

THE NAVAL ARCHITECT

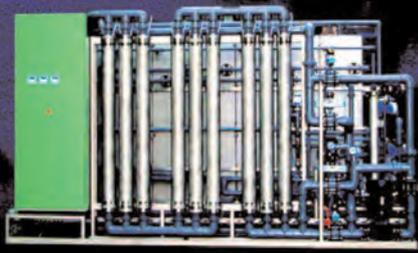


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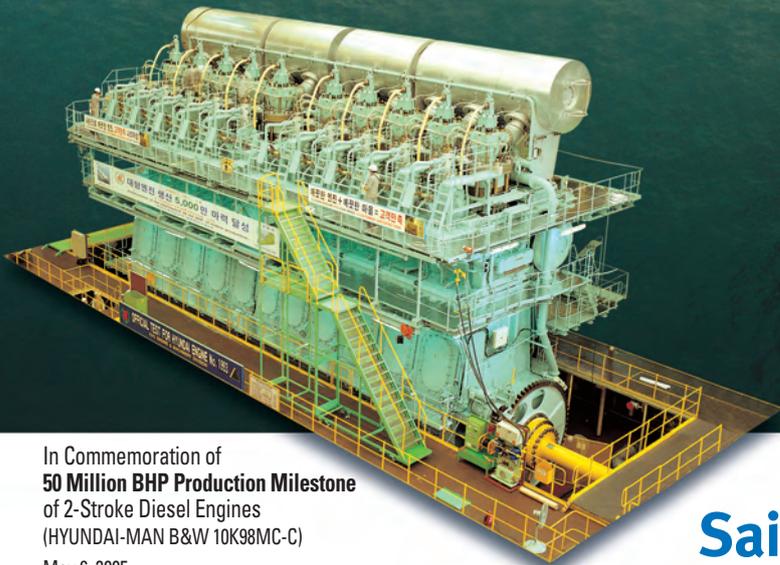


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Debbi Bonner

Advertisement Consultant
John Labdon

Advertisement Production Manager
Stephen Bell, PGDip

Marketing Manager
Adelaide Proctor

Publisher
Mark J Staunton-Lambert

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Editorial & Advertisement Office:
10 Upper Belgrave Street
London SW1X 8BQ, UK

Telephone: +44 (0) 20 7235 4622
Telefax: +44 (0) 20 7245 6959
E-mail: editorial@rina.org.uk
advertising@rina.org.uk
Website: www.rina.org.uk/tna
Subscriptions: subscriptions@rina.org.uk

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THE NAVAL ARCHITECT



The Fincantieri group in Italy is currently enjoying a most healthy workload, especially for large cruise liners, a sector where this shipbuilder probably holds top place at the present time. Seen here at the group's Monfalcone yard near Trieste is an aft hull block being placed into position for *Carnival Liberty*, the latest in the 110,000gt Conquest class. A special report on Italy begins on page 42.

PRINCIPAL ARTICLES

- 6 Healthy and innovative order book at Flensburg
- 41 Quest for fossil-free commercial ship propulsion
- 58 New initiatives in risk-based ship design

SPECIAL FEATURES

- 8-23 The Netherlands**
 - 8 Strategy change pays off for Bodewes
 - 8 MARIN builds on investment platform
 - 9 New seal solution for cutter suction dredger
 - 11 Speedy ferry deliveries from Merwede
 - 12 Container-ship series success for Damen
 - 14 New multi-thruster control concept
 - 16 Integrated electrics for TESO's new ferry
 - 17 Strong order book at Volharding
 - 20 New dredger shows Barkmeijer's capabilities
 - 22 Contra-rotating steerable propellers for inland cruise ships
 - 22 Conoship broadens its horizons
 - 23 Workhorse designs generate interest for Vuyk
- 29-38 Cruise liner update**
 - 29 easyCruise - a new economy holiday operation
 - 30 Friendly bacteria employed by PetroLimiter
 - 32 Fischer piping systems for Ultra Voyager ship
 - 34 Bolidt's innovative flooring and furniture designs
 - 35 MaK wins its first cruise-ship engine order
 - 36 New GL class for passenger comfort
 - 36 New carpet collection from Brintons
 - 38 Waste-water system specially adapted for cruise liner
- 42-53 Italy**
 - 42 New ferry designs from Ruggiero
 - 46 Studio de Jorio interiors for newest MSC ships
 - 48 Sindel simulators for many training tasks
 - 50 Busy times for the Fincantieri group
 - 52 Cruise liner contract for flooring specialist
 - 53 Class society heads new EU research project
 - 53 Possible expansion for outfitting specialist
- 56-58 Gastech 2005 report**
 - 56 ABB electrical package for new Samsung LNG carriers
 - 56 Membrane components from Samwoo Memcor
 - 57 New ABS initiatives on LNG tank systems
 - 58 Progress with new Kogas containment concept
 - 58 More Far East gas contracts for Tractebel
 - 58 Simulator for steam plant

REGULAR FEATURES

- 3 Editorial comment: Re-appraisal time for gas containment systems
- 4 News round-up
- 24 Trade and equipment news
- 54 IMO activities
- 68 Diary

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Re-appraisal time for gas containment concepts

FUELLED by a recent successful Gastech 2005 event in Bilbao, Spain, the transport of gas by sea must certainly be catch-word of the year. We have written quite extensively about this subject but events in this sector of our industry are moving fast, with Qatar alone expected to require a total of 70 new LNG ships (including those exciting ships ordered recently) in the next few years - in various sizes up to and beyond 200,000m³.

At the same time, just when it looks like the very well-established membrane containment concepts proven over many years by the French specialists Gaz Transport and Technigaz - now united as GTT - are winning the lion's share of most recent orders, along comes a whole portfolio of original ideas. Alongside these, Øivin Iversen and Roy-Inge Sørensen, both of Moss Maritime, have thrown a thoughtful spanner into the works by presenting at Gastech a positive re-appraisal of spherical tanks*.

The Moss self-supporting system, first appearing in 1973 on the 29,000m³ *Venator*, (built at one of Moss Rosenberg's own yards for Peder Smedvig), launched a whole new era in LNG transport, although somewhat similar Technigaz tanks had been installed in the 4000m³ *Euclides* two years earlier. Spheres, with their perfect geometry, are relatively easy to construct, mainly in aluminium, and can be simply analysed for stress.

Although special large workshops are needed to fabricate, bend, and weld the curved plates, and attach the skirt system,

today for standard 147,000m³ carriers) and adding an extra tank, a load capacity of 200,000m³ can easily be created (the forward tank would remain spherical).

By increasing the tank diameter to 46m, up to 235,000m³ can be accommodated - and the draught still remains within the practical 12m, approximately that of a 147,000m³ ship. If the diameter is increased yet again to 47m, capacity rises to the current maximum of 250,000m³ at 13.00m.

Moss Maritime has put much effort into perfecting twin-screw hull forms, even for standard 147,000m³ designs (as favoured by some), and has been working in association with Russia's Krylov Institute. Careful attention to detail has shown, despite a twin-skeg form's higher resistance from a larger wetted surface, a 10% reduction in power requirement can be achieved - together with a speed increase to 21knots. Low-speed diesel propulsion (with Hamworthy-Moss cargo reliquefaction) is assumed in all studies, and detailed vibration investigations for both hull and cargo tanks have therefore been made.

On the cargo front, Moss has also concluded that loading operations can be made more attractively flexible for existing tonnage if the normal tank temperature for loading of -110°C can be raised, eg, to -80°C. Reduced heel requirements will result along with reduced ballast-leg spraying, less cool-down time during commissioning, and earlier load starts. While still on the cargo front, readers may possibly be surprised to hear that Moss believes, despite the claims of those promoting alternative propulsion concepts - ie, significant extra cargo space would be released - that the company can achieve the same additional capacity using spheres and slow-speed diesel engines for only marginal cost!

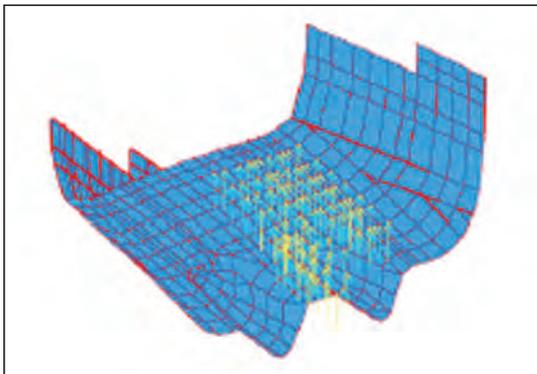
We have concentrated on this new work by spherical tank advocates, but a highly significant ingredient of the current gas carrier scene is the arrival of several fresh tank containment variations. In our next issue we will report on a proposal (using coldboxes) for pressurised liquefied natural gas (PLNG) transport - mainly for remote or stranded fields, while in our April News Round-up we illustrated ConocoPhillips' new Prism/Pyramid membrane proposal, which has received approval in principle from ABS.

We have also noted the new cylindrical tanks of Ocean LNG (January 2005, page 4) and hope to discuss the special ships designed for these soon. In March, we reported (page 32) on Cetech's proposals for compressed natural gas (CNG); these are chiefly notable for their gas storage arrangements, which are separate from the hull. This means that an oil tanker hull can be utilised, thus opening possibilities of hybrid ships able to load both oil and gas. Finally, a leading gas importer, the Korean Gas Corp (Kogas), is developing its own LNG membrane system (more details appear elsewhere in this issue), partly to avoid the presumably large licence fees that have to be paid to the undisputed global leader, GTT.

It is certainly unfair to criticise GTT for the unfortunate - and hopefully temporary - problems that have arisen on *Gaz de France Energy* with her prototype next-generation CS1 membrane concept, for GTT has accumulated vast experience in gas transport systems over many years. Nevertheless, in marketing terms, the abundance of alternatives suddenly appearing in the public arena - although not yet fully technically substantiated - plus the interesting figures presented by Moss Maritime for spherical tanks could not have appeared at a better time. 

* 'Advances in design and layout of Moss LNG carriers', by Øivin Iversen and Roy-Inge Sørensen, both of Moss Maritime, presented at Gastech 2005, Bilbao, Spain. Organised by DMG World Media, Redhill, Surrey RH1 1QS, UK.

Seeking a new generation of spherical-tank LNG carriers: examination by Moss Maritime of propeller forces acting on the aft hull of a 235,000m³ ship fitted with twin seven-cylinder low-speed diesel engines and two FP four-bladed screws. Analysis of any stresses transmitted to the cargo tanks was of special importance.



a great many ships (79 at July last year) have been completed, notably by Japanese yards, Hyundai in Korea, and a few by Norwegian and Finnish builders.

Detractors, however, point out the wasted space in the hull and forward-viewing difficulties faced by the bridge team - although the latter charge can also be levelled at container ships. These reasons may have contributed to the recent rise in the popularity of membrane-type containment, where more efficient use is made of the hull space but considerable precision skill is needed to assemble the complex stainless steel sheets, ancillary components, and their integrated insulation, all in a twin barrier arrangement.

Not surprisingly, Iversen and Sørensen are attempting to redress the balance, especially where larger ship sizes - the current trend - are concerned. In theory, the largest Moss-type ship would be determined by the largest possible sphere. The largest existing sphere is almost 42m in diameter but diameters up to 46m have been approved by class societies, and offshore versions up to 56m have been evaluated. By employing the Moss stretch technique of inserting a cylindrical ring at the equator of a tank of 41.6m (as used

Revised phase-out for single-hull tankers in force

A REVISED schedule for the phasing-out of single-hull oil tankers, and a new regulation banning transport of heavy oils in single-hull tankers came into force on April 5. The revised IMO regulation 13G brings forward the phase-out schedule for existing single-hull ships; following the *Erika* accident, this now states that ships have to be phased out or converted to a double-hull configuration according to a schedule based on their year of delivery.

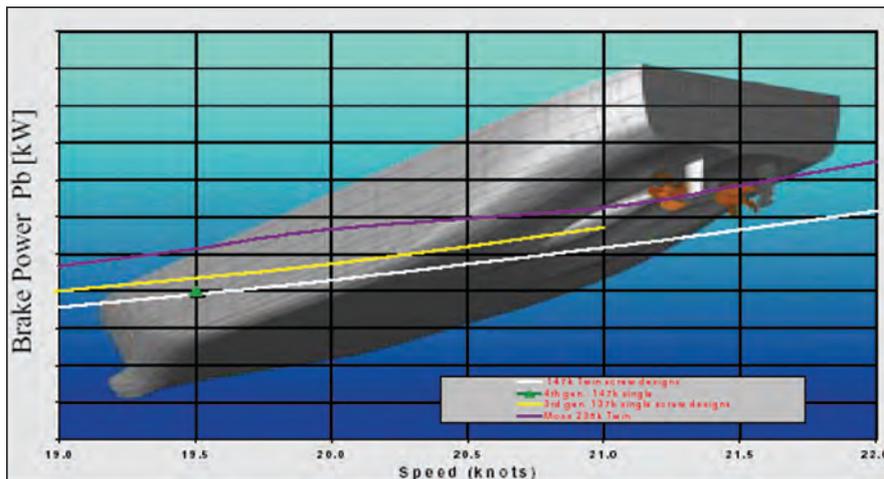
This means that Category 1 (pre-MARPOL) single-hull ships of 20,000dwt and above (carrying crude, heavy fuel, heavy diesel oil, or lubricating oil), and ships of 30,000dwt and above carrying other oils, delivered on or before April 5 1982 or after their anniversary in this current year, are no longer able to trade. Category 2 ships, which do have some protection from specially located segregated ballast tanks, will be phased out according to their age up to 2010. That year is also the final cut-off date for Category 3 vessels (generally smaller designs above 5000dwt).

CHEMICAL TANKER CONTRACT FOR KLEVEN - The Kleven Maritime subsidiary, Kleven Florø, has won an order from Stolt-Nielsen for two 43,000dwt chemical/oil parcel tankers; they will be delivered in 2007 and 2008. The ships will be built to a new concept developed by Kleven Design in cooperation with both owner and yard, which will feature 39 cargo tanks, some fabricated in stainless steel and others coated; this will give the operator maximum flexibility.

NEW SHIPS FOR FERRYWAYS? - The biggest customer of the UK port of Ipswich, a company known as Ferryways, is considering ordering new purpose-built ro-ro freight ships for its services to Ostend, and possibly elsewhere. Since 2000, growth has been very rapid, with up to 105,000 units carried in 2004, and a second, new, ro-ro berth has recently been activated at Ipswich. Discussions are proceeding with an unnamed shipyard.

SCHOTTEL FOR GAS-FUELLED FERRIES - The German propeller specialist Schottel has won the contract to supply propulsion systems for the five new gas-fuelled ferries to be built by Aker Brattvaag for Fjord 1 and operation on Norwegian coastal routes (*The Naval Architect* January 2005, page 18). Each of the LMG Marin-designed ferries (of two types but using the same length hull) will feature four Schottel units: the three larger twin ro-ro deck ships will be fitted with twin-propeller Combi SCD 2020 units - 4 x 2750kW, driven by electric motors, while the smaller single-deck ships will be driven mechanically by twin propellers of the STP 1515 type (4 x 1600kW). Respective ferry speeds will be 21knots and 17knots. Earlier, Schottel supplied propellers to Norway's prototype gas-fuelled ferry, *Glutra*, completed in 2000.

FEATHERING PROPELLERS FOR PETROMARINE - Two ice-strengthened



Much effort has recently been made at Moss Maritime to upgrade designs of spherical-tank LNG carriers, including hull-form honing, not only for the currently attractive very large twin-screw ships of 200,000m³ but also for 'standard' ships of 147,000m³, where some shipyards also show interest in two propellers. This graph from a paper presented at the recent Gastech 2005 Conference (see our Editorial Comment, page 3) shows that better propulsion efficiency - a 10% reduction in power even with a 7% higher cargo intake - can be obtained with twin skegs. The white curve shows power requirements for a new-type twin-skeg 147,000m³ design, compared with an existing single-skeg 137,000m³ model (yellow curve). A short report on the Gastech event appears on pages 56-58.

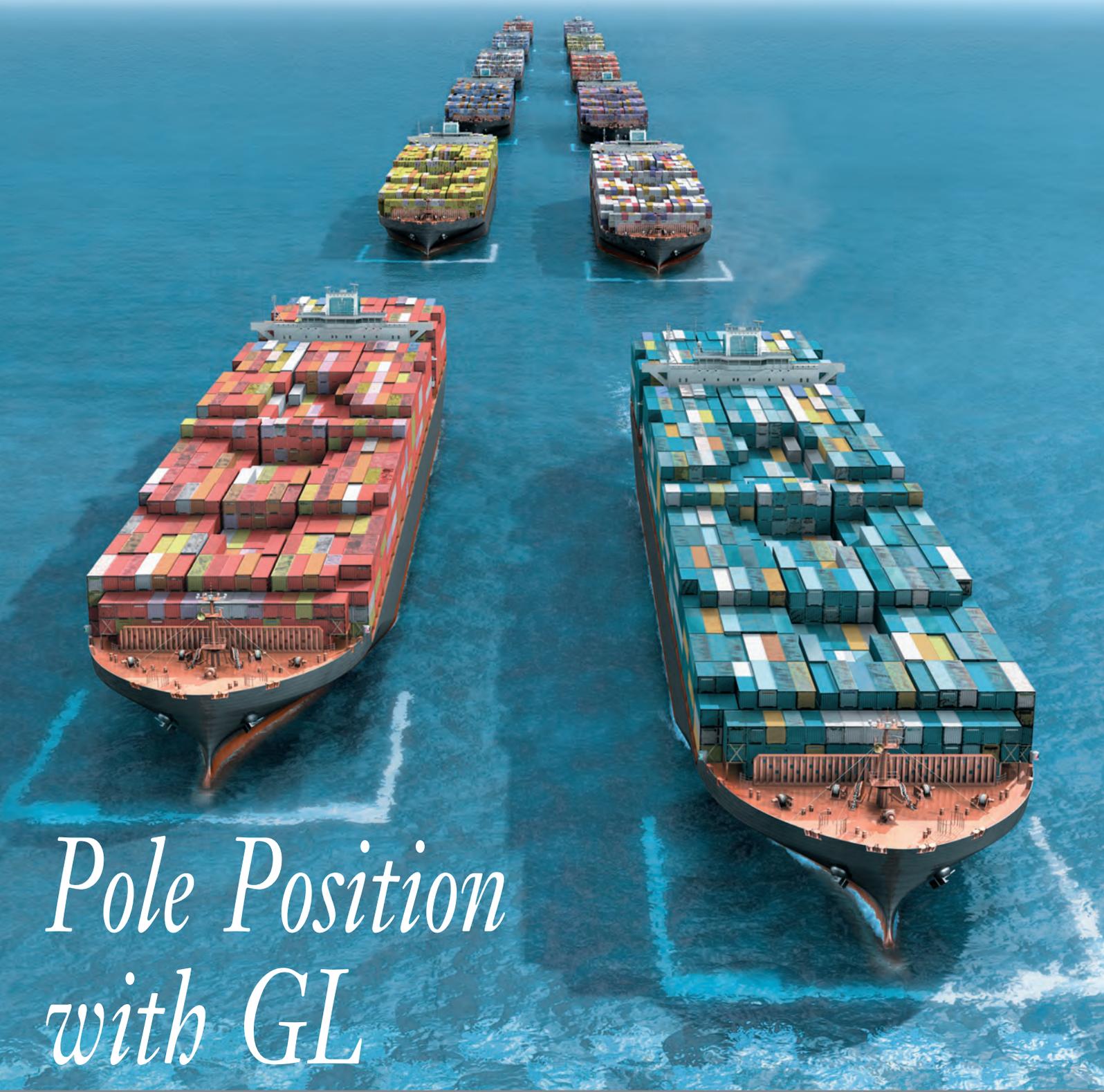
shallow-draught product/chemical tankers ordered from the Turkish yard RMK Marine by the French owner Petromarine, and designed to carry IMO Type II cargoes, are to be equipped with propulsion packages from the Wärtsilä stable. A fully redundant plant will comprise two 8L32 engines, each of approximately 3600kW. They will each drive a Lips 4CF13 feathering CP propeller through a SCV95-P58 gearbox. The specification of feathering propellers will allow propulsion by either main engine, or both, for economic operation.

IMO PILOT FROM GL - A new 5th edition *IMO Pilot 2005* publication with all current regulations of IMO in it is now available for all customers of class society Germanischer Lloyd (GL). All amendments to the regulatory framework, as decided at the 79th session of MSC 79 and the 52nd session of MEPC 52, have been included. These will include amendments to bulk carrier safety, requirements for voyage data recorders, and the new provisions of Annex

VI for exhaust emissions. The publication is in English and can be obtained free of charge from GL or can be downloaded via the Internet.

FRESH NAME FOR HSD - The leading Korean builder of marine diesel engines, HSD, based in Changwon, has been renamed Doosan Engine Co Ltd; it is a subsidiary of the Doosan Group. The previous name - in use since 2000 - has been an issue for some time, being difficult to pronounce and not correctly relating to the parent company. The engine works is primarily known for its prolific output of licence-built Sulzer and MAN B&W models.

SISTER FOR COLOR FANTASY - A letter of intent has been signed by Color Line and Aker Yards for the construction of a sister to the large cruise-ferry *Color Fantasy*, delivered last year and featured in our February issue (page 14). The contract price is approximately €300 million, and the anticipated delivery date is during the last quarter of 2007. Ⓢ



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Healthy order book and future designs at Flensburger Schiffbau

THE active German shipbuilder Flensburger Schiffbau-Gesellschaft is currently basking amongst a well-earned healthy order book that stretches through to 2008. This comprises five ro-ro ships, two so-called ConRo freight ferries, and three double-ended passenger/vehicle ferries. At the same time, this innovative yard is working hard to optimise productivity and output under its Target 2005 programme.

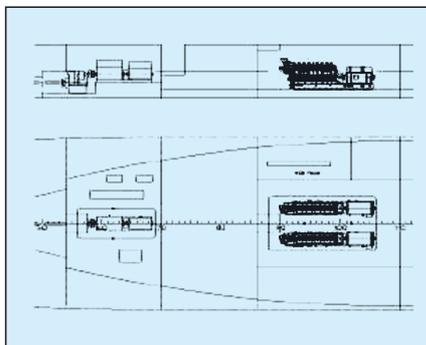
The five ro-ro vessels are mainly made up of four freight ferries for UN Ro-Ro - previously known as UND, the Turkish operator which first launched Flensburger into its current era with the successful design of the *UND Akdeniz* class. The prototype was completed in 2000 (*Significant Ships of 2000*), and five near-sisters followed. The newest version, known as the Ro-Ro 3200, has more capacity than earlier ships (3735lane metres, compared with 2640lane metres for the prototype and 3260lane metres for later ships), and the first hull is scheduled for completion this year.

Further, modified, designs - six in total (including two at Harland & Wolf) - were specially built for AWSR Shipping and for charter to the UK Ministry of Defence (*Hurst Point, Significant Ships of 2002*). Another derivative of these popular hulls, larger but with single-screw propulsion, was ordered by DFDS Tor Line. The first, *Tor Magnolia*, was presented in *Significant Ships of 2003*, and the last of the five will soon be delivered.

The next interesting project is the pair of 50,000gt ConRo freight ships for Belgian operator Cobelfret; the most notable feature of these is the specification of five fixed vehicle



An impression of the new Super C-class double-ended ferries that are being built by Flensburger Schiffbau for operation on the Canadian west coast, showing the CP propellers and rudders - the latter fitted with Costa bulbs, as used by this yard on previous designs.



A sketch showing the arrangement of one set of diesel-alternators and associated electric motors on the new British Columbia double-ended ferries. The machinery is based on the power-station principle, and all four alternator sets will normally be running.

decks - an almost unheard-of number on this type of vessel. They will be able to load 848TEU, 258 trailers, as well as 656 cars.

Progress with Canadian double-enders

Towards the end of last year, a remarkable coup was pulled off by Flensburger, when it succeeded in winning the tender for three large double-ended ferries for BC Ferries, of British Columbia, Canada. This is a fixed-price contract, and the yard is also handling delivery risks, with penalties if the ships are more than one-tenth of a knot below the 21.00knot service speed. These Super-C ships will have space for 1650 passengers, and 372 cars.

A diesel-electric propulsion plant (four medium-speed engines, each of 3840kW at 600rev/min, driving four alternators, and burning marine gas oil or marine diesel oil) will be arranged in a power-station concept - two sets at each end of the hull, and all four engines will normally be running all of the time. Current will be supplied to two electric motors arranged in tandem and stepped through a gearbox to a CP propeller, so that 10,150kW will be available at either end, depending on the direction of travel. As can be seen from the accompanying

illustration, a rudder with a Costa bulb will be fitted at each end of the ship. The bow propeller will normally be feathered.

Two vehicle decks will be available, with 1010lane metres on the main deck (4.75m free height) and a similar length on the upper level (2.90m free height). Based on standard car dimensions of 5.34m x 2.60m and standard lorry dimensions of 19.80m x 3.20m, this means that 372 cars or 32 trailers can be loaded - the latter, of course, on the main deck only.

New overnight ro-pax design for the future

Notwithstanding all this impressive current success, Flensburger is looking actively towards the future and has drawn up blueprint plans for a 'workhorse' ro-pax ferry known as a RoPax 3200/6500. This is aimed at operators working longer overnight routes which call for ensuite cabin accommodation for 420 passengers, plus space for 122 day passengers.

Space will also be available for up to 3158lane metres of rolling freight and cars, and the design deadweight will be around 8000dwt. A very high maximum service speed of 25.00knots is envisaged from a power plant of 28,000kW. Length will be 199.90m, moulded breadth, 30.80m, and a design draught of 6.50m.

An interesting range of possible routes is being considered, such as Poland-Sweden, Finland-Germany, English Channel routes, the western Mediterranean, and even Central America, where several operators are said to be considering new services in the Caribbean area. ⚓



An impression of the new 25-knot twin-screw ro-pax ferry planned by Flensburger for future longer overnight routes in various parts of Europe and perhaps Central America.

