Sudiles.

Also exemplary was the way BMT Isis recently provided safety support and advice to PDPorts' TeesPort Harbourmaster to aid planned start-up of liquefied natural gas imports. Already, the company was spinning out these skills, first into the defence market, but soon into the civil and, specifically, the civil nuclear market.

BMT was also looking to grow its presence in new territories. 'We have opened two offices in India [one in Ahmedabad and one in Mumbai] and are looking hard in China to participate in a joint venture, initially in the shipbuilding sector,' said Mr French.

The business model in India was predicated on tapping into the huge potential for port development in India, where the Indian government has said that some US\$15bn will be invested in port developments over the next six years. However, once again BMT saw opportunities to involve itself in the nation's blossoming shipbuilding sector, and in its defence industry.

In the case of one Indian shipyard, Mr French said BMT was using its expertise to 'act as a customer' in developing a new ship design. In another case, BMT was providing consultancy services, with a view to developing best shipbuilding practices at a yard yet to be constructed.

Having opened a small representative office in Shanghai 18 months ago, Mr French said BMT's approach to the Chinese shipbuilding sector was also 'coming from two directions'. He said that BMT's 'development directorate' was actively looking to promote new ship designs and that Chinese yards had expressed considerable interest in moving away from 'straightforward ships' and into more specialised vessels, including fast ferries, but also ships exhibiting more environmentally-friendly systems.

On the other hand, BMT was also looking to offer Chinese yards services that would enhance their building practices, advising for example on welding techniques, as part of a BMT role in the National Shipbuilding Research Project. In this context, Mr French said BMT was in the process of identifying 'a partner at the individual, independent yard level, with commercial and political understanding of China to whom we can bring our technical skills'.



BMT has taken over Australia's WBM, active in flow modelling and water surge analysis.



Design drawing for the New Caledonia aluminium catamaran - a spin off from a naval project.

Such is now the spread of BMT's company interests that its separate subsidiaries often find themselves offering different services to the same market. For example, where BMT Isis has been targeting LNG from a safety point of view, WBM has involvement in LNG sloshing analysis, while BMT's shipbuilding consultancy is linked to the construction of the first LNG carriers to be built in China, at the Hudong Yard. BMT Seatech, meanwhile, also has an interest in LNG, by virtue of developing ship manoeuvring software for the market.

Mr French acknowledged that BMT was 'looking at how the group is structured, with a view to grouping activities into market sectors, as we evolve particular areas of interest'. He said that BMT was trying to set up 'communities of practice, so that we can exchange information, knowledge and market intelligence between different business units'.

Whilst not a physical reorganisation, BMT is looking to consolidate efforts and better communicate the group's capabilities across a range of disciplines. The first example of the strategy saw BMT's experts in passenger shipping exhibiting collectively at the recent Cruise + Ferry show, to promote group expertise in vessel design, model testing, vessel operating simulation, operational advice, environmental auditing, best practice, fire safety, passenger flow simulation, fuel saving techniques, and hull stress monitoring. The grouping is being co-ordinated under BMT Designers and Planners, led by Scott Staron as first point of contact.

A similarly co-ordinated approach to LNG is set to follow, after which BMT will turn its attentions to the tanker sector, while Mr French said yachting also formed a particular area of interest. Expect to see further single points of contact emerge in these areas soon. Ⓢ

**Waves of Change**

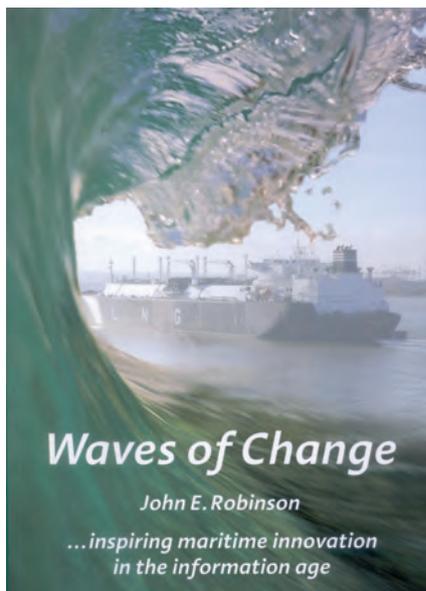
By John E Robinson. Published by The Nautical Institute, 202 Lambeth Road, London SE1 7LQ, UK. 2007. 294 pp. Softback. ISBN: 1 870077 82 2. £27.50.

WAVES of Change is the first in a new series of books, entitled 'Maritime Futures', commissioned by The Nautical Institute. This series aims to explain how innovative technologies will impact upon the maritime industry, and to demonstrate how management strategies can be formed to take advantage of new opportunities.

The author of *Waves of Change*, John E Robinson, has over three decades of experience in the shipping industry. Acquiring an MSc in innovation studies from the University of Huddersfield, he also gained a PhD in management from the University of Hull.

His former roles include being a sea-going radio officer, followed by an engineer and then later management positions in the marine electronics supply and service sector. As an engineer, he was involved in a number of pioneering development projects, including the first integrated navigational and control system for commercial ships. In his work with the corporate management of international shipping organisations he developed an insight into how technology, culture, structure, and the environment affect these organisations' ability to evolve. The issue is the main subject of this book.