TECHNICAL PARTICULARS SUPER C-CLASS FERRIES

Length, oa.....	160.00m
Length, bp.....	154.00m
Breadth, moulded.....	27.80m
Depth, to main deck.....	8.25m
Draught, design moulded.....	5.75m
Gross.....	22,100gt
Deadweight, design draught.....	1770dwt
Growth margin in addition to deadweight.....	500tonnes
Passengers (day).....	1500
Passengers (max).....	1650
Cars.....	372
Main engines (diesel-electric).....	4 x 3840kW
Fuel consumption.....	55.5tonnes/day
Tandem propulsion motors.....	2 x 10,150kW
(one pair at each end of the hull, one pair only normally operating)	
Speed, service, design draught, 85% MCR (13,056kW), 5% fouling margin, 2400kW for auxiliaries and hotel load.....	21.00knots
Classification.....	ABS +A1, Vehicle Passenger Ferry, Straits of Georgia Service, +AMS, COMF+, HAB, ES, (E)

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Strategy change pays off for Bodewes

OVER the past five years, Bodewes Shipyards has shifted its strategy away from building purely in Holland, and this policy has really started to pay off in the past year. The company now has an orderbook stretching three years ahead, and this includes contracts for around 40 multipurpose general cargo vessels.

In 2004, Bodewes completed eight vessels. This year the figure will be 10, and this will rise to 18 in 2006. A similar figure is expected in 2007. In 2000, Bodewes started cooperation with the Severnav yard, at Drobeta-Turnu-Severin, in Romania, and since then it has commenced construction activities in the Ukraine, with the Zaliv yard in Kerch; at three sites in Poland, in Gdansk, Gdynia, and Ustka; and a second yard in Romania, at Giugiu. This interesting network is supported by design and construction offices in Kaliningrad, Russia, and Constantza, in Romania.

Moreover, Bodewes has recently signed contracts to build ships in China, as part of a joint initiative with IHDA Shipbuilding Services, of Rotterdam, a company with which it already cooperates in the Ukraine. The Chinese yard will build an initial order of four 7800dwt hulls, with the first of these scheduled for delivery in late 2006. Two of the hulls will be for the Dutch owner, Flinter, and two for Feederliners.

The majority of Bodewes' overseas work involves the construction of hulls only, with final completion and outfitting carried out at the company's yard in Hoogezand, northern Holland. However, Bodewes has recently started building complete ships at the Marpro yard in Gdansk, where one Saimaa-class ship and a 5400dwt type vessel will be constructed.

Included on the Bodewes orderbook are orders for a total of 10 Saimaa-class ice-strengthened multipurpose ships of 3400dwt and 3750dwt size.



Launch of the 7800dwt *Pensilvania* at the Hoogezand yard of Bodewes. She is the first of two for the Colombian owner Navesco, and special features include a lower deckhouse, turnable masts, and cranes with reduced height - all to ensure passage under the Pumarejo bridge near Barranquilla.

In addition, the company is building a number of 4400dwt, 5400dwt, 6200dwt, and 7800dwt vessels, some geared.

New construction philosophy

Over the past year, Bodewes has changed the way its 7800dwt vessels are constructed. The aft 50m sections are being built in Holland, and the forward 70m sections, as well as the aft deckhouse, are constructed in Poland, in Gdynia. The two sections are combined in Holland, using a special skidding system, prior to final outfitting.

Customers for the Bodewes yard include owners in Colombia, Germany, Denmark, and Asia, as well as Holland. The Colombian owner, Navesco, has, for example, ordered two 7800dwt vessels, and the first of these, *Pensilvania*, was delivered

in March this year. This vessel has a number of 'special' features, including a lower deckhouse, 'turntable' masts and lowered cranes, to allow for passage under the Pumarejo bridge, near Barranquilla.

This shift in production strategy, with the increased use of overseas facilities, has required significant re-organisation at the Hoogezand yard. The company has expanded its office facilities and virtually doubled the office support staff to handle the additional work, and in particular the increased logistics requirement. There are now three separate project teams, each with responsibility for various vessel types, and each one has a dedicated logistics manager, to supervise the flow of components between Holland and the various yards overseas. 

MARIN builds on investment platform

FOUNDED in 1929, the Maritime Research Institute Netherlands (MARIN) will celebrate its 75th anniversary in 2007 in fairly robust condition. A major seven-year investment programme was completed in 2004 and this has strengthened MARIN's position as one of the world's leading vessel test facilities.

The final stage in this programme was the re-opening of a completely rebuilt deepwater towing tank in January last year. The followed on from the building of a new seakeeping and manoeuvring basin, which measures 180m x 40m x 5m; a new offshore basin that can perform tests up to 3000m on a 1:100 scale; and an upgraded depressurised towing tank.

This year, MARIN's facilities at Wageningen are heavily booked up, with cruise owners and shipbuilders expected to be amongst the biggest client group. The investment programme has proved to be particularly valuable in this sector, as larger and more sophisticated designs are produced in the cruise market, where demands for more comfort (less noise and vibration) dominate.

MARIN was extensively involved in the *Queen Mary 2* cruise ship project, and carried out all model and simulation tests, evaluating the manoeuvrability, operability, and survivability of the ship in various seagoing conditions. 'Such work could not have been done without the investment', says Henk Valkhof, principal project manager.

As well as handling several significant cruise ship projects, MARIN is busy working on a number of new dredger designs, as well as concept container vessels with capacities of up to 13,000TEU. According to Mr Valkhof, 'While we are reaching the limits of what can be done with container ships having one shaft, I believe we could achieve viable 16,500TEU designs within five years'.

The Institute is not just assessing larger container vessel designs. It is also looking at ways of increasing the speed of smaller, Panamax-class vessels - through improvements in, for instance, hull form and engine layout - up to around 30knots.

There are, at present, no plans for any further investment in the physical infrastructure at MARIN. However, the institute is investing in some advanced technology and testing techniques. For example, it is implementing laser doppler and PIV measuring to provide a more accurate idea of how water behaves around a vessel.

MARIN is also implementing high-speed camera systems, as an alternative to stroboscopic light, to better assess the cavitation phenomenon. 'Using cameras capable of taking 4800 frames/second, we can gain a lot of information about the development of cavitation, and the pace of development, on propellers', says Mr Valkhof.

MARIN is, as always, involved in a number of interesting research projects. One of these is a Dutch-government sponsored project looking at an air injection system capable of lowering hull frictional resistance, and so achieving a significant reduction in fuel consumption, and emissions. MARIN hopes to have a working prototype of an inland waterway vessel with this system within the next five years. 

Seals solution for new cutter suction dredger

A SPECIALIST in the development of shaft seals and bearing systems, IHC Lagersmit has recently been working on an interesting project to develop a high-pressure jet-water and cutter-shaft seal for *D'Artagnan*, a large cutter suction dredger nearing completion at sister company IHC Holland Merwede's yard in Kinderdijk (this is the new name for IHC's main dredger yard following major re-organisation in the IHC Caland group).

This is a demanding application, as the equipment will have to withstand an arduous operating environment, involving sand dredging, and large axial and radial movements. The seal system also has to be extremely reliable, since it will be difficult to overhaul without expensive loss of production, and to be able to contend with a very wide operating window, with pressures ranging from 0bar-20bar and speeds of zero to 50rev/min.

The owner could have selected a mechanical-type seal, but this would have been relatively expensive and would also have presented some operational issues. In particular, if a mechanical seal were to fail, then immediate repairs would be necessary, forcing a cessation of dredging activity.

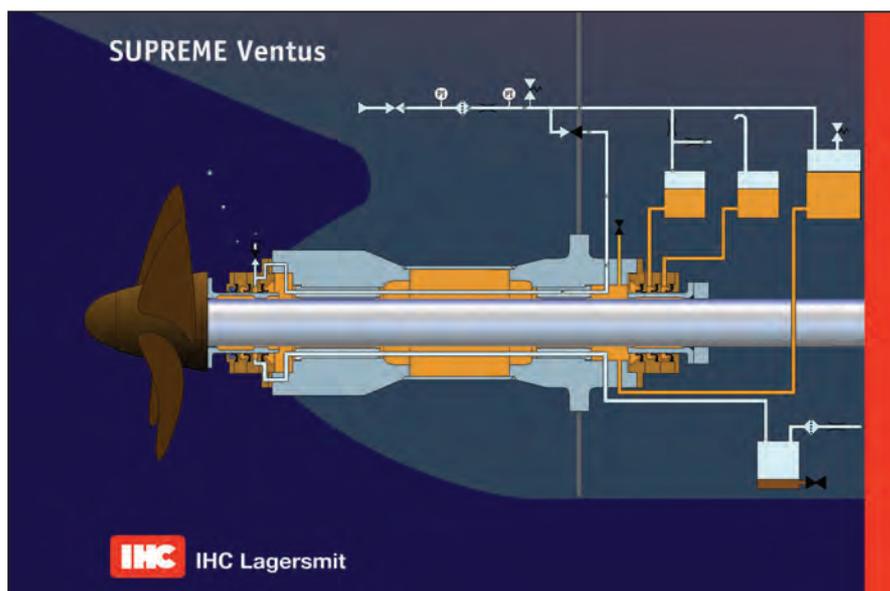
The alternative, which was eventually chosen, was to use radial lip seals, but these have a maximum 2bar operating pressure. The solution devised by IHC Lagersmit was to put 10 lip seals in series, so achieving a 20bar pressure over a relatively large area. Furthermore, this system is highly reliable, as if one or two lip seals fail, then the seal assembly will still function. It should thus be possible for the operator to finish a dredging job and undertake planned maintenance, rather than emergency repairs.

Another feature of the seal system developed for this particular ship is the existence of small channels in the housing which can generate a flow of water through the system. This maintains a low temperature and ensures that pressure stays in the 2bar range. According to IHC Lagersmit, if the seal is operated without jet water, and so no cooling, a small flow of water (approximately 100litres/h) is sufficient to still maintain the sealing system.

This Jetwater Supreme seal, developed in close cooperation with the yard and its customer, has been extensively tested at full scale, under actual conditions in terms of pressures, displacement and speed, for instance, at IHC Lagersmit's R&D department, where a special test stand was constructed. While developed specifically for this particular vessel, IHC Lagersmit believes the new seal system may open up further possibilities, on new and existing cutter dredgers especially.

New Supreme Ventus design

IHC Lagersmit has also recently developed a new sterntube sealing system, the Supreme Ventus, which is said to offer an environment-friendly, zero-emissions solution. In addition, the Supreme Ventus provides increased reliability, due to a lower pressure differential across the sealing rings. This in turn results in



A diagram illustrating the important features of IHC Lagersmit's new Supreme Ventus sterntube seal, which uses compressed air to completely isolate lubricating oil from sea water.

a lower loading of these rings and less friction and heat generation, so helping to ensure stable seal performance over a longer period of time.

The Supreme Ventus system uses compressed air to form a barrier to completely isolate sterntube lube oil from sea-water. The seal chamber between the oil-seal and water-seal section of the aft seal is kept under a constant air pressure, almost equal to the sea-water pressure. A new type of air release valve continuously balances air pressure with sea-water pressure by spouting a relatively small amount of air into the sea-water.

In contrast to standard non-return valves that require a substantial pressure differential to open, the new air release valve only needs 0.05bar pressure differential. As a result, air pressure in the aft seal is only slightly higher than the sea-water pressure. According to IHC Lagersmit, this special design prevents flooding of the air chamber in case air pressure is lost. Furthermore, since no water can come into contact with the actual valve, there is no risk of fouling.

The sterntube lubricating oil pressure is kept at a slightly higher pressure than the sea-water pressure, and any fluids that may enter the aft seal air chamber are actively drained by means of a collection unit. Any sea-water or oil that enters the aft seal air chamber is 'blown' to this

drain collection unit, thus preventing any leakage of oil into the sea-water or any water ingress to the sterntube.

The Supreme Ventus zero-emission system can be incorporated into all Supreme seal types, and is suitable for new ships, as well as retrofits. The system requires only two 12mm stainless steel lines through the sterntube, for the air-supply and drain lines.

Whereas other air-type systems are only applicable to the aft seal, IHC Lagersmit says that the pressure control feature of the Supreme Ventus can also be used to improve sealing performance of the forward seal. With conventional sealing systems, large draughts and large shaft diameters still impose heavy loads on the forward seal rings. The optional three-lip-type forward seal, combined with the Supreme Ventus system, distributes the load evenly between two seal rings, thus halving the load on each individual seal ring. As a result, the lifecycle of this seal can also be considerably lengthened.

The Supreme Ventus seal system has been extensively tested at Kinderdijk, and the first installations are now being made. A dredger is being retrofitted with the system, for example, while the company is also working with a shipping company on trial installations on a number of cargo vessels.

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Merwede meets tight ferry deadline

TODAY part of the restructured IHC Holland Merwede Shipbuilding group, which was created earlier this year, Merwede's yard at Hardinxveld-Giessendam is a facility with a diverse range of production capabilities. Over the past year it has delivered two large 16,000m³ capacity trailing suction hopper dredgers for Boskalis - the biggest of this type ever built by the yard; two jack-up platforms, *Vagrant*, for Hydrosoil Services and *Pauline* for Besix; and two river cruise vessels, *Viking Sun* and *Rousse Prestige*, for Viking River Cruises and Dunav Tours respectively.

Furthermore, Merwede has recently completed two ro-pax ferries, *Hammerodde* and *Dueodde*, for Bornholmstrafikken, a Danish operator principally aiming to maintain links to the Baltic island of Bornholm. Both of these 3000dwt vessels, each with space for 400 passengers and 1200lane metres for trailers, were handed over simultaneously towards the end of April.

This remarkable feat was completed within a particularly demanding time frame but was considerably aided by employing a ready-made ship design. The contract for the pair was only granted in June 2004, although Merwede did actually start work in February last year in anticipation of winning the contract.

Merwede's commercial manager, Mattijs Faber, says, 'We were the only yard capable of delivering the ships, to the owner's requirements, within such an extremely short delivery time. The only other option for the owner was the secondhand market'.

The vessels, configured to allow for possible future enlargement to 700-passenger capacity, are based on *Ben-My-Chree*, built by 1998 by Merwede's former sister yard, Van der Giessen-de Noord (now closed), for the UK mainland-Isle of Man route. However, the design has been tailored by Merwede to meet the particular needs of the owner, which will use the ships to run services between Køge (Denmark), Rønne (Bornholm), Ystad (Sweden), and Sassnitz (Germany).

Hammerodde and *Dueodde* differ from *Ben-My-Chree* in a number of respects. The complete accommodation area has been rearranged and



Hammerodde, first of two new ro-pax ferries for Bornholmstrafikken, is seen here nearing completion at the Merwede yard. A very tight construction schedule was aided by employing an existing successful design from the former Van de Giessen-de Noord yard.

optimised in accordance with the requirements of this particular route. This includes revisions to the passenger flow and routing arrangements, public spaces, cafeteria, and cabins. The upgraded design work was undertaken by Merwede, with Steen Friis responsible for the interior architecture. In addition, the new vessels both have ice-class strengthening and feature a propulsion system laid out to meet HFO 380 specifications.

Merwede is confident that further ferry orders will come its way in the foreseeable future. 'We believe there are opportunities in this market, which is one we would like to be in', says Mr Faber.

Merwede also plans to focus on the offshore market, and in this context is now working on a

diesel-electric platform supply vessel for Solstad. This is being built to an Ulstein design, and is due for delivery in September this year.

Other contracts in hand at Merwede include a multi-role vessel, for the Royal New Zealand Navy, and a river cruise ship, for the Zonnenbloem organisation. The latter, designed specifically for the needs of chronically ill patients, is due for delivery in December this year.

Unlike many other Dutch shipbuilders, which are subcontracting hulls to foreign yards, Merwede has no plans for such links. Mr Faber suggests, 'We only subcontract parts of the steelwork, not complete hulls, to other yards within the region, as experience shows this is the only way to be able to guarantee short delivery times and quality construction'.

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Container feeder-series success for Damen

ONE of the best known 'brands' within the Dutch shipbuilding industry, the Damen group, is finding considerable success with a number of its cargo vessel designs. Most notably, perhaps, Damen is now in the process of building a total of 12 Container Feeder 800 series ships for German owners.

The first two, *Geeststroom* and *Geestdijk*, were handed over to Jörg Köpping in December 2004 and March 2005 respectively, and are both now on charter to Geest North Sea Line (the company currently being united with Samskip, as reported in our April issue). Each has a length of 140.64m overall, a beam of 21.8m and a 7.30m draught, and can load 517TEU of homogeneously loaded 20ft containers weighing 14tonnes. *Geeststroom* was presented in *Significant Ships of 2004*.

A prime feature of *Geeststroom* and her sister is that Damen has configured the design specifically to meet the growing demand for transporting 45ft containers (Geest is switching all European operations to 45ft boxes), not only on deck, but also in the holds. A total of 329 x 45ft boxes can be carried, and the key is that all holds are equipped with moveable cell guides. Two holds have reefer power points, and overall the vessel is capable of accommodating up to 180 refrigerated units, with 60 in the holds and 120 on deck.

The propulsion arrangement selected allows this Container Feeder 800 series to have a relatively fast 18knot service speed at maximum draught, 90% MCR, utilising a 8400kW MaK 9M43 main engine. To ensure a high degree of manoeuvrability, the vessels come equipped with a CP bow thruster rated at 700kW and a 500kW CP stern thruster. Classed by Germanischer Lloyd, the hulls are also strengthened to meet GL's E3 ice class notation.

Damen's initial success in winning these first two orders for the Container Feeder 800 type has been followed by contracts for a total of 10 vessels, five each from the German owners, Becker and Kahrs. These will, like the first two, be constructed at the Damen yard at Galatz, Romania, and will be delivered at regular intervals through to January 2007. The Damen Shipyards group in Holland will, however, be extensively involved in this project, providing full design, procurement, engineering, and logistics support.

Continued concentration on Combi Freighter designs

Alongside the CF 800 series, the Damen Shipyards Cargo Vessels division intends to continue concentrating over the next few years on its successful multipurpose Combi Freighter series, and in particular on the CF 10,500, CF 12,000, and CF 19,500 versions. The first two CF 12,000 vessels (12,000dwt), *Morgenstrond I* and *Morgenstrond II*, will be built at Damen's Okean yard in the Ukraine (*The Naval Architect* January 2005, page 22) for Reederei Drent, of Delfzijl, for delivery in January and October 2006 respectively. These 142.95m long, ice-class vessels feature two large holds, well suited for project cargo; two 80tonne capacity deck cranes; hydraulic folding hatches; and a 15.5knot service



A fine view of the new Container Feeder 800 ship *Geeststroom*, specially built by Damen to load up to 329 x 45ft containers for Geest Line. She is the prototype of a new series for which 12 hulls have now been ordered by various owners.

speed. Other multipurpose vessel contracts for Damen include a series of three CF 10,500 vessels building at the Yiching yard in China for a UK owner, while the Galatz yard has a CF 19,500 vessel on its orderbook.

Looking to the future, Damen is working on a new design of multipurpose 7200dwt vessel. This CF 7200 model will be ice-strengthened, to Ice Class 1A, will have a length of 117m, a beam of 15.90m, and a draught of 6.50m. Service speed will be around 13knots.

Damen's overseas yards are also building a number of tankers to designs produced by the parent company. This includes three 3100dwt bunker tankers for Darwin Shipping, now on charter to BP, which were delivered by the Galatz yard in late 2004 and early 2005.

That yard is also building two slightly longer, 5000dwt versions of the same series for James Fisher, and these will be delivered later this year. All these vessels feature double hulls for those tanks containing oil products as well as power take-off/power take-in (PTO/PTI) systems for emergency propulsion. In PTI mode, a vessel can run on its diesel-generators, which drive the propeller through a combined alternator/electric motor coupled to the reduction gearbox, thereby providing a high degree of redundancy.

In addition, Galatz is building a series of 8000dwt tankers for Wappen Reederei, to a Ferrostaal specification. Six of these double-hull vessels have been completed and two are under construction for delivery in the second half of

2006. A possible contract for four more of these SCOT 8000 super-safe tankers with twin screws is reported to be under discussion (*Wappen von Hamburg* was presented in *Significant Ships of 2003*).

As well as concentrating on the multipurpose vessel sector, Damen believes there is considerable potential demand in the ro-ro market and with this in mind is now actively marketing its RoRo 1800 design, launched at the RoRo 2004 exhibition. This freight-only concept has an overall length of 142m, 1800lane metres of deck space, and a service speed of up to 22knots.

Meanwhile, work is nearing completion on a special double-ended passenger/vehicle ferry *Dokter Wagemaker*. The hull and major systems were built and installed at the Galatz yard, while final outfitting has been carried out at Damen's Royal Schelde yard in Vlissingen (an illustration appeared in our March 2005 edition, page 4).

This ferry will be owned by the Dutch operator, TESO, which has two similar, but slightly smaller vessels in service on the route to the island of Texel from Den Helder, in the northern part of the Netherlands. The elder of this pair, *Molengat*, will be replaced by the newbuilding this summer. *Dokter Wagemaker* provides extra car capacity (compared with her predecessors) on both decks, achieved through increased breadth, and will feature an innovative diesel-electric propulsion plant with four thrusters, plus a high degree of automation. ⚓

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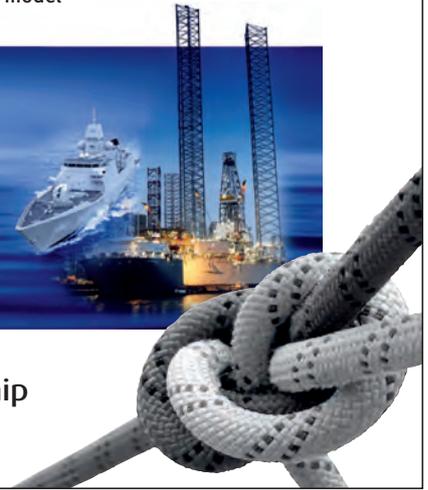
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New multi-thruster control system from HRP

AFTER a two-year development period, Rotterdam-based Holland Roer Propeller (HRP) is now actively marketing its new Multi Thruster Control System (MTCS). Today, using a single joystick, an operator can control up to 16 thrusters in an efficient, and user-friendly operation, HRP claims.

MTCS can be used in one of three modes, which can be selected by the operator according to the particular circumstances of a ship. The manoeuvring mode is used during mooring, or when the vessel is navigating in narrow passages; autopilot mode can be selected for long journeys; and steering mode is used for short transits.

In the manoeuvring mode, a side-stepping action can be achieved, with the vessel moving sideways, while maintaining its heading. The MTCS calculates the optimum setting and working angle of the thrusters. This side-step action can be combined with either a forward or aft movement, with the direction of the joystick determining the direction of the ship.

In this mode, an operator can also command the vessel to rotate around a central point without forward speed. Through the joystick, the location of this central point of rotation can be moved from midship to forward or aft, according to requirements.

Rotation can also be combined with longitudinal movement, an action achieved by a forward stroke and rotation of the joystick. A feature of the system, highlighted by HRP, is that the system will predict what move a ship will be making in this situation by projecting time steps on the display monitor.

Autopilot mode is used for long-distance, straightforward sailing. Course changes are possible by simply rotating the joystick to a new heading. Rate-of-turn course-keeping or waypoint steering functions are available, while in this mode the side-stepping and rotation at zero vessel speed are disabled.

HRP points out that, with MTCS, it is possible to arrange for a vessel to follow a pre-set course, using GPS. It is also possible to make the system 'remember' what happened during a previous voyage and to follow the same pattern.

The steering mode is used for manual steering in forward or backward directions. All thrusters respond to the movement of the joystick simultaneously, pointing in the same direction at all times.

Each thruster within the program can be configured individually, independent from other thrusters onboard. This can be achieved by double-clicking on the thruster symbol within the thruster control menu on the screen.

In the event of failure of an engine, driveline or thruster, that particular unit can be either reduced in power or disabled. As a result, the system will ignore this thruster during further operations and will reconfigure its algorithm to ensure the remaining thrusters compensate for the changed situation.

HRP director, Henk Terlouw, says, 'This new system avoids having to have a multiplicity of individual thruster controls onboard. The



Apart from developing the new MTCS control program for multiple thruster installations, Holland Roer Propeller has enjoyed success with its contra-rotating designs, such as this model with a propeller at each end of the hub.

system replaces conventional rudder controls and individual thruster controls, and combines them in a single 'magic' button'.

The company believes that owners and operators will also benefit from the fact that the system is relatively simple to operate, without too much training. According to Mr Terlouw, 'an operator simply picks the control mode, gives the command, and the thrusters are instructed to undertake that move. The movement of the joystick translates into an optimal thruster setting'.

HRP is now undertaking the first installations. One system is being fitted to a new cargo vessel, another on a converted dredger, and a third on a Danish naval vessel. The first ship with the system is expected to be in service later this year.

Broadening the geographical scope

As well as extending its product range with the MTCS, HRP is also broadening its

geographical scope. The company already has offices in Shanghai and Singapore, but has recently established an office in Dubai to cover the Middle East region.

HRP Middle East is an independent, wholly-owned subsidiary that will offer marketing, sales, and service support. The company has secured a significant contract to deliver thruster packages to the four 6200dwt bunkering tankers being built at Dubai Drydocks for Emirates National Oil (illustrated on page 41 of our March 2005 edition). Each will be fitted with two 750kW azimuthing thrusters, and this order represents an important breakthrough for HRP in this region, which it hopes to build on by having a direct presence in Dubai.

Last year was a highly successful one for HRP, which says it achieved increased sales, in Asia especially. It also notes a high level of demand for its contra-rotating propulsion propellers, with recent applications including passenger vessels and offshore supply craft. Ⓢ

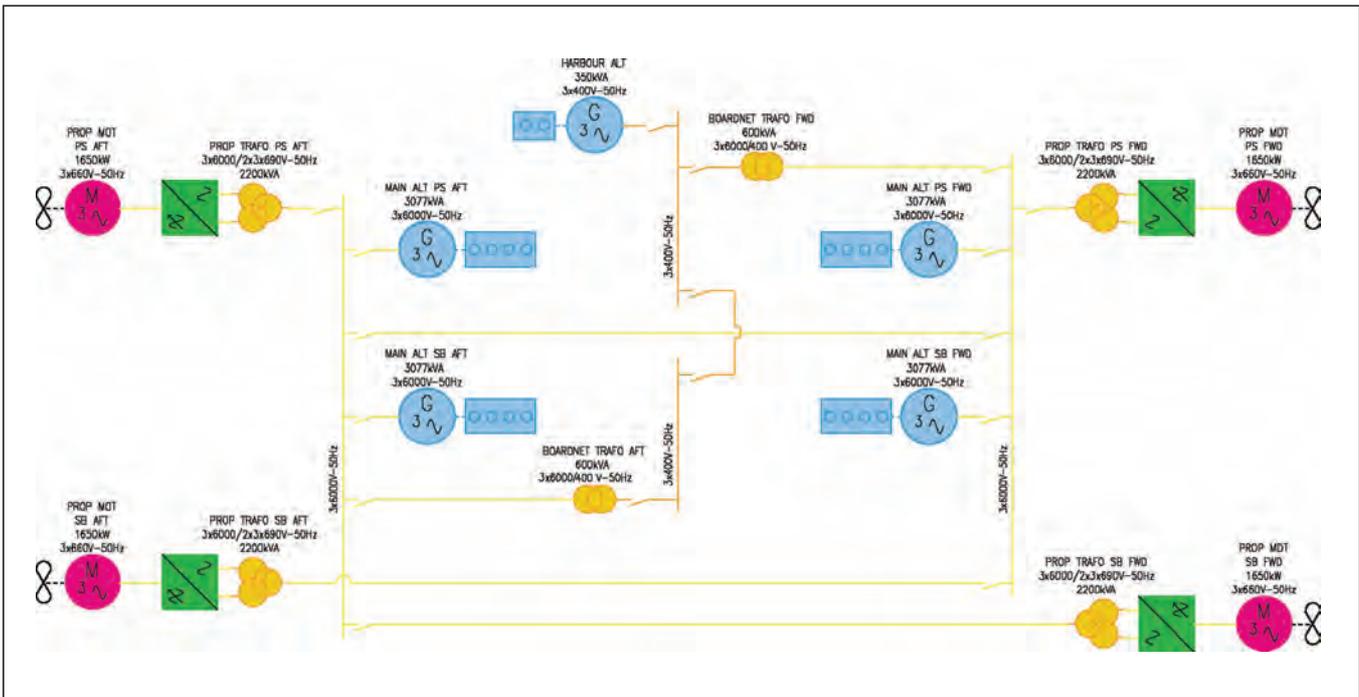


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A schematic diagram for the Bakker-designed diesel-electric propulsion system on the new double-ended ferry *Dokter Wagemaker*. This ship will also mark the first installation of Bakker's new BIMAC alarm, monitoring and control concept.

Integrated electrics for TESO's new double-ended ferry

CURRENTLY being commissioned by Bakker Sliedrecht is a range of systems and equipment onboard *Dokter Wagemaker*, an interesting new double-ended ferry constructed at Damen's Galatz facility and which is now being completed at the Royal Schelde yard, in Vlissingen, for the Dutch operator, TESO (see also our separate article in this issue). Bakker has delivered the complete electric installation on a turnkey basis, including switchboards, transformers, control desks, and cabling.

For this Lloyd's Register-classed ferry, the company has designed a diesel-electric propulsion plant with a high degree of redundancy, and this is installed in two separate engine, propulsion, and switchboard rooms. The main supply consists of a 6000V network and a 400V network. The 6000V network is fed by two-plus-two diesel-alternators, each rated at 3077kVA, and these provide power for the four azimuthing and ducted propulsion thrusters, two forward and two aft, each rated at 1800kW. Two transformers, each 600kVA, feed the 400V network, together with a 350kVA auxiliary generator.

Bakker Sliedrecht has designed the system with two symmetrical 6000V supply systems, forward and aft, which are connected with coupling switches. This system can operate as one, or be split in two, and as a result, Bakker Sliedrecht believes it has created an electrical generating layout that can guarantee continued supply to the thrusters and shipboard services, even under extreme circumstances. The thrusters are fed and

controlled by client-specific, direct water-cooled Bakker frequency converters, featuring an completely enclosed modular construction.

The aim of this whole concept onboard *Dokter Wagemaker* has been to create a very high level of safety. As Arie Boer, business development manager, observes, 'There will always be thrust on the propellers, fore and aft, and there will always be power on two thrusters. The separation of the two engine rooms is also important, since if there is a fire or flood, the vessel will still be capable of operation'.

Dokter Wagemaker also marks the first installation of the Bakker integrated modular alarm monitoring and control (BIMAC) system. BIMAC hardware brings together class and type-approved equipment from leading manufacturers, and features low-maintenance components with world-wide availability and support. The modular software architecture hosts all IMO and class-required alarm, monitoring, and control features, and is type-approved for all possible system configurations.

Further contracts for BIMAC have been received. The system is being installed as a retrofit on the dredger, *Volvox Asia*, and on an inland vessel, *Oranje Nassau*, which is being built at a Dutch yard.

Typical applications served by BIMAC include actual alarms; group alarms; alarm history; channel group display; standard system graphics; data storage and history control; system channels overview; operator access and control authorisation; and system configuration and

service tools. In addition, a number of non-standard functions can be covered. These include exhaust-gas temperature deviation monitoring; tank level gauging and content monitoring; ballast and bilge controls; and navigation and propulsion controls.

Mr Boer says, 'With the integrated BIMAC system, it is possible to control and monitor virtually everything onboard. Moreover, we have developed a number of security features to ensure that only authorised personnel can undertake appropriate activities'. He adds, 'BIMAC is suitable for a wide range of ship types, and we believe we have achieved the right balance between quality, price and user-friendliness'.

Aside from *Dokter Wagemaker*, another notable project carried out by Bakker Sliedrecht in recent months involved the cutter dredger *Fu Min 9 Hao*. For this IHC-designed dredger, built at the Wenchong Shipyard in Guangzhou, China, the company undertook to supply the complete electric package, including engineering, alternators, drive systems, switchboard, cable routing, operating instruction, and commissioning.

Equipment supplied includes a direct water-cooled Bakker Sliedrecht frequency drive for the 1000kW cutter and an electric power supply for the 1444kW dredge pump, while the cutter and submersible pump are driven by Bakker submersible motors. The gland pumps onboard are controlled by frequency drives, and the winches are controlled in terms of speed and torque by a Bakker DC-bus system. ⚓



A fine view of the new 10,700dwt heavy-lift ship *Beluga Revolution*, first in a series of four to be built by Volharding. Her hull was fabricated at the Daewoo Mangalia yard in Romania, and she is equipped with two 250tonne jib cranes mounted on the port side. A MaK 8M43 main engine of 7200kW gives a relatively fast service speed of 18knots.

Strong orderbook at Volharding Shipyards

IN common with many other shipbuilders in Northern Holland, the Volharding group has experienced a significant upturn in workload over the past year (as reported in our May 2004 article), as the global shipping market has strengthened. Its yards at Harlingen, Foxhol, and Eemshaven are all busy, both with complete newbuildings, and with the outfitting of hulls delivered from Romania, Ukraine and, as from 2006, Turkey. Overall, the group now has the impressive number of more than 30 vessels on order for delivery through to the end of 2007.

The first in a series of four heavy-lift vessels due for delivery in 2005 and 2006, *Beluga Revolution*, is now complete, and the second, *Beluga Resolution*, is now being outfitted at Eemshaven, following completion of the hull at Daewoo Mangalia Heavy Industries (DMHI) in Romania. These 10,700dwt vessels are equipped with a pair of 250tonne cranes (500tonnes when operating in tandem), and are capable of a relatively fast 18knots service speed. A very long No 2 hold of more

than 50m will assist with loading project cargoes; alternatively, up to 204TEU can be stowed here. Total ship container capacity is 569TEU.

Another notable project concerns the building of a series of four ice-strengthened 900TEU container ships, which are scheduled to be delivered to their owners from mid-2005 to early 2006. The Ukrainian-built hulls will be outfitted in Harlingen.

Although this series is based on an earlier 750TEU series developed by Volharding, the company points out that the increase in capacity has not been achieved simply by lengthening. Furthermore, in order to maintain the speed of 18knots, the lines of the forebody have been faired in such a way that the installed power of 7200kW has not had to be increased.

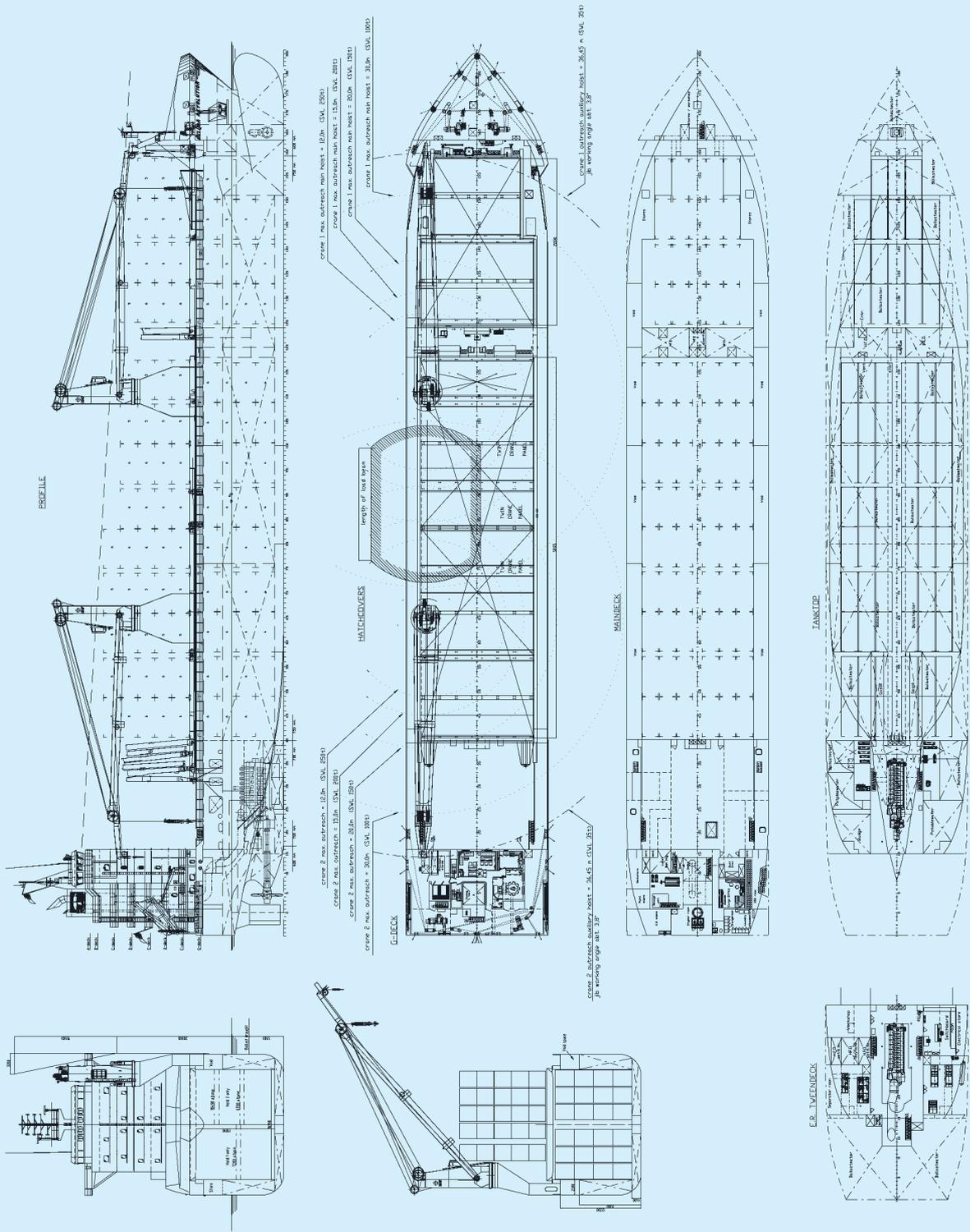
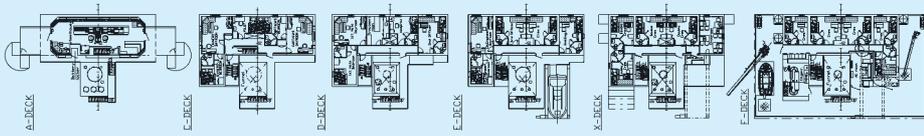
Other contracts in hand include a series of 3600dwt bunker tankers being built at Foxhol, for delivery this year and next; a 750TEU newbuilding being completed at DMHI in Romania this year; and two 4000dwt chemical

tankers and a 9800dwt multipurpose cargo ship, which are being built completely at Harlingen, for delivery in 2006.

The two chemical tankers were ordered earlier this year by Brodrene Klovning Shipping, from Norway, for West European trades. The cargo tanks (4600m³ total capacity) will be constructed from solid duplex stainless steel, and although under 5000dwt, for safety and environmental protection the vessels will have a double-hull construction and will be equipped with a powerful bow thruster that can also be used for emergency propulsion.

Towards the end of last year, Volharding entered into a joint venture with Um Deniz Sanayi, a Turkish shipbuilder with a large, modern facility at Golcuk on Izmit Bay, and this cooperation is now gaining momentum. Hulls for a series of 12,000dwt tankers will be delivered from Turkey for outfitting at Eemshaven next year, as will a number of 900TEU capacity container ships. It is also understood that Um Deniz Sanayi will build hulls for a number of 14,000dwt tankers. ☺

General arrangement plans of the quartet of 10,700dwt heavy-lift ships being built for Beluga Shipping by the Volharding group.





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Dredger shows Barkmeijer's specialist capabilities

LOCATED alongside the Prinses Margriet Kanaal at Stroobos, in northern Holland, the Barkmeijer yard has a history stretching back more than 150 years. Today, the yard is thriving, and is currently building a long series of general cargo vessels, as well as a trailing suction dredger.

Now nearing completion at the yard, the 2300m³ capacity dredger, *Andre L*, designed by Barkmeijer and Conoship in close cooperation with the French owner, DTM, of La Rochelle, will be used for dredging sand off the west coast of France. The installation onboard, delivered by Damen Dredging Equipment, consists of a 600mm suction pipe for dredging down to a depth of 40m, and which incorporates an electrically-driven pump.

A shore discharge pump, also electrically-driven, is located in the pumproom, and this can empty the hopper via four suction openings in the bottom door recesses. This shore discharge pump is designed to deliver a sand/water mixture to the bow coupling, a shore discharge line on the portside, or a shore discharge arrangement above the hopper. A second way of emptying the hopper, should *Andre L* be involved in maintenance or construction work, is through the four bottom doors.

The new dredger, due to be delivered in July this year, is capable of a speed of 13knots, and is powered by a Wärtsilä Propac propulsion package, including a 6L32 main engine, a Wärtsilä gearbox, a CP propeller, and HR nozzle. The gearbox is equipped with a PTI facility which provides a secondary means of propulsion, since a 875kW electric motor can be coupled to the gearbox through a hydraulic clutch.

From the front end of the main engine is driven a shaft generator - the main electrical provider at sea, rated at 3000kVA at 750rev/min, and this feeds the main switchboard, both for the board net and other systems, such as the dredge pump, jet pump, hydraulic pumps, and bow thruster. Barkmeijer also points out that a Wärtsilä 6L20 unit has been installed as an auxiliary generator, and in cases of emergency this can be connected to the PTI motor, providing a further means of back-up power.

According to Barkmeijer, great care has been taken to optimise the vessel's speed, as well as



Side-launch at the Barkmeijer yard of the new sand dredger *Andre L* for the French owner DTM. Great care has been taken to optimise this ship's speed and cargo operations, due to short time frames on the Atlantic coast for harbour arrival and departure.

loading and discharge operations, to ensure fast turnaround times. This is important due to the restricted port access windows that exist in the tidal harbours along the French coast.

In addition, the design philosophy adopted has been geared towards reducing maintenance requirements as much as possible. In particular, Barkmeijer notes that there are only 18 cylinders onboard, six each for the main, auxiliary, and emergency engines, and this compares with around 70 cylinders on a conventionally-designed dredger of this size.

According to Hans Veraart, Barkmeijer's commercial director, 'This project shows our capabilities in the dredger market and we are keen to secure more contracts of this type in the near future. It is important that we are not dependent on one line of business, such as the cargo ships for Arklow'. Currently under construction are eight of these 4500dwt multipurpose general cargo vessels, continuing examples of the successful Arklow R-class design, first built in 2002 and somewhat similar to the Bijlsma-built *Arklow Rally*, presented in *Significant Ships of 2002*. These have been ordered both by Arklow

Shipping, of Ireland, and by Dutch interests, and will be delivered from late 2005 through to early 2007.

To date, seven ships of this Conoship design have been delivered by Barkmeijer, all to Arklow Shipping, beginning with *Arklow Rose*. The class features an obstruction-free box-shaped cargo hold of 5935m³ and a cargo capacity of 4530dwt at a draught of 5.68m. The hold can be subdivided into separate parts through a movable bulkhead, while the tanktop has been strengthened for the carriage of heavy steel coils and containers.

Commercial prospects for Barkmeijer appear promising. Mr Veraart comments, 'The market really picked up in mid-2004, and we also benefited from a subsidy arranged by the Dutch Government, with the agreement of the EU. As a result of the increase in the volume of business, there are now around 200 people working at the yard'.

Looking to the future, Barkmeijer is working with Conoship on a series of relatively high-speed general cargo vessels. As Mr Veraart observes, 'The Arklow R-type ships have been a very successful series for us, but we know there has to be life beyond this, and we are now preparing for it'. ⚓



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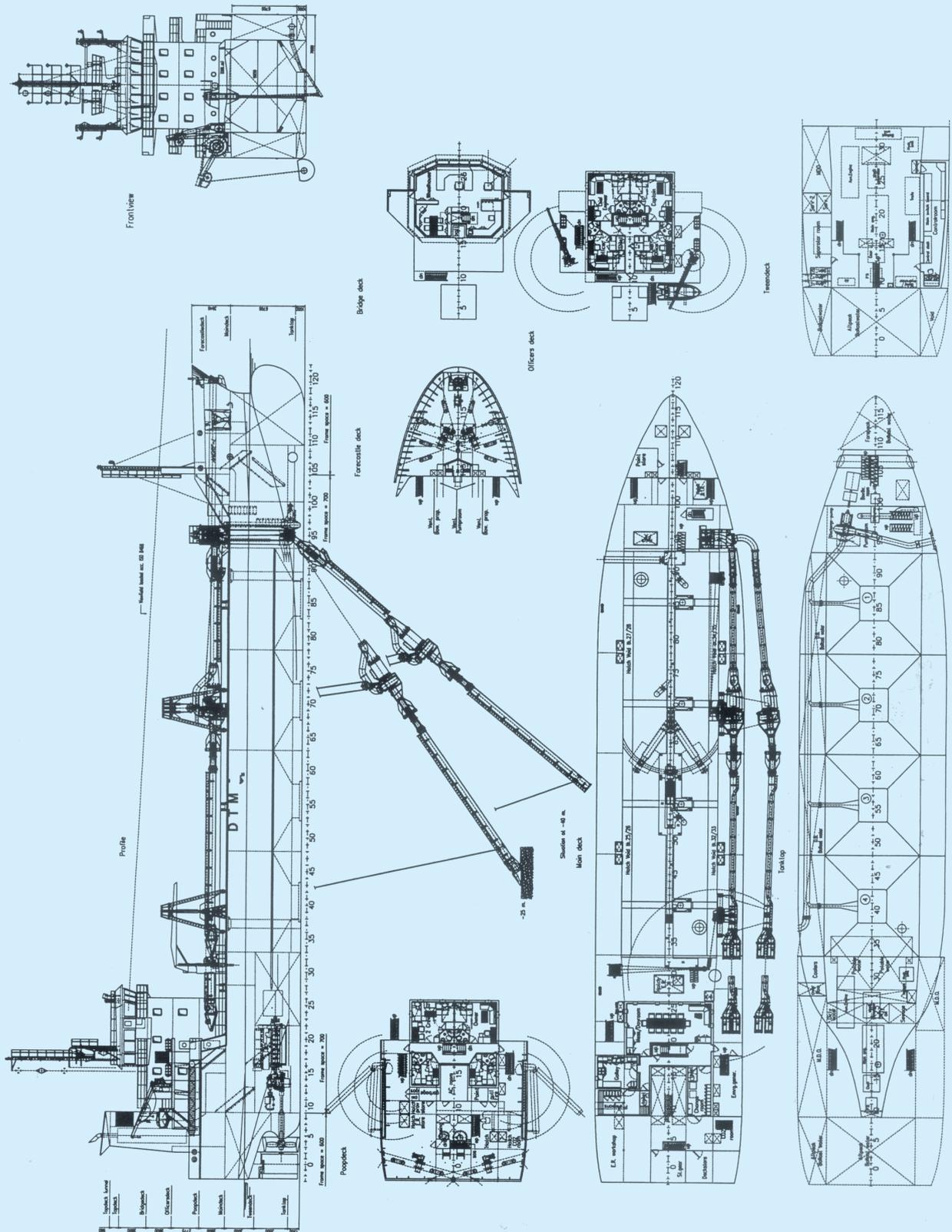
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General arrangement plans of the 2300m³ sand dredger *Andre L*, scheduled for July completion by Barkmeijer Stroobos.



Contra-rotating steerable propellers for new inland cruise ships

TWO Veth-Z-Drive contra-rotating azimuthing propellers, each rated at 783kW at 1600rev/min, as well as a Veth-Compact-Jet bow thruster, have recently been supplied by Veth Motoren to Viking River Cruises' new passenger vessel, *Viking Sun*. She is the second of two new liners to be constructed at Merwede; her virtual sister, *Rousse Prestige*, for Dunav Tours, was featured in the May 2004 edition of *The Naval Architect*.

The contra-rotating propeller units, driven through cardan shafts by Caterpillar engines, are designed to combine high efficiency and small propeller diameters with reduced noise emission. According to Veth, power distributed over two propellers results in better performance.

Within the unit, each propeller rotates in an opposite direction, so that the aft propeller can recover energy from flow from the forward propeller. As a consequence, rotational losses are minimised, and maximum efficiency is gained from the available power and propeller diameters. Furthermore, as the optimum number of revolutions is approximately 20% less than for a single propeller, noise levels are lower, while reduced stresses on the blades and reduced water turbulence contribute to less vibration.

Viking Sun is also fitted with a Veth-Compact-Jet bow thruster; combining the two contra-rotating rudder propellers with a jet-type bow unit should give a very high level of manoeuvrability. The Compact-Jet consists of a circular rotating construction, provided with a hydrodynamic streamlined channel in which the



A typical example of a Veth contra-rotating rudder propeller, for which several benefits are claimed.

propeller is placed at an angle. Water is drawn in diagonally from under the hull and thrust out in any desired direction. As both the suction side and the outflow side rotate together with the unit, the same high thrust is achieved over 360deg. On *Viking Sun*, the electric motor is placed

vertically on the Compact-Jet, thereby saving much space (on *Rousse Prestige*, the same type of thruster is driven by a diesel engine). Furthermore, as a result of double-skin construction, the Compact-Jet should also offer very low sound levels. ⚓

Conoship broadens its horizons

UNTIL relatively recently, the Groningen-based ship designer, Conoship International, could only work for full member yards, which at present include Royal Niestern Sander, Bodewes Shipyards, and Barkmeijer Shipyards, all situated in the northern part of Holland. Over the past year, however, a strategic decision has been taken by shareholders to allow Conoship to market its services to other yards, and also to deal with owners directly. Furthermore, Conoship was previously only allowed to promote its designs to the export market. Now Conoship is actively marketing its capabilities to Dutch shipowners as well.

This shift in strategy is already producing results. Most notably, perhaps, Conoship has struck up a close working relationship with the Chowgule shipyard, in Goa, India, which is now an associate member, and has been able to put the yard in contact with European owners.

As a consequence, in February this year, Chowgule signed a contract to build six 4450dwt general cargo vessels, to a Conoship design, for a joint venture formed by the Navigia Group, of Holland and Apollo Shipping, of Germany. As well as providing the design of the ship, Conoship will assist Chowgule in procurement of the equipment to be installed onboard.

The first of these vessels, which are 90m long overall, 14.4m wide, and have a depth of 5.7m, will be delivered in mid-2006. Thereafter, one

vessel is expected to be completed every four months. Designed for bulk and general cargo transportation, these ships feature one large hold, with a capacity of around 205,000ft³.

Conoship is now working on other potential projects for the Chowgule yard, which has up to now primarily built vessels for inland operations. Further orders could be confirmed in the next few months. According to Dick Kuiper, Conoship sales and marketing manager, 'There is a lot of knowledge and a good skills base in India, and we believe we are well placed to give them the opportunity to use it'.

Conoship is now looking to forge similar strategic partnerships with other shipbuilders overseas. For example, there have been contacts with the Mednaval yard in Tunisia, and facilities in Brazil, while it has appointed a Chinese agent, SAAME, to help the company establish links with this market also.

New designs for Dutch yards

Conoship continues to work closely with its existing member yards in Holland, and a number of new designs have been produced, or are on the drawing board in connection with existing, or potential orders for these shipbuilders. As an example, the Royal Niestern Sander yard has secured a contract from the Italian owner, Setramar, for a new design of 14,650dwt multipurpose container vessel, with two options.

Developed by Conoship in close co-operation with the owner, this vessel has two cargo holds with a clear opening of 43.4m x 15.5m and 49.7m and 15.5m respectively. Each of the holds is closed by eight pontoon hatches and the ship is equipped with a hatch cover gantry crane to speed up cover removal and closing operations.

Conoship has also been actively involved with a number of other contracts for the Royal Niestern Sander yard. This includes a series of six ice-strengthened 5800dwt multipurpose vessels on order with German interests, two of which have recently been delivered, and four 6100dwt ships for the Dutch owner, Wagenborg.