The publication focuses on the maritime sector, being aimed at navigators, engineers, managers, shipowners, government administrators, sea staff, and marine technologists, among others. However,



it also has relevance to other traditional organisations seeking to cultivate or strengthen their capacity to innovate.

A foreword by Paul Keys, Professor of Management Sciences, University of Hull, cites the works of Russell Ackoff and C West Churchman as appropriate to study before starting *Waves of Change*. Professor Keys believes that their ideas regarding the development of systems ideas and

their practical application are the basis for this book, a volume which should challenge the reader to improve understanding of shipping technology and organisation, with a number of different viewpoints.

The text is divided into ten chapters, with the author beginning by arguing that the shipping industry has always been very resistant to change. The first chapters of the publication explore past technology fads, fashions, and misconceptions, plus the legacy of types of marine communications, radar, and navigation. Impediments to progress and the social aspects of emerging technologies are also discussed.

Moving on to the innovation process itself, emerging management theories, construction theory, and recognising drivers and barriers are also dealt with. There is a call for alliances and cooperation as opposed to specialisation and independence, in order to avoid continuing with past assumptions which could take the market into dangerous waters.

Part of the ingenuity of this volume is the way the writer shows how the influences that unsettle traditional attitudes and behaviour are also the same means by which transformations in expectations and culture can be made. The concept of organisational learning, with emphasis on setting up virtual systems, which can also be accessed by ships at sea, is considered as well. The challenge set by the suggestions contained within is to arrive at a course which best suits the operating culture of a company in pursuit of competitive advantage, in an age when there is no longer a lack of information to restrict progress. 



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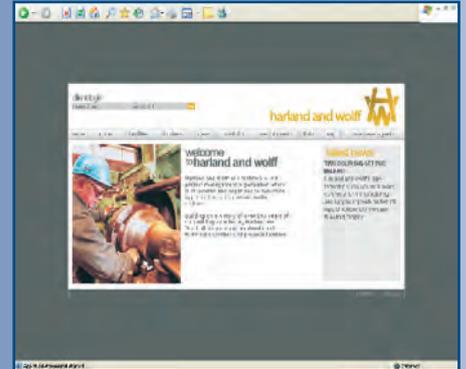
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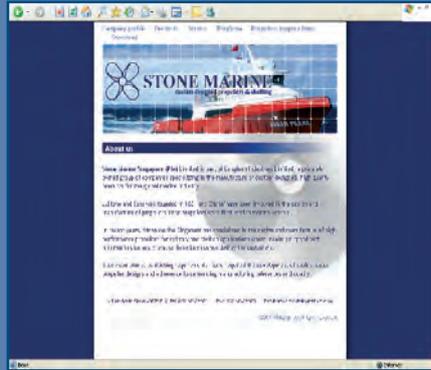
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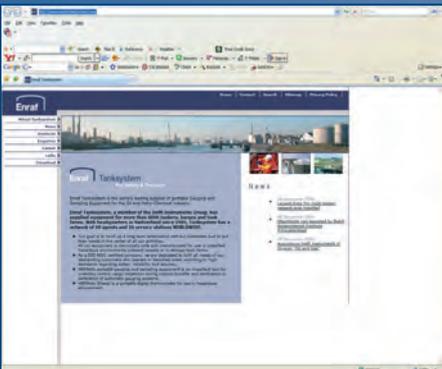
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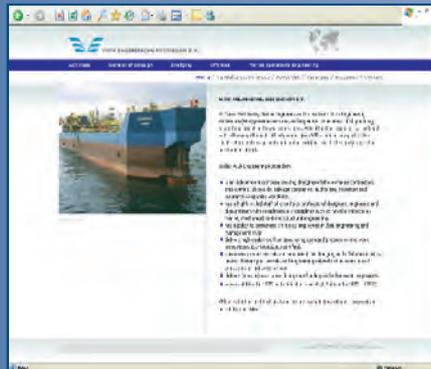
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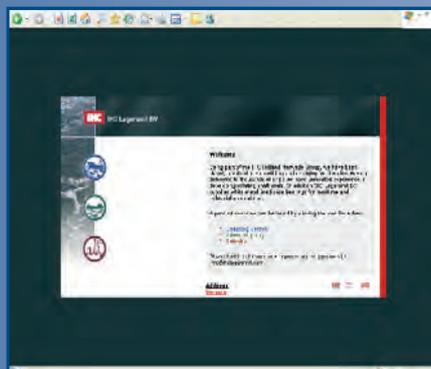
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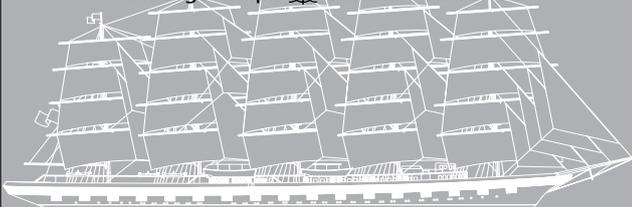


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