Conoship further highlights a new design it has recently produced, for which as yet there are no confirmed orders. This is a 3700dwt multipurpose vessel based on the successful Tille Trader 3300 series, seven ships of which have been built to date, for owners including Union Transport and Scotline. According to Conoship, the design features 'excellent' stowage flexibility and a relatively fast service speed of 13knots.

The vessel type incorporates a single cargo hold, with a clear opening of 70m x 10.8 x 8.5m, which is designed for heavy and project cargo movements. This hold is fitted with two moveable bulkheads, which can be slotted at seven positions in the hold, using the hatch cover crane. A considerable amount of interest has already been generated by the design, Conoship indicates. ⚓

Vuyk workhorse designs generate interest

OVER the past year, the focus of activity at Vuyk Engineering's Groningen office has shifted to the development of geared and gearless multipurpose general cargo ships for shortsea operations. The company has recently signed a contract with a Dutch owner in connection with its 4200dwt, 140TEU capacity VG 4200 type vessel, and is now working with MARIN undertaking CFD analysis. In the next few weeks, towing tests will be carried out at MARIN on a scale model of this design. Vuyk has been contracted by the yard involved to carry out all the engineering, and as soon as class society approval is given, keel laying will commence.

The VG 4200 class has a length overall of 84.95m, a breadth of 13.60m, and a design draught of 5.35m. Focus of the design work, says Vuyk, has been maximising the cargo intake capacity within the single hold, which is around 5664m³ in size.

Vuyk has designed a series of multipurpose, 'workhorse' ships of a similar type up to 6500dwt. While a firm order has been received for the VG 4200 type, the company says it is close to securing contracts for the VG 5000 and VG 3800 versions as well, the latter possibly for a long series. In all cases, the probability is that the hulls will be constructed overseas, at yards in Poland, Turkey or China, and then finished in Holland.



Megayachts, such as the new *Athena*, seen here sporting her classic lines, are an interesting aspect of the current workload at Vuyk Engineering. *Athena* was delivered earlier this year by the Royal Huisman yard to a US owner.

Other projects being undertaken by Vuyk include engineering for two tankers and four 6100dwt multipurpose ships being built at yards in northern Holland. In addition, the company is continuing with its feasibility study for a coastal cruise vessel that can operate both on the Rhine and the North Sea in conditions up to sea state 6.

Aside from general cargo ships, the biggest area of work for Vuyk at present is the design

and construction of megayachts. The company has, for instance, handled all the construction and mechanical engineering for *Athena*, an 89m vessel that is, for the time being at least, the world's largest privately owned sailing yacht. She was delivered by the Royal Huisman yard earlier this year to a US businessman. Vuyk is now working on the mast design and construction for *Maltese Falcon*, another large yacht being built at a Turkish yard.

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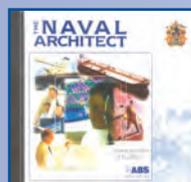
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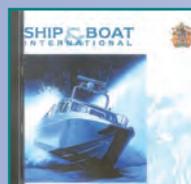
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First AutoChief C20 automation system in service

The first AutoChief C20 main engine remote control system from Kongsberg Maritime has successfully completed its sea trials. The equipment is fitted to one of the first MAN B&W ME-type low-speed diesel engines to be built by Hyundai Heavy Industries, and is installed on *SCF Aldan*, lead vessel in a series of six Suezmax crude oil tankers for Sovcomflot. All five following ships will be similarly equipped. More than 60 systems of the C20 type have now been sold, mainly for ships with Sulzer RT-flex and MAN B&W ME types with electronic controls.

These new Sovcomflot vessels will also feature Kongsberg Maritime DataChief C20 alarm and monitoring equipment; DataChief and AutoChief concepts utilise common architecture with Kongsberg technology and communicate on a CAN-bus, sharing non-essential sensors and information. This enhances compatibility, reducing failure rates and making systems easier to install while being more cost-effective.

*Kongsberg Maritime,
Horten, Norway.*

Tel: + 47 33 032329.

E-mail: rita.krathe@kongsberg.com

New Firemaster selection guide

A new fire extinguisher and safety equipment brochure from Firemaster Extinguisher Ltd includes a guide on how to choose the correct extinguisher for different fire risks. Models include foam, powder, CO₂, and water with special additives, available as factory-sealed and refillable units, also automatic fire systems; these are all available for various applications, including marine. Today, innovative technology and materials are being used and are being constantly updated to comply with regulations.

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Reintjes largest gearbox

The largest marine reduction gearbox to be built by the German company Reintjes was delivered in February to the J J Sietas shipyard in Hamburg. This 56tonne SVAL1250 unit has a length of 4.10m, a breadth of 3.40m, and a depth of 4.20m. It will transmit the 11,120kW output of a MAN B&W 8L58/64 medium-speed engine through a clutch, in a new 14,300dwt container ship being built for the Canadian company Oceanic. Input speed is 428rev/min and output speed to the propeller is 119rev/min.

Special features include strengthened components, including a housing to absorb additional dynamic stresses, to meet Germanischer Lloyd E3 ice class. The gearbox also includes an advanced power take-off/power take-in arrangement to provide get-you-home propulsion power in an emergency. The combined alternator/motor includes its own clutch and can generate 2000kW or supply



The ice-strengthened reduction gearbox for the new Canadian container ship, seen in Reintjes' Hameln works. It includes a combined power take-off/power take-in arrangement to supply emergency power to the propeller.

2100kW. Gearing is coordinated so that the propeller can absorb the optimum power when being driven by the electric motor.

The installation includes three hydraulic clutches, thus an innovative electric dual pump system with twin circuits is fitted. A division into working pressure and lubricating oil pressure considerably reduces stray power in the gearbox, since the entire 650litres/min capacity does not have to be pumped up and maintained at working pressure.

*Reintjes GmbH,
Eugen-Reintjes-Strasse 7,
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Tel: + 49 5151 104 228.

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New marine personal computer

A new personal computer suitable for operation in a marine environment has been introduced by the Israeli electronics company known for its automation and control systems also VDR equipment, Totem Plus. The Totem PC TPC 1.2 is a PC-compatible unit based on Intel computer technology and incorporating an Intel 856G chipset. The configuration is flexible and expandable. Both computer and peripheries are designed for marine conditions, and the computer has been certified by Det Norske Veritas for this purpose. Customers are expected to include not only shipowners but shipbuilders, marine equipment manufacturers and users, also those companies building cargo loading programs.

*Totem Plus, P O Box 164,
Herzliya, 46100 Israel.*

Tel: + 972 99572458.

Fax: + 972 37602722.

E-mail: totempls@totempls.co.il

Web-based cable gland selection

A web-based cable gland selection application has been launched by Hawke International for

registered users of its website. This should help project designers and electrical engineers to choose a correct gland over the Internet. The website also includes installation-training videos, downloadable PDF-file brochures, and a searchable FAQ database for technical questions.

Once a selection has been made, the specification can be sent to Hawke, or its distributor, for a quotation. Projects can be saved and recalled later for additions or amendments. The modern technology employed on the website is said to be much improved over traditional web-based applications. This provides a single screen user interface that allows all sections and amendments to be made without page re-loading, thus speeding and easing the process.

Hawke International, UK.

Tel: + 44 161 308 3611.

Fax: +44 161 308 5831.

E-mail: phil.oconnor@hawke.com

New test facilities for anchors and chains

A new test facility is now fully operational at the UK factory in Caerphilly, Wales, of Lloyds Beal Ltd for anchors, chains, and deck equipment. In addition to the full range of mechanical test services previously offered at the company's Cardiff centre, the new unit features a 5000kN capacity fatigue testing machine with a 14m bed length and a 3.2m stroke. This machine is said to offer state-of-the-art data capture and is capable of many test profiles in load and position control.

A number of upright test machines are also at the site, ranging from 0.25kN to 2000kN, and several are able to carry out cyclic tests under computer control. The new site retains the approval of Lloyd's Register, and the ISO9001-2000 scope of registration is extended to include site activities. Lloyds Beal can also offer tensile testing against its UKAS accreditation.

To support proof testing activities, the company has developed an integrated strong floor suitable for the testing of beams and similar fabrications

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Second Notice



The Rigid Inflatable Boat, or RIB as it is more commonly known, has made a significant impact on many kinds of small boat operations over the last three decades. Its advantages are well proven in practice and a thriving industry is now established around these unique craft.

The conference will be held in the run-up to, and on the first day of "RIBEX 2005". This is a major three day exhibition organised by RIB International magazine, the leading international journal for RIBs. This will attract professional operators as well as RIB builders and designers from around the world. The venue for the conference will be in the newly built conference facilities at Cowes Yacht Haven, where the exhibition will also be held.



Since RINA's last RIB conference in 1998, the technology has advanced considerably: the trend towards larger and faster boats continues, and there are a multitude of variations on the original RIB concept.

This conference will examine topics relating to the design and operation of RIBs including the following topics:



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product testing with accurate modelling should reduce the time-to-market for safety-critical elements of a design, such as a collision bulkhead.

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be lifted in confined spaces. Compressed-air drives enable the hoists to be fitted in hazardous areas; however, extra protection can be fitted if required. At this particular shipyard, the hoist will travel on a long I-section beam with A-supports.

Special features include a 'rams' hook with shackle bore mounted at the end of the hoist, also travelling motors that have a free-run mechanism for use when loads are being lifted, since many blocks will not be perfectly balanced. The Neuhaus solution allows an operator to open the motor brakes once the hoist is parked over its load; when lifting starts, the EH50 hoist will move itself above the centre of gravity to allow a safe lifting operation.

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New welding analysis technique

Building on experience gained in the nuclear industry, the specialist engineering consultancy Frazer-Nash (working autonomously within the DML group) has launched what it claims is a unique welding analysis modelling service that could be of benefit to the marine industry. This procedure is a design and assessment model, capable of predicting all aspects of welding process performance, particularly with regard to residual stress.

By simulating the complete welding process, the method is able to analyse post-weld residual stresses and/or dimensional variations that may result; it can be applied to any type of weld, including those on repair work. The consultancy has developed the technique in combination with the software packages Abaqus (mechanical analysis) and Feat (temperature performance).

By using Feat, for example, distortions that may arise as a result of welds within an area of steel plate, such as a hull block, can be predicted, and both design and manufacturing can then be optimised. Replacement of more extensive

Hoists for shipyards

A special version of its EH50 monorail hoist has recently been supplied by J D Neuhaus Ltd to a US shipyard for handling hull blocks. The yard required an ability to handle 60tonnes, even though the nominal load would be 46tonnes, so the EH50 with a nominal capability of 50tonnes proved a good solution, with its 25% overload rating, effectively enabling loads of up to 62.5tonnes to be lifted.

Based on a concept with two drive motors instead of four, the EH50 hoist is compact enough to be operated in areas where heavy loads have to



A typical example of a Neuhaus EH50 hoist operated by compressed air.



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New cruise concept sets sail

THE latest venture from Stelios Haji-Ioannou is easyCruise. This will offer passengers an opportunity to stay onboard a mini-cruise ship for flexible one-week itineraries, allowing travellers to embark and depart at any port along the route, provided that they stay onboard for at least two nights. During summer 2005, *easyCruiseOne* will sail along the French and Italian Rivas. Her inaugural journey begins on May 6.

Unlike traditional cruises, *easyCruiseOne* will stay in port in the afternoon and evening, and will encourage passengers to explore the local area. The vessel will then sail in the early hours of the morning to the next destination. The ship will also arrive at each destination by lunchtime, when passengers will be free to come and go whilst the ship is in port. *easyCruise* will also be offering excursions.

Passengers can book accommodation for up to two weeks, which represents two full itineraries. It is expected that this cruise concept will appeal to travellers in their 20s and 30s who have not cruised the more traditional way before.

The 4077gt, 88m-long vessel (one of the former Renaissance designs built at the Apuania yard in Italy) can carry 170 passengers, with a crew of 54. Amenities on the six decks include the Italian Caffè Ritazza, an American-style sports bar, and a tapas bar. There is also a six-person outdoor jacuzzi.

Twin and four-berth cabins, as well as suites, are available and cost from between US\$113 and US\$304. There are 72 twin cabins onboard, six four-berth cabins, and four suites. All interiors are brand new, after a total refit was carried out by Keppel in Singapore.

Cabins are minimalist in design (following removal of more luxurious fittings originally installed), and feature the colour orange, the corporate colour of the *easyCruise*. Twin cabins



This recently refurbished, *easyCruiseOne*, owned by the Easy Group, introduces a totally new cruise ship concept.

measure 10m² and have two single beds that can be joined to form a double. Four-berth cabins are 14.86m² with two sets of bunk beds. Suites measure 23.96m² and have two single beds which again, can be joined up. Located on the top deck, suites also have balconies. Only suites have full windows.

Every cabin comes with ensuite facilities and includes toilet, shower, and basin, and all cabins come with air conditioning. An extra housekeeping charge of US\$20 will be levied for passengers who want their cabin cleaned, and to have new clean sheets! ⚓

Newbuilding contract for third Freedom liner

A FIRM contract has recently been assigned between Royal Caribbean Cruises and Aker Yards for the order of a third ship in the Freedom class - the world's largest cruise design (formerly known as the Ultra-Voyager). The contract value is at the same level as the second in this class, ordered in the autumn of 2004.

Aker Finnyards, which is a part of Aker Yards, currently has two of these record-breaking vessels under construction at its yard in Turku, Finland. The first in this class - *Freedom of the Seas* - will be delivered to RCI in April 2006, and the second should be ready for delivery in spring 2007. This third vessel is scheduled to be delivered early 2008. These new ships are some 15% larger in space and passenger capacity than the earlier Voyager-class vessels.

The new Freedom-class designs will have lengths of 339m and breadths of 38.6m, and

will stand 18 decks high. Gross tonnage is 158,000gt, which make them 6% larger than today's largest cruise ship (*Queen Mary 2*). The ships will carry 3600 passengers, some 500 more than predecessors in the Voyager-series, and will have 1400 crew members.

In other news, Color Line and has also signed a letter of intent with Aker Yards for a second cruise-ferry. This vessel will be a sister to *Color Fantasy*, claimed as the world's largest cruise ship with car decks, which was delivered from Aker Finnyards at the beginning of December last year (*The Naval Architect* February 2005, page 14). The contract value is the same level as for *Color Fantasy* - approximately €300 million. The contract is anticipated to be made effective within the second quarter of 2005, and the new ship is scheduled to be delivered during the last quarter of 2007. ⚓

New American venture for panels company

A JOINT venture agreement has been signed by Australian-based Ayres Composite Panels Pty Ltd, a leader in lightweight panel systems, to establish an American manufacturing operation, Ayres Composite Panels USA. Mark Robicheaux Inc, of Louisiana, a marine outfit and furniture manufacturer, is to partner Ayres Composite Panels in the USA. The majority equity will be held by Ayres Composite Panels' wholly owned US subsidiary.

This new joint venture will improve lead times and service to the North American region. Ayres will now have offices and manufacturing facilities in Australia and the USA, with a sales office in Europe. Ayres Composite Panels USA will manufacture the full range of lightweight Ayrlyte panel systems and offer the same US Coast Guard and IMO SOLAS certifications. It is anticipated that manufacturing will commence in the third quarter of 2005. ⚓

Unique bilge water system utilises friendly 'bacteria'

A COMPLETE pollution-prevention solution for bilge water, the PetroLimator, invented by Ensolve, based in North Carolina, is a US Coast Guard and IMO-approved oily water separator (OWS) that easily handles phase-separated oil, emulsified oil, and water. A short description first appeared in our January 2005 issue, page 28.

Properly used, the system takes suction directly from a ship's bilge or oily water collection tank and reduces the total petroleum hydrocarbons to less than 15ppm. Emulsified oil is easily handled by the system, whether caused by detergents and/or the ship's mechanical systems.

This automated bio-mechanical system is claimed to be safe, reliable, and to require low maintenance. Unlike conventional oil water separators, the PetroLimator actually destroys oil and grease using naturally occurring bacteria. The technology has been successfully used in hundreds of land-based applications since the 1970s and has now been adapted for shipboard applications. A patent was awarded in 1998.

Since its introduction to the marine industry in 2000, PetroLimator systems have been installed on a number of different ships with reportedly excellent results. Major customers include UECC, BC Ferries, and Interlake Steamships, with which Ensolve is currently in negotiations with, regarding fleet-wide installations. The company has also received SBIR funding from the US Navy to develop the PetroLimator technology as a potential replacement for mechanical oily water separator systems on USN ships. Several large cruise ship operators have also expressed an interest in this system.

The fully automated non-pressurised three-stage unit is designed to work 24 hours a day, seven days a week but can accommodate other schedules or instances when the bilge water has been entirely processed. There are three basic PetroLimator models: PL630, PL300, and PL100, to meet the different requirements for capacity and size constraints. The three stages are as follows:

- Stage 1 - heavy phase separation. In the first stage, contaminated bilge water is pumped directly into the PetroLimator. The oil is separated from the water, and sludge and suspended solids collect at the bottom of a tank. An oil probe allows pure oil to pass through a solenoid-operated valve into a waste oil tank. The remaining oily mixture is then continuously pumped into Stage 2.
- Stage 2 - emulsified oil degradation. The second stage contains safe, non-pathogenic micro-organisms that convert oil, grease, transmission fluid, petrol, fuel, and other hydrocarbons into harmless end products. The oily water passes through a support



Ensolve's PetroLimator bilge water system disposes of waste in an environmentally-friendly way.

medium to which the bacteria are attached. The bacteria secrete a biological polysaccharide that tightly binds them to the support medium. This minimises bacterial washout as the water flows through the system. Oil and related contaminants are degraded in this biological layer, as the bacteria actually 'consume' the hydrocarbons. The naturally-occurring bacteria used in the system are said to be safe and non-pathogenic. Detergents and other emulsifiers actually help this process by breaking up the oil into 'bite-sized' pieces for the bacteria.

- Stage 3 - clarifier. In the final stage, any remaining solid particles are removed prior to pumping the clean effluent overboard. Unlike most conventional separator/monitor systems, the PetroLimator's oil content monitor continuously checks the effluent prior to

discharge. This added safety feature minimises accidental spills due to sampling time delay of monitoring systems.

This system is also said to cost around half to one third of the price of more traditional bilge water systems, according to Ensolve. It is also cheaper to maintain and operate. The company believes operators will see financial payback from the system within a year if they are currently using an offloading system. Very little training is required to operate the unit, as it has so few moving parts. The unit also only needs to be examined for maintenance about once a year, and does not require cleaning.

If, in the rare event, something does go wrong with the system, there is a failsafe oil monitor, so if the amount of oil exceeds a limit, the unit redirects the bilge and stops discharging the waste. 

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Piping systems for RCCL's Ultra Voyagers

THE contract for hot and cold water distribution, water treatment, and other piping systems on the first Ultra Voyager cruise ship has been awarded to George Fischer, by Royal Caribbean Cruises. Utilising Instaflex to provide hot and cold services to 2600 cabins on the vessel, Fischer will also supply ABS and PVC-C piping systems for water treatment and drinking water, as well as for the swimming pools, the wellness centre, and entertainment areas.

Instaflex has a smooth inner bore and a 10-year guarantee, and is claimed not to corrode or

support encrustation. As the pipes are lightweight and flexible, they are resistant to stress cracking. In addition, they are said to be easy and quick to install since they often eliminate the need for fittings when changes in direction are necessary.

The ABS plastic piping system is ideal for fresh and sea water cooling, air conditioning, drinking water indirect refrigeration, and brine systems. A halogen-free, solvent-cemented plastic piping system, ABS is also claimed to have good low-temperature resistance. 

CruiseMail ensures private and quick mail

A NEW service called CruiseMail was recently introduced by TeamTalk Satellite. This service enables passengers to send mail with a photograph ashore, via hybrid mail. This blend of a handwritten letter, transmission via satellite, and 'last mile' delivery by a local postman should hopefully ensure that passengers can send mail which is received before the end of a cruise.

Passengers hand-write a message on a pre-printed form and select a full-colour photograph from a selection. The CruiseMail is then scanned at the collection point onboard the ship, and sent to the land-based server via satellite. Messages are then distributed immediately to regional post offices and based on the city or country address, are printed (they are already securely sealed) for delivery by local mail. 

Successful running of cruise-ship gas turbines

THE fleet of 25 aero-derivative marine gas turbines from GE have accumulated more than 320,000 hours of operation on 16 cruise ships. GE claims that there has not been a single port arrival or departure missed due to GE engine problems on any of the vessels currently in service.

The turbines are configured in two different arrangements: the LM2500+ models are the basis for a combined gas and steam turbine integrated electric drive system (COGES) used aboard four Celebrity Cruises and four Royal Caribbean ships, and six LM2500+ and LM2500 gas turbines are used in combined diesel and gas turbine (CODAG) arrangements on four Princess, one Cunard, and three Holland America Line ships. In 2006, an additional LM2500 gas turbine will begin service in a CODAG arrangement on Holland America Line's *Noordam*.

So far, Royal Caribbean and Celebrity's fleets have accumulated 25,000 hours of operation without maintenance. The average time between maintenance activities, including hot-section refurbishment, has exceeded initial estimates. As a result, operators are said to have seen reduced maintenance costs and increased flexibility in maintenance planning; however, normal inspections and monitoring and maintenance have been able to be planned. For example, gas generator exchanges have been scheduled during port stays, with the plant ready to return to service in less than 12 hours. 

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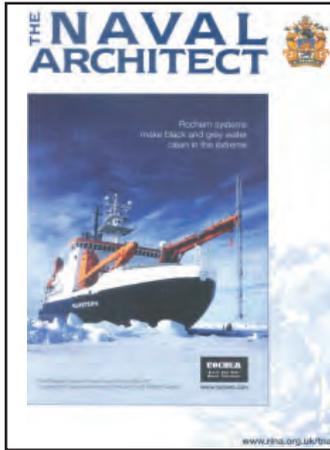


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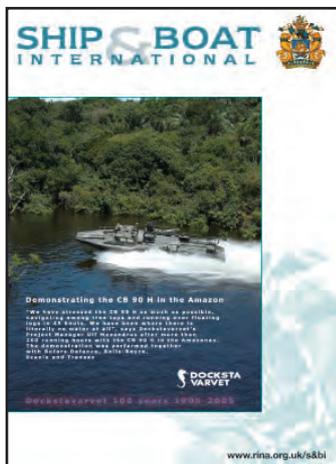


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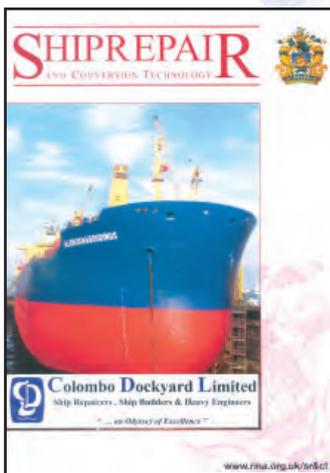


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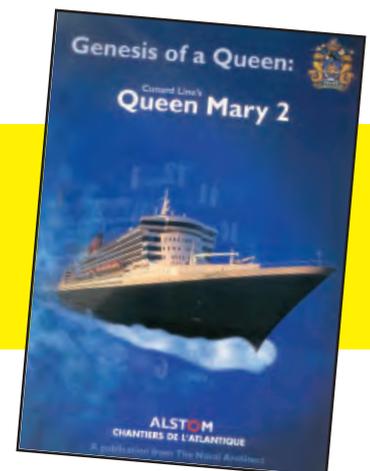
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New product ranges from flooring specialist

THE flooring specialist company based in The Netherlands, Bolidt, has recently launched several new products for ships, as well as branching out into a new range of furniture, made of the same material as the company's flooring.

Future Teak is a flooring material that looks exactly like teak, but is in fact totally synthetic. Like all of Bolidt's surfaces, it is a liquid that is poured over the deck area to harden. Unlike glued vinyl decking, there should be no problems with air bubbles under the surface. A special machine then applies a grooved effect onto the 'teak' to make it look like authentic wooden planking.

This surface is slip- and wear-resistant, and non-absorbent. It is also lightweight, with a minimum thickness of 8mm-10mm. Joints can be any colour, and the grooves can be any degree of depth or shallowness; this choice will affect water flow in the rain, for example.

The first cruise ship on which Future Teak has been installed is *Spirit of Oceanus*, operated by Seattle Cruise Co. The surface will be finished at the end of this month. This contract was a retrofit, in which Bolidt removed the old real teak, and replaced it with its new version. The 'teak' has also been installed on the balconies of *Enchantment of the Seas* and in a test area on *Norwegian Jewel*.



Bolidt has introduced a new range of decorative table tops, as well some innovative furniture.



This temperature-changing surface can be used in the heat or the cold, and comes in a number of colour combinations.

Other contracts are currently being bid for, and Bolidt reports that this has been a popular surface with architects as it is environment-friendly. Bolidt believes that this flooring will be one of its best-wearing overall. It should not crack, and thus cannot cause any structural steel corrosion.

Another new development is a temperature-changing surface, which changes colour when it is hot or cold. Any colour can change into any other colour.

This surface (which can be used on floors or on tables, for example) is ideal for use in children's play areas, or around swimming pools.

Other new products include a foray into the furniture business. Using the same material as in its flooring, Bolidt has created a range of furniture. This includes wall claddings, table and bar tops, lamps, ceiling decorations, and many others. These can be created in block or multi-colours, and glitters. 

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First cruise order for MaK engines

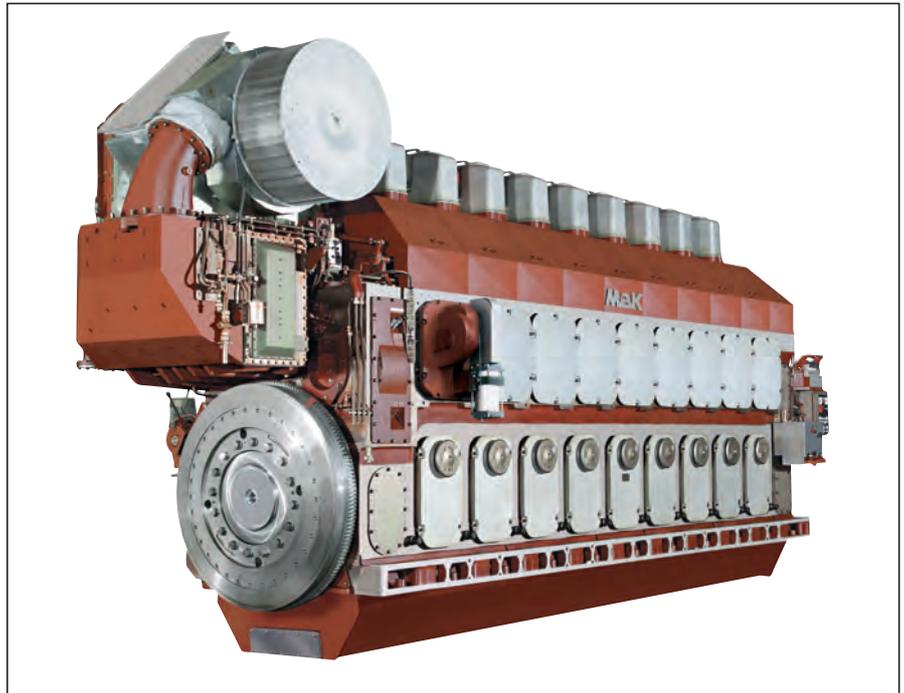
THE next generation of AIDA Cruises' vessels are to be equipped with Caterpillar Marine Power Systems' upgraded MaK M43C medium-speed engines in a diesel-electric arrangement. These ships are on order at Meyer Werft, in Papenburg, Germany, and are scheduled for delivery in 2007 and 2009. AIDA Cruises and Meyer Werft had very specific demands for their propulsion systems, including limits on engine noise, improved reliability, and strict guidelines on emissions reduction.

The two 68,500gt ships will have an overall length of more than 249m and a beam of 32.2m. These AIDA 'club ships' represent the third generation of such designs and will be operated according to the AIDA 'club' concept, which is mainly aimed at more youthful passengers. AIDA has termed these ships the Sphinx class, since the project was first announced in Egypt in September last year.

Each vessel will have a passenger capacity of 2030 (up to 2500) accommodated in 1015 cabins. Around 18 cabins measure between 25m² and 35m², there are 439 balcony cabins, 209 window cabins, and 349 inner cabins. There will be 150 cabins with four berths, and all balcony and window cabins are to be equipped with sofa beds. In fact, 66% of cabins are external.

Each of the two new ships will be equipped with four identical MaK nine-cylinder M43C engines with a total power of 36MW, driving alternators to provide current to twin electric propulsion motors, as well as to twin bow thrusters, and two stern thrusters. In addition, the installation will supply current for all other high-consumption units onboard, including air conditioning, hotel/restaurant operation, and an advanced health spa.

M43C engines satisfy IMO guidelines, and NO_x emission is well below regulatory requirements. The engines are equipped with flexible camshaft technology, part of Caterpillar's innovative emissions reduction ACERT technology (discussed in *The Naval Architect* May 2002, page 6). In this application, flexible camshaft technology will reduce soot particle emissions to below the visible limit, thereby satisfying the industry's highest



For the first time in the MaK M43C engine's history, models will be installed on cruise tonnage. Four nine-cylinder engines (4 x 9000kW) have been specified for each of two new AIDA club cruise ships ordered from Meyer Werft.

environmental requirements. In addition, the engines are equipped with safety features such as a slow-turning device, a system which enables engineers to check for the presence of water or fuel in the cylinders before start-up. It can be similarly activated at fixed time intervals when an engine is on standby.

The design is also equipped with a splash-oil temperature monitoring alarm system designed to prevent bearing seizures. Spray oil from the connecting rod bearings is collected by means of capture pockets on the crankcase covers, and sensors record the temperatures. If an average temperature is exceeded, an alarm is initiated and the engine stopped automatically.

In addition, the units are equipped with oil-mist detectors and locators with individual displays, also the DICARE engine monitoring

programme, which allows users to monitor all engine components. The complete system operates online so that current data can be called up at any time.

The monitoring of exhaust gas averages and the monitoring functions are all integrated in an alarm installed on the engines. Data is transmitted via a Profibus to the higher level automation equipment.

More than 300 M43 series engines have been sold since 1999, and by 2003, more than 40% of all vessels delivered worldwide with medium-speed propulsion systems in the 5MW-9MW class were equipped with M43 engines. While the M43C series has been successful in the ro-ro, ro-pax and freight sectors, the new AIDA contract represents the first time that the M43C model will power a cruise ship. 

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New class for passenger comfort

THE passenger vessel industry is growing in both numbers and capacity of vessels. Future traffic expansion requires a detailed look not only at environmental concerns but also at passenger safety risks. This is due not only to increased numbers of passengers onboard large ferries and cruise liners but to congestion on waterways, owing to larger numbers of ships utilising them. A service from classification society Germanischer Lloyd can provide both owners and yards with a solution to design, building, and operation challenges for such vessels.

Special focus is centred on novel layout arrangements, reduction of noise and vibration, lightweight and fatigue-resistant structures, and passenger safety. Currently, Germanischer Lloyd services 233 passenger ships. Recent contracts include the two new Sphinx-class cruise liners for more than 2000 passengers, ordered by AIDA cruises at the Meyer shipyard in Germany (see also our separate article in this feature).

Noise and vibration

Noise and vibration, even when not actively noticed by passengers, can be a serious inconvenience to comfort. However, vibration limits need to be defined not only for the effect on passengers, but also for structural vibrations and the vibration generated by engines and associated equipment.

GL's Harmony Class focuses on both noise and vibration. Comfort is scaled according to

harmony criteria numbers, HCN 1 to 5, where 1 represents an extraordinary comfort (the most ambitious level). The rules do not only comprise limits and assessment procedures for normal seagoing service conditions, but account for thruster operation and harbour mode as well. Moreover, 'acoustic privacy' is introduced as an additional noise criterion, reflecting both sound insulation and impact sound insulation of cabins to adjacent spaces.

GL's Harmony Class notation allows for a flexible application of noise and vibration limits depending on location and space use. An owner or operator can choose different comfort level ratings for different parts of a ship, and shipyards can minimise costs by restricting special anti-noise and anti-vibration measures to those places where they are really required.

Alternative design solutions for fire safety

A new approach to fire safety offers the industry potential advantages. It allows the primary focus on the overall layout of a ship also the interaction of passive and active fire safety measures in conjunction with management procedures. Formal steps for the alternative design process, as well as administration requirements required by SOLAS Regulation II-2/17, are outlined in the IMO guidelines, MSC/Circ 1002.

To provide client support with regard to a scientific methodology, Germanischer Lloyd has

developed the NESTOR concept. This service includes a qualitative design review (QDR), a modelling/data analysis (MDA), a quantitative risk analysis (QRA), and a report. A software application is used in conjunction with the following methods:

- physical fire simulation: multi-room fire code (MRFC) software determines time lines for temperature, smoke concentration, and further parameters for the section under consideration
- evacuation analysis: the simulation software AENEAS is used to determine the egress times necessary for different scenarios and variants. This tool, which was developed by TraffGo in cooperation with Germanischer Lloyd, works efficiently and presents clear results to offer yards and owners planning safety during the design phase, and operational safety from realistic simulations of evacuation procedures
- risk analysis: the fire event under investigation is modelled in all its complexity with the help of an event-tree analysis (ETA). Starting with an underlying initial fire, this event tree defines a variety of sub-scenarios incorporating the functions of all available active and passive fire safety measures and of fire safety management. 

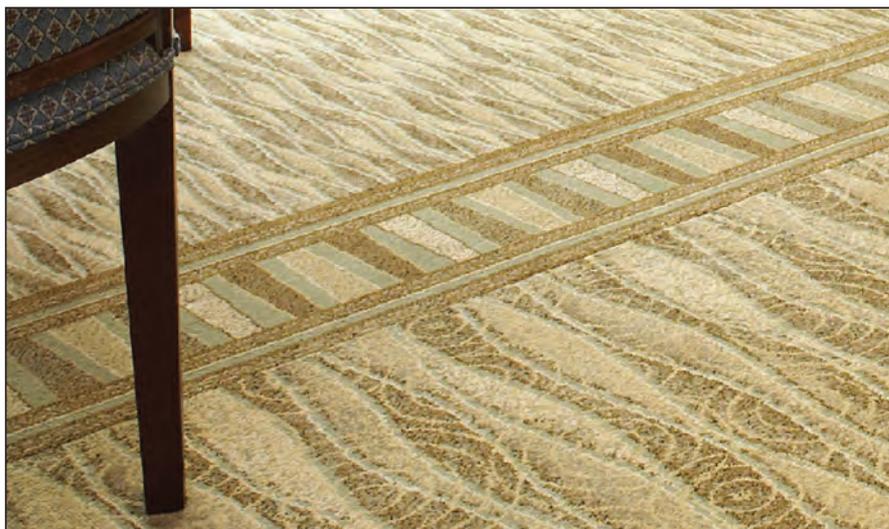
New carpet collection launched

ONE of the largest producers of woven Axminster carpet, Brintons, has introduced Escape, a new series of designs available from stock. This collection is made up of seven trios of coordinating patterns which feature organic and geometric styles in an array of colour palettes. Escape nine-row Axminster woven construction is made of 80% wool and 20% nylon.

The program is designed to provide ready-made accessibility and sophisticated styling with the finest quality woven construction. The simplicity of the Escape family is especially useful to designers involved in refurbishments as well as other shipboard interior projects.

Each colour-coordinated grouping in Escape consists of a medium and a large scale with a matching border. For example, 'Waves' is a flowing organic design of undulating streams, while the larger-scale companion, 'Echo', broadens the fluid lines and is etched with concentric circles. 'Sonic', the coordinating border, adds stylised bars and detailed scrolling, all in the same colour theme. Two of the pattern trios are offered in two colourways each. The five remaining clusters are offered in one colourway each.

Having providing carpet for more than 500 marine projects, all of Brintons' products specified for shipboard application meet the stringent marine fire and safety requirements of IMO, US Coast Guard, SOLAS, the UK



A new series of Brintons carpet designs, Escape, is made up of seven trios of coordinating patterns.

MCA, and the Marine Equipment Directorate; all marine products are supplied with Wheelmark certification. Recent deliveries include 58,527m² of Axminster on *Queen Mary 2*.

In other news, another design has been added to Brinton's Studio Influence design portfolio series. 'Rivulet' has been created by Amavaz Mundagar, Brintons' field designer in Chicago. More than 12 coordinated designs in 'Rivulet'

are featured in a colour palette of 11 hues, ranging from soft grey to rich gold, greens, and earth tones.

The grouping of related patterns includes coordinated large, medium- and small-scale designs for various room sizes using outfills, borders, medallions and rug effects. The designs are available on CD and packaged in a four-colour brochure which visually depicts major elements of the collection. 

The Royal Institution of Naval Architects

WARSHIP 2005 NAVAL SUBMARINES 8

22 - 23 June 2005

Second Notice



The changing face of naval warfare means that the role of the submarine has altered in recent years. Their use is increasingly moving away from the open ocean into shallower waters and the littoral.

Most navies are currently facing a reduction in resources, which will also affect the design of future submarines and size of complement. Lower complements are becoming more attractive with advances such as total integration of combat systems, machinery controls and data presentation. However, lower complements mean improved support infrastructures are required. Much can be done in making the submarine more 'support friendly' with more efficient supply chains both in production and for support.



The issue of safety aboard submarines is becoming increasingly important. Effective evacuation and fire fighting are complicated by the enclosed atmosphere and deep operation. A further issue is the resolution of minor incidents, such as onboard fires, while still retaining covert operations.

This will be the twenty-fifth in the Institution's successful WARSHIP symposia. The symposium will cover developments since 'Naval Submarines 7' in 2002. The Institution invites papers on the following subjects:

- **Propulsion:** nuclear power, air independent propulsion (AIP), hotel & combat system energy requirements, fuel processing, hull resistance, propulsors.
- **Design & Construction:** developments in design and analysis methods, advanced materials, more efficient structural configurations, ease of construction, inspection techniques, quality assurance.
- **Combat Systems:** sensor and data integration and presentation, non penetrating masts and periscopes; command, control and communication systems, weapon stowage and launch solutions, shore bombardment weapons.
- **Signature control:** passive & active anti-ASW.
- **Life Support:** atmosphere control and monitoring, acceptable concentrations of contaminants, food, water, accommodation standards.
- **Upkeep & Support:** equipment re-supply, refit support, maintenance, through life support, access to the submarine, disposal.
- **Emergency Situations:** escape & rescue, fire fighting, policy, equipment, life support.
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Waste-water system specially adapted for installation

A RETROFIT of the MariSan advanced waste-water treatment plant, from the US company MEP, has recently been installed on a vessel belonging to a major US entertainment company, with an option for a second vessel. Work began last autumn and is set to be completed at the end of this month. The MariSan system was specifically adapted for this particular project; it was larger than usual, weighing in at 12 tonnes. It is very unusual to make changes to a system such as this, according to MEP.

This waste-water treatment plant incorporates a systems approach to ensure total treatment in all applications. Stream conditioning begins with IONZ disinfection of wastewater in the supply tanks. This process causes mixing, a breakdown of oily emulsions, and any electrical/magnetic influence of the contaminants. The pH level is then automatically adjusted before the stream flows to the electro-coagulation system. This sophisticated unit has recently been added to the MariSan plant.

The primary coagulant created by the electro-coagulator, together with a flocculent, are injected into the waste. Liquids and solids are then separated in a compact proprietary Solvac advanced dissolved air flotation system (SADAF), which has been engineered to maximise efficiency of the IONZ micro-bubbles that are injected into SADAF. Internally, different pressure causes the bubbles to expand and rise to the surface; solid particles also float to the surface where they are removed by vacuum and sent to a sludge tank. This flotation arrangement has been designed with no moving parts which should ensure that it is easy to maintain. MEP has also made the new system simpler for chemical management.

As effluent from the SADAF passes into the initial group of contact tanks, a Bro-Gen disinfectant generator uses electrolysis to generate safe levels of disinfectants to begin the sanitisation process. This begins with the removal of bacteria and viruses.

The waste stream then flows through a shear-mix manifold and into the secondary group of contact tanks where IONZ, using air as the raw material and ozone, provides a mixed oxidant that enables further disinfection. This also stabilises the effluent for discharge. The effluent passes through an ultra-violet ray for final disinfection.

As a final safety net of the process, a three-way valve has been added. If the effluent does not meet predetermined values, the valve returns the water for reprocessing, or routes it to safety filters before discharge, or re-use. MEP is waiting to see the results of the retrofit of this new waste configured system, and will then decide if more amendments are needed.

The automation system has also been changed for this new layout. The MariSan plant has a programmable logic-control (PLC) and monitor system, which interfaces with separate controllers operating sub-systems, and can be interfaced with a ship's communication network.

The PLC includes a built-in touch screen interface to provide at-a-glance system



One step of the MariSan system is ionisation, which is taken care of by this IONZ generator.

Operation of this MariSan so-called A-WWTP plant is fully automated, requiring only initial start commands from an operator. A display panel, located in a remote control facility, is available as an option for monitoring and alarm functions only. A central operator interface control panel provides status indication and manual overrides of the automatic operation for the entire system, and of the various sub-systems.

Hands-off auto-control covers run-type selection, PLC-enabling, automatic coarse screen, influent pumps, liquid/solid separator, recirculation pumps, feed pumps, vacuum system, and effluent pumps. The control panel includes visual indication of the run/stop status, thermal relay pump status, high/low level alarms, 'lack of flow' alarms, flow indication, and other features. Components monitored include the automatic course screen, pumps, IONZ generator system, supply tank system, and other components.

In other news, a totally new desalination unit has been invented by MEP, and the company is waiting for its patent. This is expected to be received in about four weeks time. It is hoped that the unit will be in commercial use by the end of this year. MEP is currently working on a number of proposals for newbuilding installations, as well as retrofits, from operators all over the world. 

parameters, including trend graphics and peak history. The PLC has fail-safe capabilities that compensate, shut down, and alarm to prevent non-compliance conditions, and assure system performance. The disinfection stage is monitored and adjusted by the PLC to assure proper sanitisation of the effluent stream, and correct regulation compliance. Interfaced with the PLC, a display monitor provides continuous monitoring of influent and effluent parameters including pH, salinity, flow rates, and flow volumes.

Firefighting systems installed on Ultra Voyager

FREEDOM of the Seas, the first of the two Ultra Voyager-class cruise ships building at Aker Finnyards' Turku site, will be fitted with approximately 13,000 Hi-Fog sprinklers in the accommodation, public, and service areas, as well as 400 spray heads in the machinery spaces, all from Marioff. This high-pressure water-mist fire extinguishing system should be able to put out practically any fire, so that the primary total flooding system, a CO₂ system, may never have to be used.

The effectiveness of this concept was illustrated in June 2002 when a fire began in

one of the machinery spaces on *Explorer of the Seas*, a slightly smaller vessel than *Freedom of the Seas*. In less than one minute, Hi-Fog extinguished the fire. The damage amounted to only US\$500 - for the replacement of a sensor.

Marioff has also equipped *Birka Paradise*, delivered at the end of last year from Aker Finnyards' Rauma site, with Hi-Fog technology. Around 2900 sprinklers are installed in accommodation, public, and service areas, along with 150 spray heads in machinery spaces. The pump unit used is an electrically-driven SPU 5+1 type. 

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Benefits

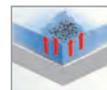
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- Reduces risk of slips • Easy to clean with standard equipment
- Does not ruck, shrink, fray or curl • 10 year wear guarantee
- Reduces ambient noise • Easy to maintain and repair
- Certified anti-microbial and anti-fungal
- The warmth of carpet, cleanability of vinyl

Construction

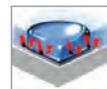
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Quest for fossil-free commercial ship propulsion

Following on from his January 2005 letter, Andrew Spyrou expands on his beliefs that nuclear fusion could be the way forward for emission-free fuels for merchant ships.

FOR several years, the shipping industry has been seeking to substitute fossil fuels as propulsion energy for commercial ships - energy that is economical, easy to handle, non-polluting, and free of cartel dangers. It was the British physicist Sir Oliver Joseph Lodge (1851-1940), who wrote in 1920, 'The time will come when atomic energy will take the place of coal as a source of power. I hope the human race will not discover how to use the energy until it has brains to use it properly'.

Detonating the first atomic bomb on August 6 1945 gave an awesome and terrifying demonstration of one practical application of this source of energy. This was a time of military priority and there were valid reasons for this pre-occupation. For a long time after the Second World War, nuclear technology was confused by its heritage, unclear whether to be proud that it rapidly responded to the political/society requirement to create the ultimate deterrent, or ashamed that it had let the genie out of the bottle.

Discovery of the fission process - splitting of atoms - was found to release energy locked in the structure of uranium atoms. This was the basis for all methods to tap atomic energy, including development of the atomic bomb. It was in December 1942 that it was demonstrated in the USA, how to fit the 'key' into the 'lock' to produce a chain reaction of fissioning uranium to produce enormous quantities of energy.

One of many challenges facing the nuclear industry is achieving wide public and political acceptance, continuing to improve safety, and demonstrating the safe management of spent fuel and nuclear toxic waste. In spite of these concerns, the European Commission has endorsed the view that there is need to keep the nuclear option open, simply because it is the only major source of electricity production that does not result in any significant quantity of greenhouse gases to impact on weather and climate patterns. Also, it is one of the EU's most secure energy sources.

The safety record of 50 years' reactor operation and development has been generally impressive (despite one or two serious accidents, eg, Chernobyl, and the loss at sea of a few nuclear submarines, not necessarily due to nuclear-plant problems - Ed). Safety in the nuclear industry is an integral part of continuous progress. We must accept the fact that modern society cannot exist without the production and utilisation of energy and that there will necessarily be some hazards.

For the present, these hazards appear to be acceptable when balanced against the quite different hazards that a nuclear energy ban would bring. Such considerations have created a climate in Europe and USA for rebirth of the civil nuclear industry. Admiral Hyman G Rickover (considered the father of the US

nuclear navy) has, however, noted that there are certain principles that must be adopted and adhered to. These are:

- rising standards of adequacy
- technical self-sufficiency
- facing of facts
- respect for even small amounts of radiation
- development of a capacity to learn by experience.

In Europe, where a large portion of the required electricity is generated by civil nuclear power, strong feelings exist against the use of nuclear reactors. These are the result of misconceptions. In some cases, there is also the misconception that solar, wind and even ocean-wave and ocean current power should be the way to the future. It is recognized that such renewable resources have a growing part to play in the energy mix but none offer reasonable prospects of providing significant base-load power.

The civil nuclear power generation industry has avoided direct confrontation (which might arouse public wrath) by keeping a low profile. While fewer mistakes are made, and while no nuclear plant is or ever will be totally fail-safe, today's technology enables an operator to move quickly and to minimise human error - the cause of most past accidents.

The European pressurised-water reactor (ERP), with a service life of 60 years, is now technically ready to be built and is based on the most recent technologies benefiting from over 30 years of operating feed back from nuclear power plants. It is an evolutionary product not a revolutionary one, based on proven technologies.

The ERP is based on pressurised-water technology, which is currently the most widely used concept, with 209 reactors in operation out of 440 worldwide, representing various other types of technology. It should be noted that risk assessment was pioneered by the nuclear industry and has been adopted by other industries worldwide.

Transporting and storing nuclear toxic waste still poses problems for the nuclear industry, and surveys in Europe and North America indicate that nuclear waste management is the primary popular concern with nuclear power. Arguments presented to the public, however, are often couched in scientific terms by cleverly packaging their ideology in such terms, that they confront the public with different conclusions.

Ultimately it is an issue of trust. How far can the public trust science to provide reliable, objective, and unbiased knowledge? What must also be realized is that society needs the energy, not the nuclear community. Regardless of the 'Faustian pact', fears about nuclear energy continue to be regarded as a near-indispensable input of a future hydrogen economy.

Shipping industry and nuclear energy

Readers should examine the shipping industry's efforts to develop and use fuel-cell technology

and electro-magnetic propulsion. Both concepts require electrical energy, and the challenge is to produce that energy without fossil fuels, inexpensively. The answer is nuclear technology plus hydrogen. Hydrogen, although a primary energy by itself, in the context of a hydrogen economy is not a primary energy source like petroleum, natural gas or coal that exist freely in nature. It is a secondary source that has to be manufactured from water or hydrocarbons such as petroleum or natural gas.

Hydrogen is the least complex, least massive, and most abundant element in the universe. Free hydrogen however, is relatively rare on earth. It exists as water, with carbon, oxygen, and trace elements as organic compounds. It is the source of all elements through the process of nuclear fusion in the sun and the stars.

Nuclear fusion - safe, efficient and peaceful

The incentive to develop and implement civil nuclear energy for electricity generation is economic, a need to conserve non-replaceable hydrocarbon resources and environmental benefits. For decades, scientists have been aiming to create a limitless supply of energy with machines that mimic the nuclear fusion process. The problem facing the nuclear industry today is to confine this inferno and attain the necessary temperatures and pressures on an industrial scale, and producing an almost limitless source of energy to generate electrical power using the abundance of hydrogen as fuel.

Once nuclear fusion becomes a commercial reality, today's urgent unresolved question of how to manage toxic nuclear waste and safeguard against the abuse of weapons-grade plutonium - a by-product in current nuclear plants - would become largely academic. Nuclear energy is a potential heat source for thermo-chemical water splitting or as a electricity source for electrolysis, if that should prove economically superior for hydrogen making.

The aim is to convert electrical energy (produced by atomic reaction) to hydrogen at the energy source and make it available to commercial ships where it will be converted back to electricity on site for use by fuel-cells on board, or to use the hydrogen in combustion to provide mechanical power. This will be the job of officials involved in the International Thermo-Nuclear Experimental Reactor (ITER), who met in December 2003 in Washington, DC, USA, with a view to choosing a host for the project. Those involved are representatives from the USA, Japan, European Union, Russia, China, and South Korea. The race is on: a race to find a workable, socially and environmentally acceptable alternative to the use of hydrocarbons as fuel. Ⓢ

Readers are also referred to the articles 'Brighter horizon for sails and fuel cells', *The Naval Architect* March 2005, page 22, and 'Orcelle: a totally green concept for the future', *The Naval Architect* April 2005, page 14.



A profile of the 179.00m ro-ro passenger version, which is almost identical to the ro-pax ship.

New ferry proposals from Ruggiero

NAVAL architecture and marine engineering consultancy Ruggiero, based in Genoa, despite being a specialist in the smaller boat and yacht sector, has recently designed two ro-ro ferries, both with passenger capacity, for Rodriquez Cantieri Navale. These vessels have not yet been utilised by this Italian builder, but the designs are a good illustration of the range and scope of work of which Ruggiero is capable.

The ro-ro passenger ferry is 179.00m long, with a length between perpendiculars of 166.00m. Beam measures 26.70m, depth 8.80m, and draught is 6.70m. Displacement is 18,500tonnes, gross tonnage 30,000gt, net tonnage 12,400tonnes, and the vessel's deadweight 7500tonnes. Classification is to the standards of Registro Italiano Navale with the notations 100A 1.1 +, Tp, -I.A.Q.1, -1.1, IAP or to Bureau Veritas 1+ Pass Ship, AUT, UMS, OUTPORT.

A pair of Wärtsilä 12V46C main engines, with an output of 2 x 12,840kW at 500rev/min, is proposed, along with two Maag gearboxes, and Lips propellers with a diameter of 5000mm and a speed of 130rev/min. Speed at full load can reach 24knots at 90% MCR.

Two shaft generators each have an output of 1500kW, and two bow thrusters an output of 800kW each. In addition, two Rodriquez Marine System fins are specified for stabilisation.

Heavy fuel oil capacity onboard is 900tonnes (380Cst), marine diesel oil capacity is 70tonnes, and the general fuel consumption of the ferry is expected to be 173g/kWh.

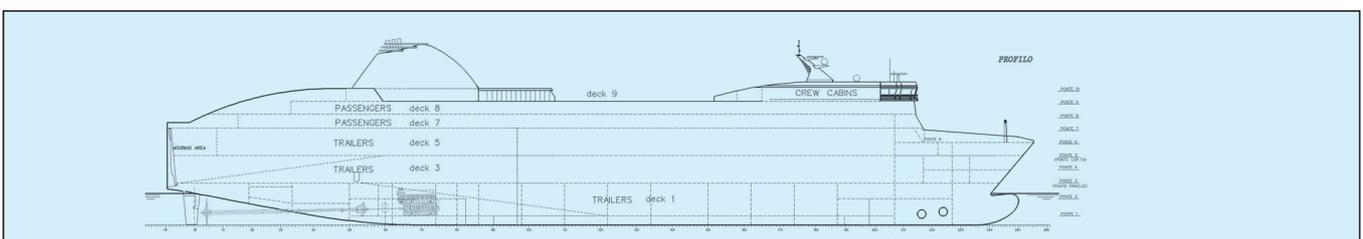
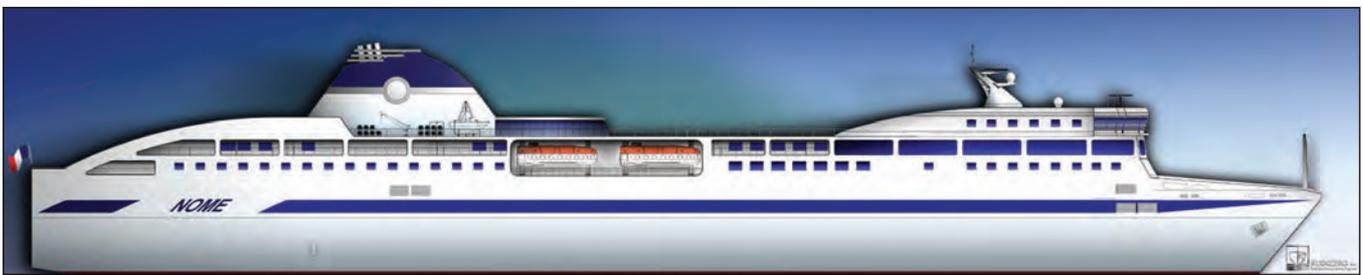
The vessel has a capacity for 1060 passengers in 100 four-berth cabins and 25 two-bed cabins, with accommodation for 80 crew members. There are three restaurants in total, two for passengers, and the other for lorry drivers. Other facilities include a shop and a cinema.

Approximately 2000lane metres, equalling 140 trailers, have been assigned. Two ramps are located near the stern door - one leads from the main deck to the upper deck, and the other from the main deck to the lower deck.

The ro-pax design is almost identical to the ro-ro passenger version, except for a few minor amendments. These include 0.10m less on the draught, a displacement of 17,500tonnes, a gross tonnage of 29,000gt, a net tonnage of 12,000tonnes, and a deadweight of 7000dw. The same model of Wärtsilä engines have an output of 2 x 12,600kW at 500rev/min. Speed at full load is still around 24knots at 90% MCR.

Naturally, the interior to this vessel also differs to the ro-ro passenger model in that there are only 50 four-bed cabins, with space for a crew of 50. There are also two restaurants, one for passengers, and one for truck drivers. 🚚

External and internal profiles of the as yet un-built 179.00m ro-pax ferry designed by Ruggiero.



The Royal Institution of Naval Architects

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First Notice & Call for Papers



Since they were developed in the 1950s, bulk carriers have provided a crucial service to world commodities' transportation. Some 5,000 bulk carriers trade around the world.



Following a spate of losses of bulk carriers in the early 1990s, IMO in November 1997 adopted new regulations in SOLAS containing specific safety requirements for bulk carriers. In December 2004, the Maritime Safety Committee adopted a new text for SOLAS chapter XII, incorporating revisions to some regulations and new requirements relating to double-side skin bulk carriers. The International Association of Classification Societies are also developing a set of unified requirements for the classification of bulk carriers. This conference will bring together designers, regulators, class societies and operators to discuss these, and other, aspects of bulk carrier design and operation.



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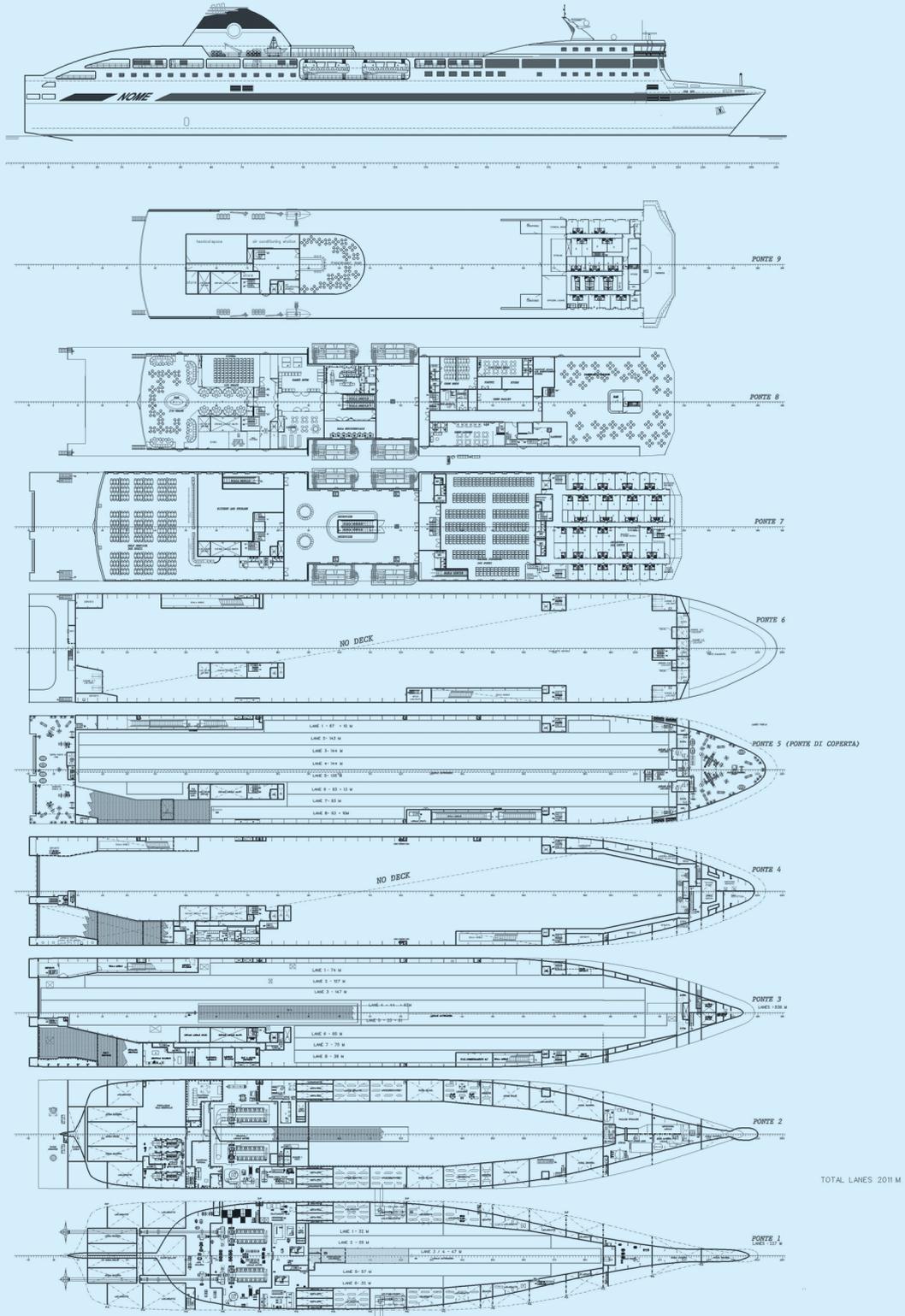
- Pros & Cons of Double Skin Tankers
- Designing to meet New Regulations
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General arrangement plans of the 170.00m ro-pax ferry designed for Rodriquez.





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New MSC cruise ship with typical Italian style

MARINE interior architectural and design company, Studio de Jorio, is currently working on the designs of two MSC cruise sisters, *MSC Musica* and *MSC Orchestra*, building at French shipyard Chantiers de l'Atlantique, and which are set for delivery in spring 2006 and 2007 respectively. De Jorio has previously worked with MSC, designing both *MSC Lirica* and *MSC Opera* (*The Naval Architect* May 2003, page 17). Outfitting of the first ship will begin next month (June).

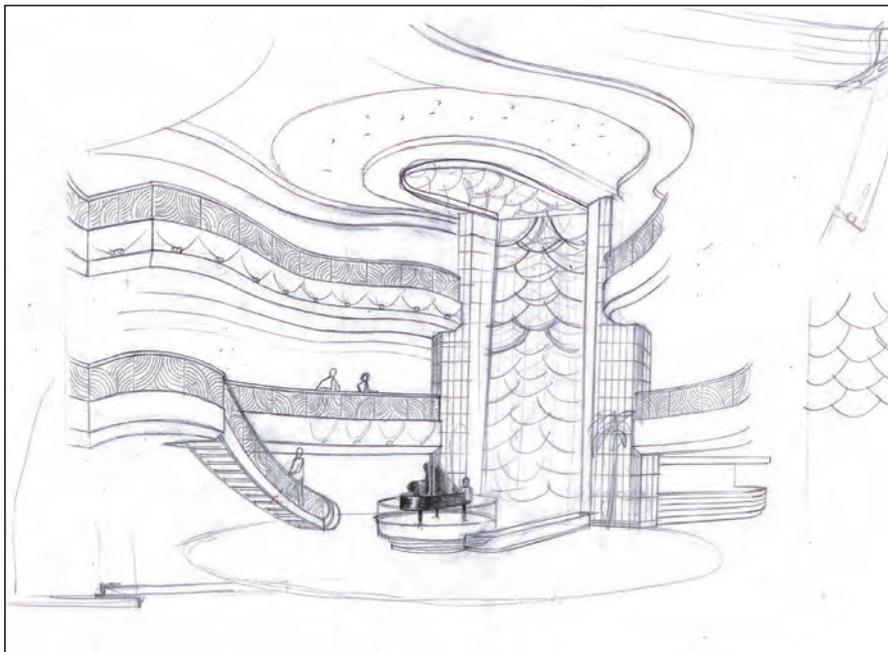
MSC Musica is of Panamax size, with 1300 cabins, and 22,000m² of public space. An impressive 85% of these cabins are external, and 65% have a balcony. The whole ship has been themed with designs from the last century, ranging from Art Deco to high tech, and De Jorio was involved with all aspects of the design, even including the funnel.

The concept of this ship was, in fact, to have the features of a post-Panamax vessel, on a Panamax-sized hull - a most useful feature already employed by other builders such as Kvaerner Masa-Yards. There are numerous entertainment areas featured on *MSC Musica*, a concept on which the owner is greatly focussed.

A three-deck foyer gives a large sense of space, and instead of lifts in this area, as is common in such vessels, there is a waterfall contained inside glass shells, which is backlit. The main theatre/auditorium onboard is also three decks high, and contains 1200 seats. In addition to this, there is a show lounge which is 1000m² in size, positioned at the extreme stern. This can be used as a theatre as it has a large back stage, or as a concert or conference room. It is structured on different heights and decorated with backlit sandblasted glass, a large glass-topped bar, and warm materials.

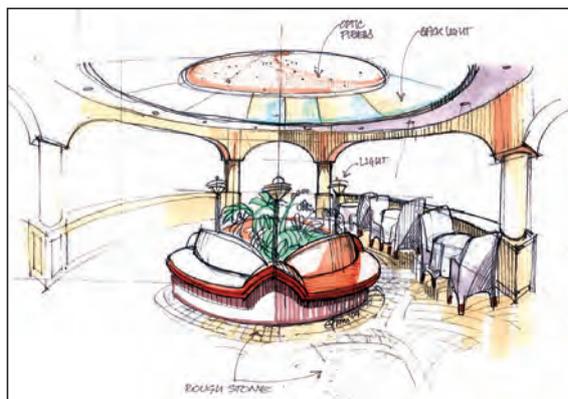
There are four restaurant areas onboard, the main one being located aft, and there is a sushi bar on deck 7 with a Zen garden - a first for MSC. A garden restaurant is subdivided by arches and columns, and is inspired by Hadrian's Villa; it also features frescoed ceilings. Sixteen bars include a wine tasting bar, a piano bar, and a whisky room.

Deck six features a shopping area with six boutiques, which are separated by marble

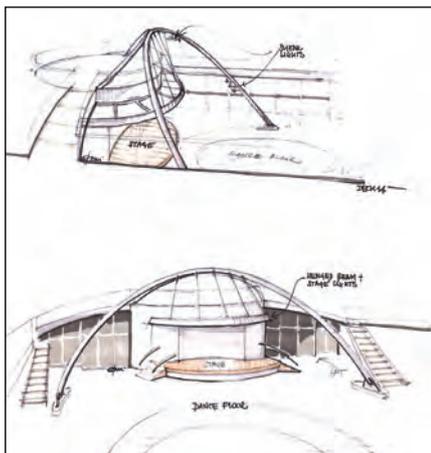


Sketches by Studio de Jorio for the atrium of *MSC Musica*, which contains a three-deck-high waterfall encased in glass.

The main restaurant, located aft, has been designed in an Art Deco style by Studio de Jorio.



This unusual and innovative pool area includes a stage, and a large LCD screen.



columns and wood. The ship's casino, located on deck 7, is 800m² in size, and has a bar 13m long, which is decorated with columns, lights, and walls inlaid with illuminated sandblasted glass panes. In addition, a 1250m² music hall, connected to the casino by means of a double stairway, has been equipped for use by orchestras and cabaret and dance shows. This is also the location of the over-30s disco, which has a marble dance floor in the shape of a sea shell. This hall also has a 20m-long bar, and has been designed in 1930s style.

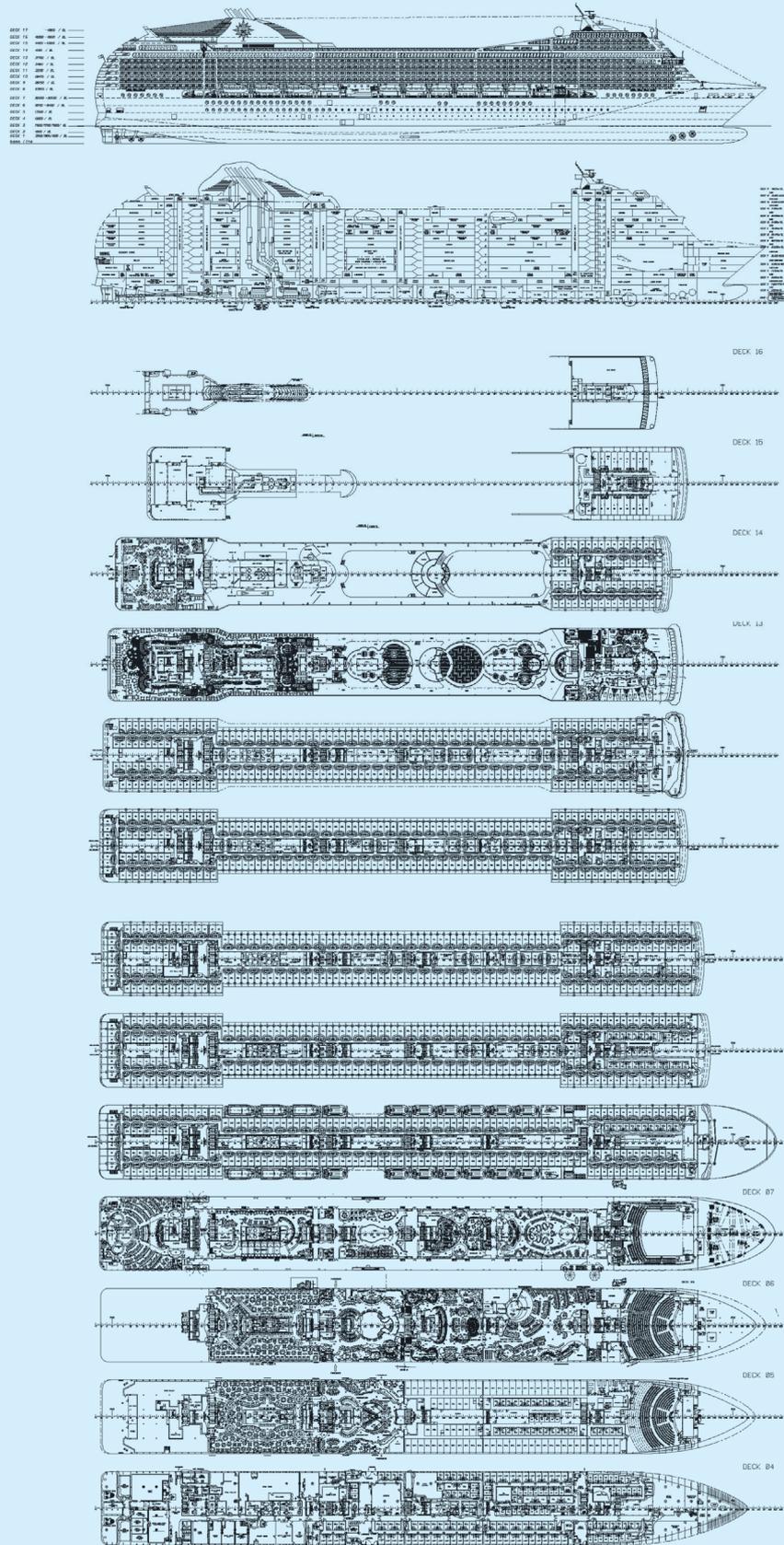
The pool area doubles up as an outdoor theatre. It has a wide stage that is covered by a large metal arch-like structure that spans the entire breadth of the ship, and a large video screen can be utilised, which is placed at the highest point of *MSC Musica's* forward superstructure, and is visible from all sides. This screen is approximately 6.6m by 3.5m and is naturally covered to protect it from the elements.

There are actually two swimming pools onboard, as well as a wading pool, and a children's pool. Also located in the same area is a children's entertainment area. MSC wanted to ensure that the top deck area was very open, and that passengers could see from one end to the other, so that shows and sport events could easily be arranged. Sporting activities onboard include a tennis and basketball court, as well as mini golf and golf training areas.

A panoramic disco at the stern, again on the top deck, has been designed with extremely high-tech features. It contains plasma screens all over the floors and ceilings, and large glass sliding doors open onto the outside of the ship, allowing an open-air disco.

Relaxing areas of the ship include a fitness area, located forward of deck 14. This 'wellness' part of *MSC Musica* includes a juice bar, a gym, and a spa, including a Turkish bath. This area is 1250m² in size.

General arrangement plans of the 1200-passenger *MSC Musica* which is set for delivery next spring.



Sindel simulators for shipboard and shore training

ESTABLISHED in 1982, Sindel designs, produces, and sells PC-based nautical and naval simulators, software, and hardware for maritime training. The company guarantees after-sales maintenance of its systems, through a direct modem connection that allow real-time trouble-shooting, and real-time software updates, when required.

The company has 300 simulators working worldwide, and has installed these systems in more than 20 countries. Sindel teaches the teachers to use the systems, and its simulators are additionally used in research centres, universities, and by a number of owners.

Systems that the company produces include a full-mission shiphandling simulator that can also be used for navigation and watchkeeping; a 3D image generation system; an instructor station; a conning console simulator; chart table and navigation aid simulator; a generic radar/ARPA simulator; a 'near replica' GMDSS console; a sonar simulator for ASW and mine-hunting training; electronic chart display and information system; a desktop bridge simulator; and a tug simulator.

Sindel has recently made deliveries to Furuno Electric, in Japan, for an integrated bridge simulator; to the Maritime Institute of Turku, Finland, for a GMDSS simulator; and to Benetti Shipyard, Italy, for a bridge simulator.



Pictured here is the navigation simulator that was supplied by Sindel for yacht masters, to the Benetti Shipyard, of Italy.

The full-mission simulator can be used for navigation and watchkeeping, as well as for shiphandling on conventional ships and high-speed craft. The package can be adapted to cover GMDSS; escorting tug; fishery and fish finding; VTMS; radar/ARPA; ECDIS; and navigation aids. Sindel is currently developing other interesting versions for cargo handling, machinery, oil spills, and crisis management.

The latest system, which is totally modular, and which has recently been supplied to the Korean Navy, is the ASWTT (anti-submarine warfare team training simulator). The Koreans needed a two-floor building to fit in the whole system, and this contract is worth an estimated €10.5 million.

ASWTT is a multi-platform high-scalable simulation package to train naval crews. It is composed by advanced simulation 'engines'

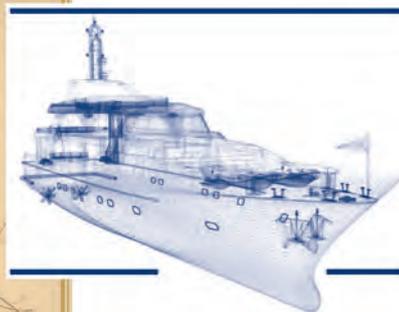
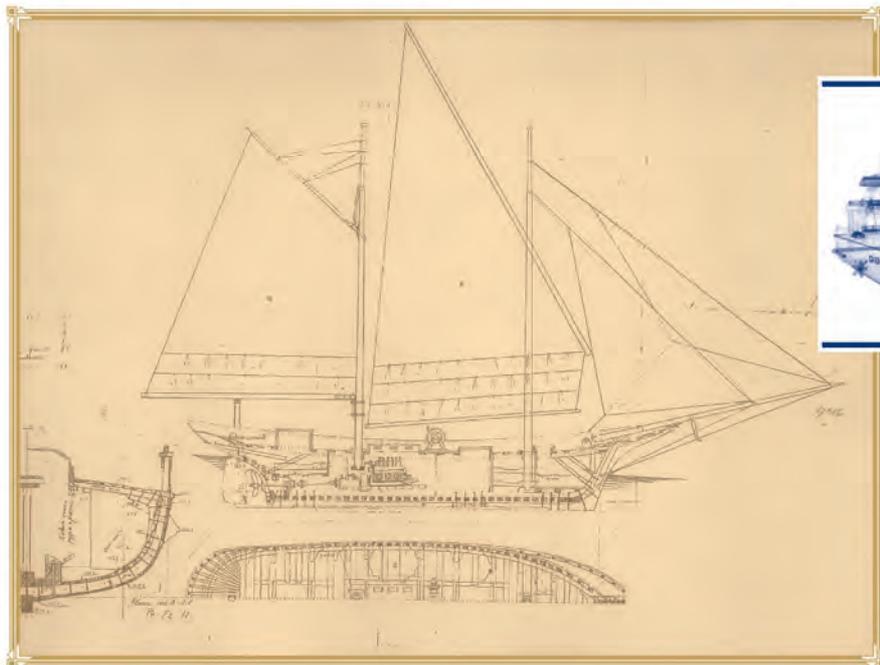
based on a modular database, and it can compute complex damage calculation algorithms. It can also train operators in sonar, radar, and other systems on surface ships, helicopters, and aircraft. The package is able to simulate a wide range of sensors and weapons systems, and can simulate all war scenarios.

The ASWTT structure is completely modular and any simulation sub-system can be easily integrated in a selected configuration. It is possible to customise platform equipment to train on a generic system or create both hardware or software replicas of real apparatus.

If a customer chooses, the military and tactical parts of this system can be removed. This would then be an ideal platform to teach search-and-rescue operations to pupils.

The ASWTT database is a relational database using a custom user-friendly interface. It allows the creation and modification of, hydrodynamic, sonar, detection, radar, logistic, weapon, damage, and ESM data, as well as countermeasures, and platform fittings. 

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Busy times for prolific builder

A GREAT deal of work is going on at Fincantieri's group of yards at present; in addition, the company recently reported a highly successful 2004, with profits hitting €99.5 million, compared with €82.8 million in 2003. Not only are order books full for a long time to come, but the group is seriously considering expanding outside its traditional domain.

There have been rumours circulating in the industry about possible acquisitions, but Fincantieri confirmed last month to *The Naval Architect* that interest is merely at a very preliminary stage; however, it is definitely looking for cooperations or agreements in other geographical and construction areas.

Expansion however, is also planned for closer to home. A 'technology park' is set to be established in Trieste. The aim of this is to improve the procedures of subcontractors through innovation and R&D. Fincantieri will invite companies to invent new ideas for the production process and for improvement of facilities and engineering - a general advance on current working practices, with a focus on detail.

New orders secured

Meanwhile, Fincantieri has won some significant new contracts. These include four new ships for the Grimaldi Group, with an option for another two. This order lies within the scope of a wider agreement of cooperation between the two companies, which foresees the possibility of new projects, plus the use of Fincantieri's shipyards for the maintenance and repair of all ships in Grimaldi's fleet. Overall value of the order, excluding options, is approximately €360 million.

Two cruise-ferries will be delivered in 2007 and two ro-pax ships in 2008. A further two ships as options, if taken up, will be delivered in 2009. The first vessel will be built at the Castellammare di Stabia (Naples) yard.

The cruise-ferries will have a length of 190m, a maximum deadweight of 7500dwt, a passenger capacity of 2000, with 400 cabins, 2600lane metres of space for vehicles, and a maximum speed of 28knots. The ro-pax designs will have a length of 180m, a maximum deadweight of 7500dwt, a passenger capacity of 1000, with 100 cabins, 2700lane metres, and a maximum speed of 25knots.

Other new orders include a contract from Costa Crociere SpA to build a new 112,000gt cruise liner. This will be built at the Fincantieri shipyard in Sestri Ponente (Genoa), for a total investment of €475 million. It will be a sister to *Costa Concordia*, also currently under construction in Sestri Ponente, and scheduled to become part of the Costa fleet by the end of spring in 2006. The new Concordia-class ship, which has yet to be named, is scheduled to be delivered in the spring of 2007.

In fact, in addition to *Costa Concordia* and her new sister, Fincantieri has already built Costa's current flagship, *Costa Fortuna*, and her sister *Costa Magica*, which entered service in November 2003 and in November 2004, respectively. *Costa Concordia* and her future sister will have a length of 290m, and a total



Arcadia, the new flagship of P&O Cruises, was delivered in March from Fincantieri's Marghera yard.



Noordam, the last in a series of four Vista-class ships, was recently floated out at the Marghera yard.

capacity of 3800 passengers (3000 in lower berths). More than 60% of the 1500 cabins will include a private balcony or window.

The two new ships will be built to operate in the Mediterranean year-round, so their characteristics will be designed for winter holidays. Such features include greater stability to ensure comfortable sailing in the Mediterranean, even in the winter, with an large 1900m² wellness area, extending over two decks, claimed to be one of the largest ever on any cruise ship, and the possibility of covering two of the four swimming pools so that they can be used throughout the year, regardless of weather conditions.

In February 2004, Fincantieri and Finlines, the Finnish shipping company, signed a contract to build three large ro-pax ferries. The total value of the contract is €300 million. Since then, the companies have agreed an option for two more sisters (the value of each vessel being €100 million). The first three will be employed by Finlines to link Helsinki and Travemünde (Germany), with the first being delivered at the end of 2005, the second and the third in mid-2006.

This innovative design project, which was created in Fincantieri's Merchant Ship Business Unit, will afford operational flexibility and high technical reliability, thus making it possible to fully exploit the loading volume of these ferries, which can carry up to 500 passengers and 300 trucks on 4200lane metres: record figures for this type of ship. They are believed to be the largest ro-pax designs ever built and the fastest in their size and class.

They will have a large gross of 42,000gt, with a loading capacity of 9300tonnes, a maximum length of 216m, and a breadth of 30.5m; height to the upper deck is 16m, while the draught is approximately 7m. A total of 225 deluxe cabins will be installed. The ferries will be powered by four Wärtsilä 9L46D engines, capable of providing a total power of 48,000kW and a service speed of 25knots.

New deliveries

In March, at Fincantieri's Marghera (Venice) yard, the cruise liner *Arcadia*, owned by Carnival Corp, was completed for group member P&O Cruises. This 82,500gt vessel has 16 decks, is

285.3m long, and 32m wide. She will be able to accommodate a maximum of 3400 people: 2556 passengers (1996 in lower berths) in 1478 cabins; approximately 86% of cabins will have a sea view and 69% a balcony. The crew will number 890.

This vessel is the new flagship of P&O Cruises and is believed to be the largest cruise ship ever conceived and built expressly for the British market. The ship has a theatre which extends over three decks, a large area devoted to health and fitness, a pub, and a number of restaurants.

Arcadia's diesel-electric power plant is based on four Wärtsilä Sulzer 16ZAV40S medium-speed engines and two 12ZAV40S models, each rated at 11,520kW and 8640kW at 514rev/min, respectively. Using ABB azimuthing pods, *Arcadia's* service speed is 22knots, but a top speed of 24knots can be achieved.

The vessel's automation plant, supplied by CAE Valmarine, features automatic/remote control of the electric generating plant and auxiliary equipment; it is interfaced with an ABB propulsion machinery control system and has a monitoring and alarm system for all tanks, air conditioning plant, and pumps.

Comfort features include a pair of Fincantieri active, retractable fin stabilisers, which should be able to reduce roll by 85%. *Arcadia* also features three bow thrusters with CP propellers incorporating 'bubble' noise reduction, each driven by a 1900kW motor; a joystick system can be used for controlling both pods and bow thrusters when manoeuvring.

Safety and rescue equipment includes 12 partially enclosed 150-passenger lifeboats, six enclosed 150-passenger combined cruise tender/lifeboats, and two 25knot rescue boats for six people.

Black water is collected through a vacuum system and treated by membrane bio-reactors. There is an extensive plant (including compactors and glass shredders) for dealing with solid waste, oil sludge, and food waste; the latter is also transported by vacuum and passed through water presses. Most rubbish ends up in two multi-chamber pyrolytic incinerators of 1600kW each.

The main paint system used is an epoxy primer with modified acrylic finish from Hempel Coatings, and an alkyd cycle is applied on the internal bulkheads. For the final coating of underwater surfaces, self-polishing tin-free copolymer antifouling is used.

Special attention has been paid during the design and construction of *Arcadia* to limit noise and vibration generation and transmission. Noise does not exceed 45dB(A) in passenger suites; 50dB(A) in passenger mini suites, deluxe and standard cabins; and 55dB(A) in passenger public spaces.

New ferry for Tirrenia

A further completion in March was the ferry *Sharden*, built at the Castellammare di Stabia yard for Tirrenia di Navigazione. This ship, which was launched in September 2004, belongs to a new class of new-generation ferries; with four diesel engines each capable of providing 12,840kW, the ferry is able to reach top speeds of 31knots and maintain a cruising speed of 30knots.

Built in just 12 months from keel-laying, the new vessel has a gross of 40,000gt, is 214m long,



Sharden belongs to a new class of ferries which can reach speeds of 31knots.

and more than 26m wide, and has space for 3000 passengers as well as 1085 vehicles. The Castellammare yard has already built a sister for the same owner, *Nuraghes*, which was delivered in June 2004 (*Significant Ships of 2004*). The design of the two vessels was developed - with the addition of an entire car deck - from ferries built in recent years by the same shipyard for Tirrenia: *Bithia*, *Janas*, and *Athara*, delivered in July 2001, April 2002, and June 2003 respectively. *Sharden* will operate on the Civitavecchia-Olbia route, alternating with the other latest two ships in the owner's fleet.

Conquest-class progress

In November last year, in Monfalcone, *Carnival Valor* was delivered. The ship, which follows *Carnival Conquest* and *Carnival Glory*, delivered in October 2002 and in June 2003 respectively, is the third in a series of sisters and was built in record time - just 24 months (seven in the workshop, nine in the building dock, and eight at the outfitting pier). Currently under construction at the Monfalcone shipyard is *Carnival Liberty*, the fourth in this Conquest class, which was floated out in early December, and will be delivered this summer.

On completion of the last, *Carnival Liberty*, the Monfalcone shipyard will go on to build another three sisters of the 116,000gt *Caribbean Princess* type, which are scheduled for delivery in 2006, 2007, and 2008. The prototype was featured in *Significant Ships of 2004*.

The fourth vessel in the 110,000gt/3710-passenger Conquest class is *Carnival Liberty*, which is scheduled to be delivered from the Monfalcone yard this summer. This picture illustrates prefabricated sections being lifted into position. The semi-tunnel stern can be seen.



Last month, at the Marghera shipyard in Venice, the cruise liner *Noordam*, ordered by Holland America Line, part of Carnival Corp, was floated. This is the last of four ships which Fincantieri is building for HAL. *Zuiderdam*, prototype in the Vista series, was delivered in November 2002, *Oosterdam* in July 2003, and *Westerdam* in April 2004. The last will be delivered in early 2006.

The vessels in the Vista class, of around 82,000gt and 290m long, can accommodate up to 3200 people - 2400 passengers and 800 crew - and have a cruising speed of 22knots. The largest and the most advanced vessels in HAL's fleet, they boast a particularly elegant décor. Features include innovative external lifts running along both sides of the ship and spacious cabins fitted with every comfort, 85% of them external.

Progress with fast ferry contract for Gotland

In February this year at the Riva Trigoso (Genoa) shipyard, which reports to Fincantieri's Naval Vessel Business Unit, the keel laying of the fast ferry ordered last August by Swedish owner Rederi AB Gotland took place. Delivery is scheduled for early 2006. This new ferry will be the fifth of this type built by Fincantieri to take up service in the Baltic Sea; two are currently operating for the Finnish operator, Silja Line, and two for the Estonian company, Tallink. Further fast ferries built by Fincantieri are in service in the seas off UK and Italy.

The vessel, which will be built and was designed in accordance with IMO code HSC 2000 and is classed by Lloyd's Register of Shipping, will be 122m long, 16.65m wide, and will be powered by four diesel engines of 9000kW each, driving four water jets. Two bow thrusters will be fitted for manoeuvring. She will be able to reach a maximum speed of approximately 40knots and will have an operating speed of 36knots. Her maximum deadweight will be approximately 600dwt, with a capacity for 800 passengers in addition to more 160 cars and eight buses.

Since she is scheduled to operate in the Baltic Sea, the ferry has been designed in accordance with the stringent requirements laid down by the Swedish Maritime Authority with regard to environmental impact. She will be equipped with catalytic converters to reduce the level of pollutants emitted both at sea and when in port, and with passive control systems to enable noise levels to be substantially contained at all times.

The design and construction of the vessel will draw on dual technologies, some from the naval field, as in a series of high-performance ferries built in the shipyards of Fincantieri's Naval Vessel Business Unit in the second half of the 1990s.

Cruise liner contract for flooring specialist

THE Italian flooring specialist Api, based in Mignanego, near Genoa, designs and produces more than 200 types of resinous compounds, as well as protective products such as sealants, both for marine and land-based use. The company's products offer high-quality synthetic floors, protective and decorative coatings for decks, waterproofing and sealing treatments, tank coatings for foodstuffs and petrochemicals, and anti-corrosion protection and surface coatings for helidecks.

Api has applied its decorative floors, for internal and external use, on a number of cruise liners, the most recent being *Carnival Liberty* (more details about this ship can be found on page 50). This new vessel will be supplied with flooring for outside public areas - such as 900m² on the lido area and the running track, and some inside public areas. Application of the flooring is being made at the present time.

Flexigel Tile Effect will be used on outside areas around the swimming pool; this involves cutting lines into the floor whilst it is drying (all floors are applied as a liquid) to create grooves, making the floor look like tiles. This then prevents slipping and allows water to drain away easily.

The decorative flooring solution that Api has created is named Flexigel Decoro. This comes in a large range of colours, and is low weight, seamless, as well as being waterproof, with no



An example of the decorative outdoor lido area flooring that Api can produce for use on cruise ships.

expansion joints or other water seepage points. Flexigel Teak Effect is a synthetic resin that creates the look of real teak. This system is said to weigh between two and three times less per square metre than conventional systems and can be decorated to look like classic wood deck in the natural and warm tones of teak. It can be applied in a hard or soft type solution.

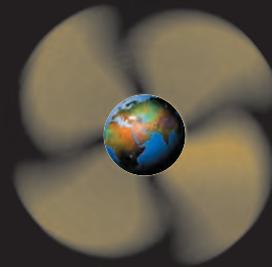
Api Technical Floor is a heavy-duty system that can be substituted for traditional tile flooring, which is easy to clean as it is seamless with no

joints. This is hygienic and suitable for food areas; it is low in weight compared with traditional systems, resistant to abrasion, and chemically bonded to the surface. This type is also particularly suitable for laundry areas, workshops, and corridors.

In addition, Api can also create surfaces for anti-static flight decks, interior and exterior floorings, as well as hull and tank coatings. The Italian Navy regularly use this company's products. 

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RINa heads key new EU research project

THE Italian classification and certification organisation Registro Italiano Navale (RINa) is the leading partner in a new EU technology platform, which has been called Waterborne. This transport technology programme will involve industry, national authorities, regulatory bodies, research centres, and universities, and will seek to stimulate more effective public and private investment in R&D, and improve the coherence of research activities at European, national, regional, and local levels.

This technology platform is the latest in a series, created with the support of the EU's sixth framework programme for research and technological development. Around €138 million has been made available for research.

RINa's chief executive officer, Ugo Dalerno, and head of R&D, Mario Dogliani, are, respectively, chairman and day-to-day technical manager of Waterborne. This platform is thought to be an unprecedented initiative in common R&D, confirming that the EU is aware that there are certain priority sectors, namely maritime transport, and that a national approach

only is not sufficient. RINa believes this recognition is the first step in the process of ensuring that a European research area in the waterborne sector will be established.

Around 90% of the EU's external trade and 40% of its internal trade is transported by sea. Europe is a world leader in the design, manufacture, and production of specialist technical vessels, but is facing increasing competition from Asia, particularly with regard to the volume of ship production.

Thus, in order for Europe to survive, it must continue to innovate. This is the driving force behind the Waterborne initiative (and others already in place). Better coordination of research across Europe, it is hoped, will maintain the region's position as an environmentally-responsible, and safe operator and manufacturer.

Green Star advancements

As has been well documented in previous issues of this journal, RINa has been very successful with its Green Star classification award, which has been given to a number of vessels with

regard to environmental awareness. Now this standard has been advanced further, with Green Star Design.

This award allows owners to have their designs examined against environmental criteria before a vessel is actually built. Criteria include all types of operational emissions, including those from cargo, and the notation also covers protection against accidental environmental damage, such as by insisting on double skins for bunker tanks.

Early design stage involvement would include an examination of ozone-depleting substances, oil consumption, ad hoc waste management, certified NOx engines, sewage treatment plants and holding tanks for treated black and grey water, SOx reduction procedures, a ballast water management plan. TBT antifouling paints, and incinerators.

Costa Crociere, the Italian cruise company, has recently had its entire fleet certified with the Green Star classification, and *Costa Atlantica*, which was delivered last summer, was the first vessel to be awarded with Green Star Design. 

Possible expansion for outfitting company

THE design and outfitting company Gerolamo Scorza, based in Genoa, is currently working on a number of interesting projects. Over the past few years, this company has worked closely with shipbuilder Fincantieri, in particular outfitting public



areas on a number of cruise vessels, and a brand-new task has been completion of work on *Arcadia*, P&O Cruises' new flagship; some of her public areas, the lounges and upper decks, were outfitted by Scorza. The company also did similar work on Holland America sisters *Oosterdam* and *Westerdam*, while *Costa Concordia* will have the same areas worked on as on *Costa Fortuna* and *Costa Magica*, that is, 60% of public spaces.

Scorza additionally carries out refurbishment projects. At present, a team is in Cape Town, repairing rough-weather

An example of the design and outfitting work that Gerolamo Scorza undertook on the cruise liner *Oosterdam*. 

damage sustained recently on *Voyager*, owned by Royal Olympic Cruises. This vessel was previously *Olympic Voyager*, an interesting smaller cruise liner, one of two sisters built by Blohm & Voss and designed for fast voyages between ports (*Significant Ships of 2000*).

Gerolamo Scorza is also currently thinking about the possibility of moving further into the refurbishment market. It is having talks with Royal Caribbean and Carnival in a bid to revitalise their fleets. The company is aware that this sort of move would mean a great deal of organisation, and a move to opening offices in another area, such as in the Caribbean, where many cruise-ship repairs are carried out. 

New initiatives in risk-based ship design

TWO marine consultancies - one Finnish and the other British - who have worked together previously have created what is claimed to be a novel risk-based design and engineering methodology covering the complete lifecycle of a ship. Deltamarin Ltd, based at Raisio, Finland, and Safety at Sea Ltd (the commercial arm of the Ship Stability Research Centre at the University of Strathclyde, in Glasgow) have teamed up to offer a systematic approach to risk avoidance, prevention, and mitigation. Innovative designs (already a prominent feature of Deltamarin work) will be developed by targeting safety and performance into an overall cost-effective configuration.

Services will cover concepts and layout optimisation, risk-based specification

development, first-principles design evaluation of collision and grounding damage, fire safety, time-to-flood and evacuation analyses, and system and component redundancy. Concept development will be based on a new design process combining best practice, configuration optimisation, and analysis of selected layouts using modern simulation methods.

Opportunities offered by the new regulations for probabilistic damage stability (SLF-47), alternative fire safety design and approaches (IMO Circular 1002), and total safety assessment are to be fully utilised to reach optimum capacity configuration with high safety at low cost. First references are said to have already proved the added value offered by

the new method, and designs have improved significantly in aspects of safety, redundancy, functionality, performance, and costs.

This new methodology is based on comprehensive R&D work by the alliance partners, which includes participation in a number of EU-funded projects such as ROROPROB and HARDER. Both companies have already completed major development and engineering projects in connection with upgrading of North European ferry fleets (some 100 ships) to meet SOLAS 90 standards and the Stockholm Agreement. Some aspects of these tasks and other work, particularly on the simulation scene, were reported in *The Naval Architect's* special publication *The Future of Ship Design Part 2*, published in June 2001 and in our June 2002 article (page 20). 

Fuel tanks and hull surveys top DE discussions

Hull survey requirements, fuel tank protection, and ballast water management systems were among the issues discussed at the 48th meeting of the International Maritime Organisation (IMO)'s Sub-Committee on Ship Design and Equipment (DE), which took place from February 21-25 2005.

REQUIREMENTS for hull thickness, assessments of aged double-hull oil tankers, and specifications for double-skin bulk carriers were discussed by sub-committee members. The sub-committee agreed on several amendments to existing regulations on hull surveys, including the insertion of survey requirements for double-side-skin bulk carriers in the ESP Guidelines.

In terms of proposed changes to the Condition Assessment Scheme (CAS), the procedures that flag administrations must undertake when a vessel changes flag during a CAS survey were the subject of debate. Several delegations expressed their alarm over the legal implications, while others were concerned with the administrator's obligation to issue a Document of Compliance and conduct a full technical review of CAS documentation. Given these outstanding issues, the sub-committee agreed to consider the proposed CAS amendments during its next session.

Lifeboat accidents

Between 1985 and 1992, approximately 60,000 person-drops have occurred with the free-fall lifeboat FF 48. Of these 60,000, 16 have resulted in complaints of minor back or neck pain following the drop. For this reason, the sub-committee is currently considering the issue of free-fall lifeboat safety. While the Maritime Safety Committee (MSC) has released a circular on the prevention of accidents in high free-fall launches, the sub-committee agreed that the issue is of such importance that it will continue to discuss it at its next meeting.

In addition, the sub-committee noted that the STW Sub-Committee recommends that administrations accept simulated free-falls during lifeboat drills, which must be conducted at least every six months, as fulfilling the drill requirement. As this advice conflicts with current SOLAS requirements, the sub-committee has asked the MSC for permission to consider appropriate amendments to SOLAS.

Fuel tank protection

BIMCO joined the working group established to discuss fuel tank protection and finalise draft MARPOL regulations on the topic. The working group addressed the development of the new regulations in light of the request that the phase-in period facilitate the work of shipbuilders worldwide. The new regulation will be included in the revised MARPOL Annex I, adopted by MEPC 52, and is expected to take effect on January 1 2007.

The sub-committee approved the working group's draft regulation, which encompasses a number of important points. The minimum double-hull distance from the side shell to fuel tanks has been raised to 1m, except for individual tanks with a capacity of less than 500m³, when the minimum value will remain at 0.76m. In addition, the term 'oil fuel' will apply to heavy fuel oil, marine diesel, oil and gas oil. The regulation also aims to provide for protection against pollution from damaged oil pipes and takes MARPOL's cargo piping requirements into account.

Furthermore, the sub-committee agreed that probabilistic methodology sufficiently addresses size in terms of the need for individual tank size limitations. However, to avoid extreme designs, maximum capacity is limited to 2500m³/tank. Finally, the factor for oil capture (CDB) was added to the probabilistic methodology used to account for the reduction of oil outflow from oil fuel tanks located above the double bottom.

Accommodation ladders

Following a number of accidents involving accommodation ladders, the MSC recently decided to amend SOLAS to require inspections of such areas as gangways, pilot ladders, and accommodation ladders as part of the ship's equipment survey. The development of these amendments has been placed on the DE committee's agenda.

The sub-committee agreed that this is not mainly a design and specification issue, but is instead related to maintenance. A number of national and international standards addressing the matter already exist, which might be used in the preparation of relevant inspection and survey requirements. This matter will be discussed further at the next DE session of the sub-committee, with a view to finalisation in 2006.

Gas-fuelled ships

The sub-committee continued the work of the MSC on provisions for gas-fuelled ships. These provisions aim to establish an international standard for the installation and operation of internal combustion engine installations using gas fuel in all types of ships with the exception of LNG carriers.

The sub-committee agreed that relevant mandatory regulations for gas-fuelled ships should be developed that should not only consider natural gas but also other potential gas fuels, such as hydrogen and propane. Work on these regulations will be continued at the next DE meeting.

Ballast water management

At its previous meeting, the sub-committee discussed permitting transitory deviations from ballast water regulations included in SOLAS and MARPOL. In this respect, the MEPC has prepared precautionary advice for masters undertaking ballast water exchange sequences when the criteria for propeller immersion, minimum draught, or trim and bridge visibility

cannot be met. The MSC has since approved the proposed amendments to SOLAS for adoption at MSC 81 as well as the MSC circular.

On a related issue, a programme for the development of guidelines for the uniform implementation of the Ballast Water Convention has been put in place. Several sets of draft guidelines were submitted to the sub-committee for comment, including guidelines for the approval of ballast water management systems, guidelines for ballast water exchange design and construction standards, guidelines for sediment control on ships, and procedures for approval of prototype ballast water treatment technologies.

Additional issues of interest

Emergency towing systems

Draft amendments to SOLAS regulations on emergency towing arrangements for tankers were also considered by the sub-committee. In general, the sub-committee agreed that functional requirements were acceptable, but that no mandatory hardware requirements for emergency towing systems should be introduced. To handle further consideration of the issue, the sub-committee established a correspondence group and instructed it to prepare a revised proposal for draft SOLAS amendments and related guidelines for the assessment of deck equipment to be used in emergency towing.

Lifesaving appliances

A possible re-evaluation of the present weight and space allocations assigned by the lifesaving-apparatus-related IMO instruments was considered by the sub-committee. This re-evaluation would take the increase in physical space needed when seafarers are wearing insulated immersion suits into account. In addition, the sub-committee addressed three related issues: compatibility of immersion suits and lifejackets; compatibility of immersion suits, and lifeboat access and capacity; and compatibility of lifejackets and marine evacuation systems. As the sub-committee feels this discussion is necessary, it will consider the matter further at its next session.

Protective coatings

BIMCO and several other shipping organisations jointly submitted a set of draft performance standards for protective coatings on both the double-side-skin spaces of bulk carriers and ballast tanks. Based on the information submitted by BIMCO, as well as details provided by other parties, the sub-committee agreed that the coating performance standard should apply to all ballast and void spaces on all types of ships. In addition, coatings with a life of 15 years should be a target for future development. A correspondence group will now not only consider the establishment of a Coating Technical File, but also discuss how verification and inspection can be undertaken with regard to protective coatings.

continued

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Safety Regulations & Naval Class

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Call for Papers and First Notice



The first conference on Safety Regulations and Naval Class was held in 2002. This conference will follow on from that and draw on the experiences of the past few years.

Changes in national laws and public perceptions, developments in procurement and support, and recent accidents have increasingly led to Navies re-assessing their existing safety management policies. Foremost in supporting the navies in their re-assessments are the Classification Societies. Significant investment has been made by both Navies and Classification Societies in developing these new procedures and has resulted in a far better understanding of the Navies' requirements and the differences between naval requirements and the requirements of national merchant ship administrations. Since the last conference in 2002 warships have been built to comply with Naval Classification rules and kept in "Naval Class".



Influential speakers will be gathered from around the world to ensure the latest advances are available to the audience. Papers will be presented on the following topics:-

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Exhaust cleaning systems

On May 19 2005, MARPOL Annex VI - Regulations for the Prevention of Air Pollution from Ships - will enter into force. Continuing this line of work, the sub-committee considered a set of draft guidelines for onboard exhaust-gas cleaning systems as well as a proposal for an exhaust-gas cleaning system certification programme and ship compliance scheme. Among the aspects addressed in this discussion were type approval of cleaning systems, their application to all fuel oil burning units, the minimum discharge criteria for wash water, and the use of reference test fuels for certification.

With regard to the proposed exhaust-gas cleaning system certification programme and the related ship compliance scheme, the sub-committee concluded that these items should be included in the draft guidelines. In addition, the

sub-committee submitted a request to the MEPC that criteria be developed for wash water discharges.

Oily waste handling

The MEPC has considered incorporating the design concepts of Integrated Bilge Water Treatment Systems (IBTS) into its guidelines for handling oily waters in machinery spaces. During the discussion on this issue within the sub-committee, concerns were raised in terms of the need to avoid oil contamination of ballast water. Several delegations also questioned the filling of sludge tanks and the use of purifiers. Given these concerns, the sub-committee agreed to reconsider matters at the next session.

Brittle fractures in ships

The sub-committee considered unstable brittle fracture risks, particularly those occurring in the

side shells of ships constructed with low-quality steel operating in cold waters. In this connection, the International Association of Classification Societies (IACS) is currently discussing the development of requirements for guaranteed minimum steel toughness.

Mooring and towing requirements

An expert group established to analyse a draft MSC circular on mooring and towing requirements reported back to the sub-committee that it had approved of the draft circular. It will now be submitted to the MSC for approval.

Next meeting

The next meeting of the DE Sub-Committee will take place from February 20-24 2006. 

This article is compiled in association with BIMCO (The Baltic and International Maritime Council).

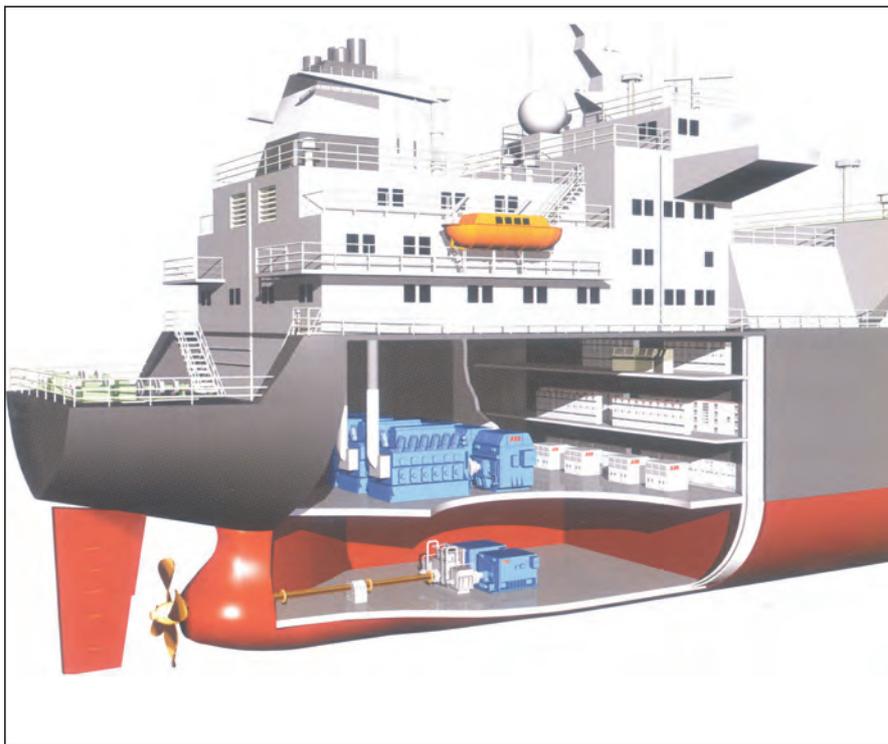
GASTECH 2005 REPORT

ABB electrics for Samsung-built LNG carriers

ONE of the newest contracts in the recent exciting tranche of LNG carrier orders to feature alternative propulsion concepts is that at Samsung in Korea for six 153,200m³ membrane designs. Four will be owned by A P Möller and two by K Line but all will feature a dual-fuel diesel-electric propulsion plant where the electrical package will be supplied by the ABB group. Wärtsilä has just announced that it will supply the diesel engines: three 12-cylinder and one six-cylinder 50DF models for each ship, developing a total power of 39.9MW.

For each ship, ABB will supply four alternators, along with two 6.6kV medium-voltage main switchboards and two 6.6kV medium-voltage cargo switchboards. Twin medium-speed electric propulsion motors, also of ABB make, will be geared to a single propeller shaft and will develop a total output of 25,300kW.

In addition, for each ship ABB will provide four three-winding propulsion transformers, two ACS6000 frequency converters, medium-voltage distribution transformers, and propulsion controls; the company will additionally carry out all necessary system calculations and undertake any studies required. ABB is already supplying basically similar systems to the two 153,500m³ LNG carriers on order at Chantiers de l'Atlantique in France for Gaz de France and NYK. 



An impression of the diesel-electric propulsion plant layout, which will include an ABB electrical package, to be fitted in the new 153,200m³ LNG carriers on order at Samsung for A P Möller and K Line.

Automated membrane-sheet production at Samwoo Memcor

ONE of many specialist exhibitors at the Gastech 2005 exhibition was the Korean company Samwoo Memcor, whose modern factory at Chinhae is today principally devoted to the production of stainless steel membrane sheets, plus fabrication of special corners and anchor strips, for the GTT Mk III membrane containment system. The company was formerly known as Samwoo, which was established in 1982 for making special

shipbuilding parts, and from 1993 supplied securing devices for the GTT NO 96 containment system to more than 30 LNG carriers at both Korean and Japanese yards.

In 1997, approval was secured for production of heavy steel corners and anchor strips for the Mk III concept. Following the setting up of a new company, Samwoo Memcor, in 2001, a brand-new fully automated line commenced production in the following year of corrugated

membrane sheets for the same containment system. Apart from flat panels, the factory also turns out special shapes, such as angle pieces, dog legs, re-entrant angle pieces, and end corrugations. Subsidiary companies manufacture coupler sets and the specialised bolts for securing the insulation system in position. Samwoo Memcor is fully certified by both GTT and a number of leading class societies. 

New LNG vibration and strength initiatives from ABS

TWO new initiatives in the LNG field have recently been launched by US class society ABS. Possibly the most topical is a joint vibration research project being carried out with Hyundai Heavy Industries to determine any undue vibration influences resulting from the new philosophy of diesel engine propulsion - both medium-speed and low-speed - for LNG carriers.

This is aimed at any vibration that might be transmitted to a ship's membrane cargo containment system, particularly as new-generation larger LNG carriers are designed for the traditional ship speed range between 19.50knots and 21.00knots but, being much larger, require an increase in propulsion power.

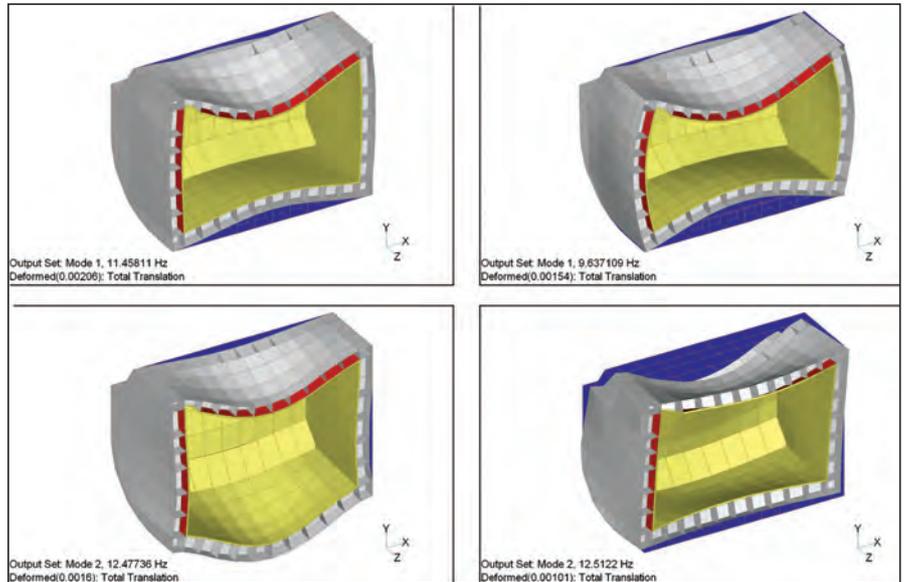
The study is especially centred on the local plate vibration effect on insulation, and on the insulation system and mastic attachment between the inner hull plating and the plywood back layer. Work will examine what effect vibration may have on materials such as plywood, foam, and epoxy resin, and if any damage might result. Global and local vibration levels will be examined at selected locations inside the cargo tank adjacent to the engineroom.

Stress levels in the plywood, foam, and mastics are being determined to verify containment concept adequacy, and the natural frequency of an insulation system is being investigated for potential movement due to engine-excited resonance and fluctuating propeller forces. ABS does not specify any particular brand of containment being analysed, but the outcome of this work could be of great interest to the industry, in view of current problems - not necessarily due to vibration - that are being examined in the prototype GTT CS1 membrane containment system on *Gaz de France Energy*.

Strength assessment study

In another move, ABS is carrying out two joint studies, one with two leading Korean shipyards (DSME and Samsung) and another separately with Gaztransport & Technigaz (GTT), to evaluate the two current leading membrane systems, Mk III and NO 96. The outcome should lead to new classification criteria for strength assessment of membrane containment concepts. Today's much larger LNG ships (beyond 200,000m³) mean that hydro-elasticity and visco-elasticity must be taken in consideration, and these two fluid and structure interaction principles are being applied by ABS, using the society's considerable expertise, to determine motions and loads for various ship types.

Full-scale drop tests will be carried out to determine the impact strength and failure mode threshold. Both wet and dry tests will be conducted to evaluate the shock absorption of insulation in both water and on a hard surface. An advanced numerical and experimental procedure was developed to evaluate the



Finite-element analysis model images of No 4 cargo tank on a large LNG carrier of more than 200,000m³, illustrating containment system vibration induced by a main engine and propeller.



A drop test for a GTT NO 96 membrane containment module being made by DSME as part of the joint strength-assessment project being carried out with ABS.

strength, while dynamic material properties of the foam and plywood are being tested in collaboration with the University of Illinois.

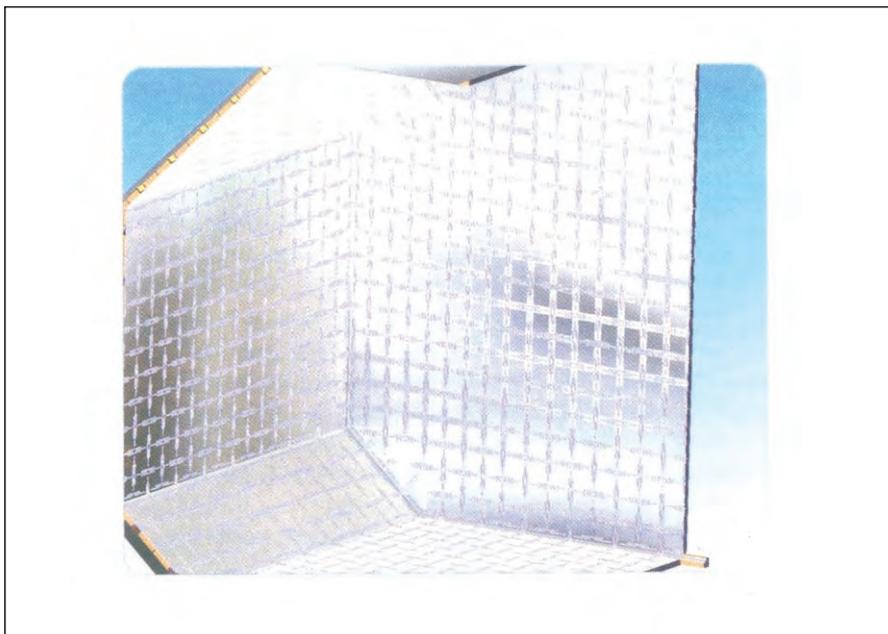
In a dry-drop test by DSME on an NO 96 system, the impact load was increased until

containment or boxes collapsed. The buckling mode of the insulation side panel was detected as a failure mode, and the effect of perlite insulation material to the dynamic strength was studied.

Progress with Kogas cargo membrane system

BY building on its experience in the development of land storage tanks, the Korean Gas Corp (Kogas) is proceeding with the perfection of a new marine LNG cargo containment system that employs different technology from that used on today's LNG carriers. While using a well-proven basic membrane concept with primary and secondary barriers plus polyurethane foam insulation, the new Kogas system features what perhaps can be described as long smooth corrugations with sloping ends. The barriers are formed from 304L stainless steel plate, 2mm thick.

On-going R&D particularly aims to minimise the effects of hull and membrane deformation on the insulation and to avoid any welding work on the corrugations themselves. The latter feature would reduce the number of tag welding points, as well as improving welding speed, and thus construction time. Membrane pitch adjustment should enable ships to carry larger cargoes. Welding consumables are currently being developed, and, if all goes well, KOGAS is hopeful that the first ship to feature this novel containment system could perhaps be ordered in 2008.



An impression of how an LNG cargo tank featuring the novel KOGAS membrane system (currently being developed) would appear.

New Far East gas-handling contracts for Tractebel

THE German gas-handling specialist Tractebel Gas Engineering has secured an important new contract, to supply equipment for six 8000m³ ethylene/LPG tankers ordered at INP Heavy Industries in Korea by the Danish owner Lauritzen Kosan. INP, based at Ulsan and formerly known as Chung-Gu Shipyard, was established in 1999. It is one of the country's up-and-coming smaller yards and since 1999 has delivered four small chemical tankers up to 3650dwt and five 20,000dwt bulk carriers. LPG tankers are the prime target today. Last year, another Korean-built ship, the 23,000m³ *Almarona*, with her sister, was completed at the STX yard with Tractebel equipment onboard, for Qatar Shipping.

At the same time, Tractebel has made an important breakthrough into the Japanese

market with a contract to manufacture the gas-handling plant, including cargo tanks, for an 8000m³ semi-refrigerated LPG tanker being built at the Sanoyas Hishino Meisho yard for an unspecified owner. This particular order could result in further projects at the yard since more orders are under discussion.

These contracts, to which can be added an additional one for equipment being installed on two 16,500m³ ethylene tankers currently under construction at Jiangnan Shipyard in China for Formosa Plastic Marine (plus two further ethylene carriers for an undisclosed owner) mean that today Tractebel has an order book worth €75 million. Since 1995, the company has won orders for 32 ships (71% of the market) or 419,000m³ cargo capacity in total, equating 78% of the market.

Steam propulsion plant simulator

NOTWITHSTANDING the current trend towards alternative propulsion plant for new-generation LNG carriers, steam-powered ships are still being ordered. To meet the continuing need for suitably trained engineers to man such vessels, MRPI Ship Analytics has launched a new training software package, a move which was forecast in our 2004 special supplement *Design and Operation of Gas Carriers*, where we discussed this company's WISE 'intelligent' liquid cargo handling simulator for gas (now available with an assessment module added).

The new steam software is offered as a stand-alone version for use on a single PC, or as a networked version with an instructor and a number of student stations; thus, it can be used in a wide range of training scenarios. It reproduces all characteristics of a typical steam propulsion plant and its auxiliary systems. A new intuitive and user-friendly interface, developed after extensive consultation with the industry, should enable trainees to quickly familiarise themselves with the system, to operate all equipment, and to implement procedures.

In addition, MRPI Ship Analytics expects to add a WISE student monitoring and feedback system to the stand-alone version, enabling it to be used in environments where a skilled instructor may not be available, such as on board a ship. The 'intelligent' features of WISE are claimed to provide the monitoring aspects as a virtual instructor. Meanwhile, more computer-based training packages are to be developed with the assistance of the Norwegian company Seagull AS, particularly for cargo handling and machinery operations.

Amongst a number of interesting ship models on display at the Gastech 2005 exhibition was this one of a new-generation 216,000m³ LNG carrier on the Samsung stand. It shows the twin propellers and rudders, also the two MAN B&W 6S70ME-C low-speed diesel engines - the first plant of this type to be specified for modern LNG tonnage.

These ships, ordered by the Overseas Shipholding Group, and others at Hyundai for the same owner, will reliquefy all their cargo boil-off. Similar arrangements will be installed on a series of 210,000m³ ships ordered at Daewoo by Pronav.



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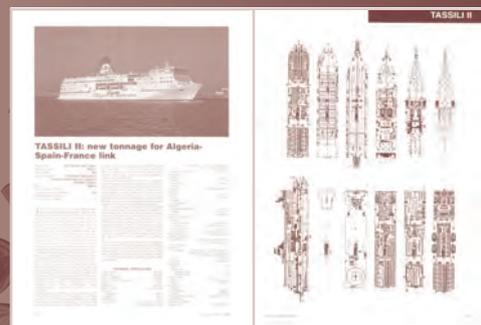
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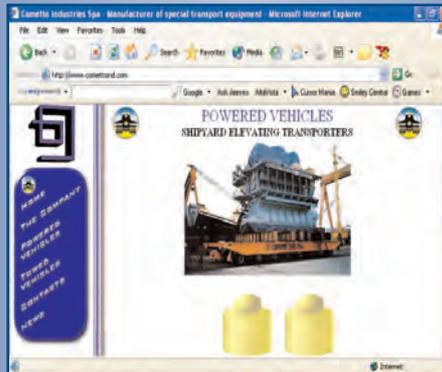
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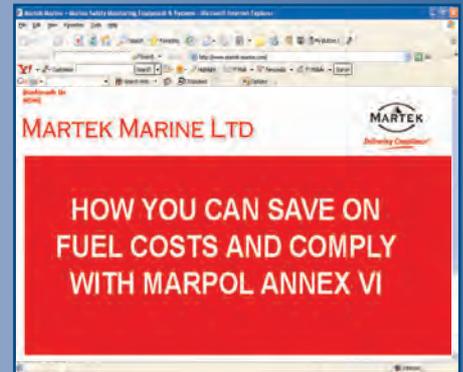
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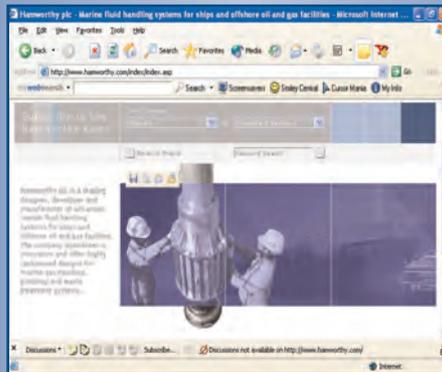
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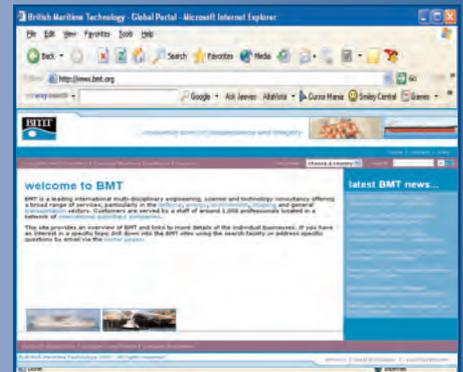
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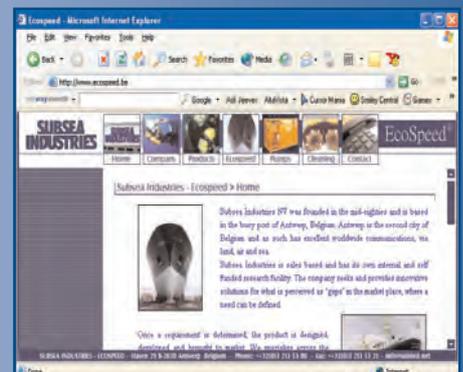
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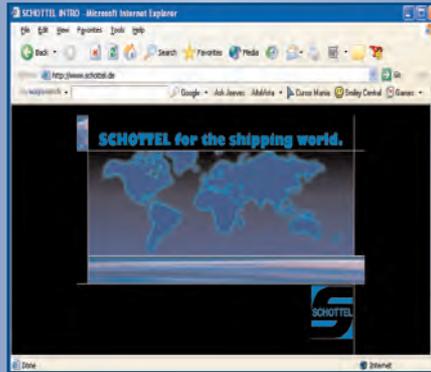
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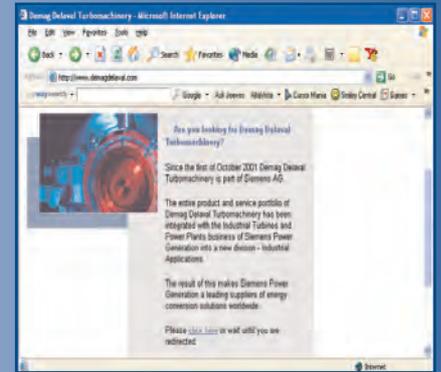
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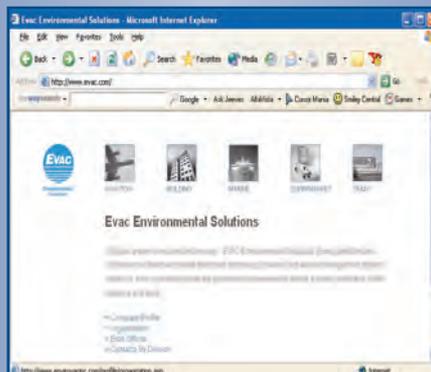
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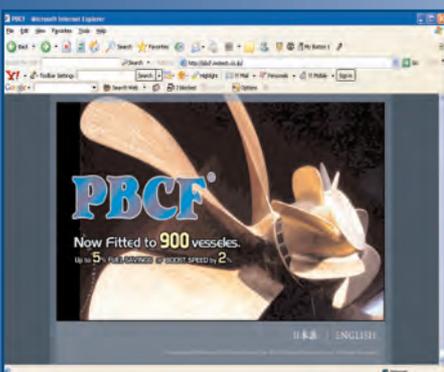
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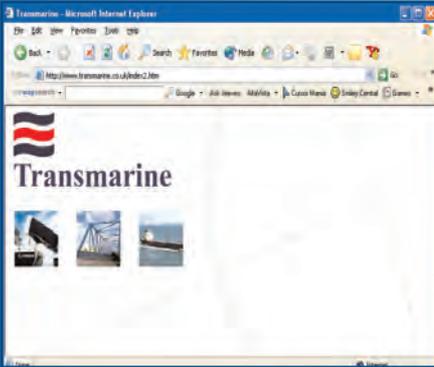
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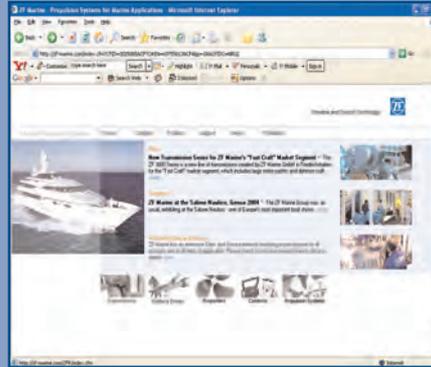
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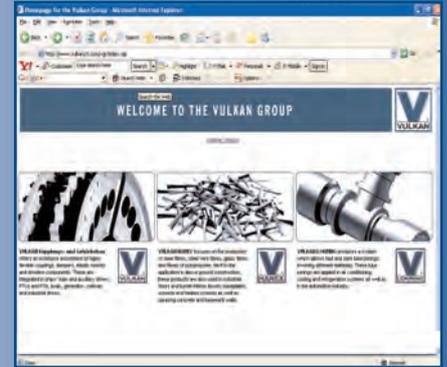
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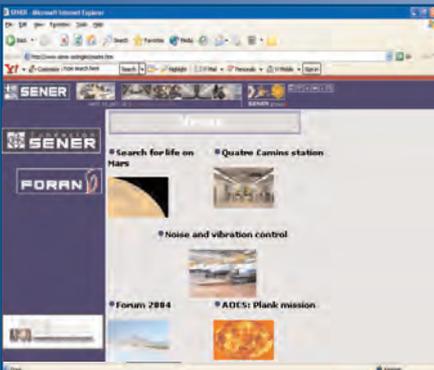
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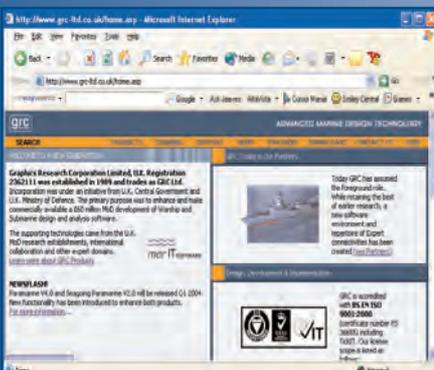
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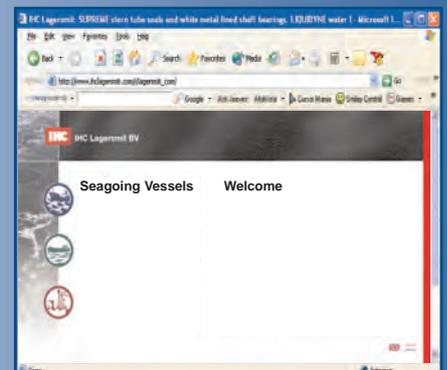
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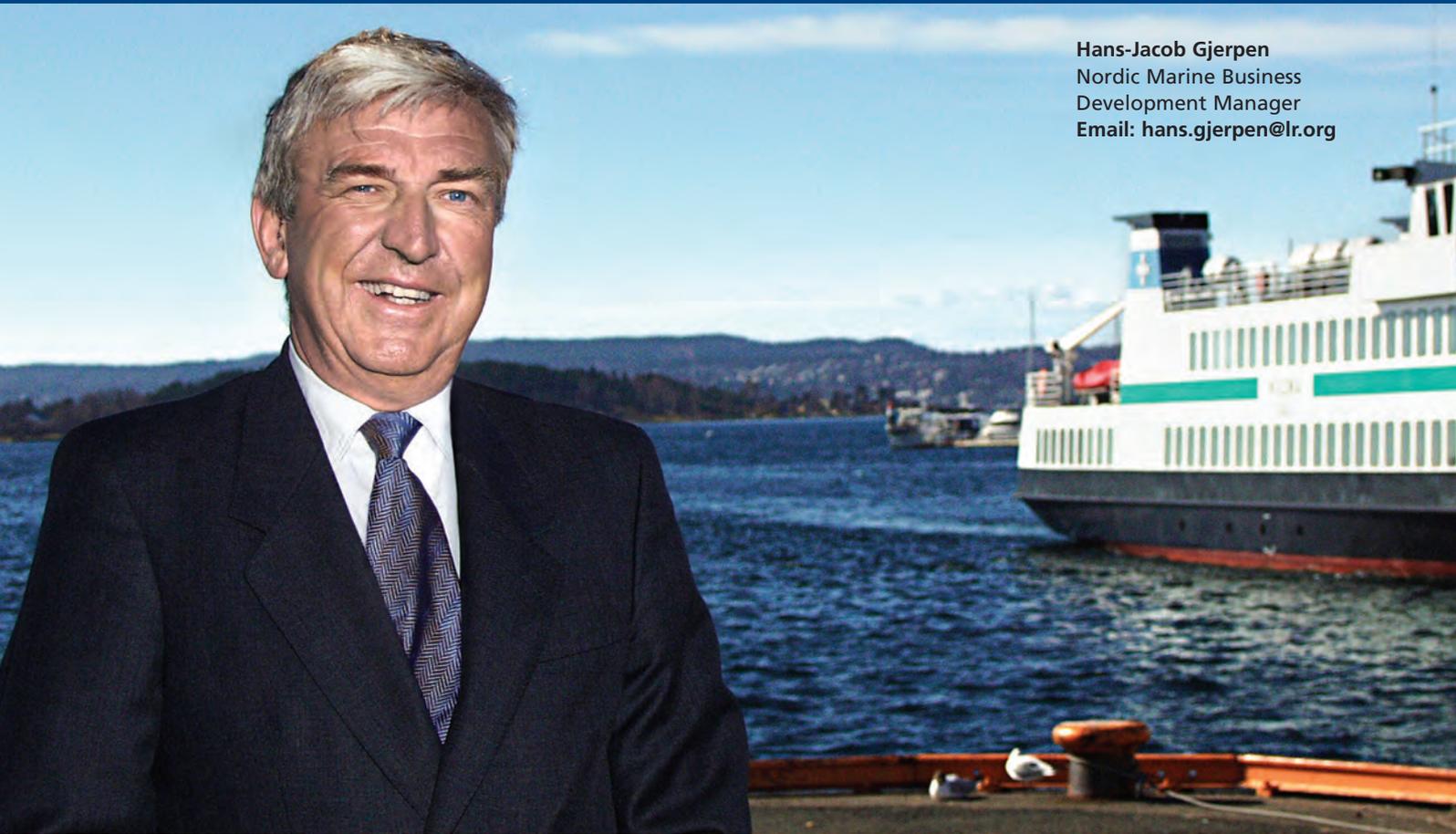
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