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A brand-new design from the Dutch consultancy Vuyk Engineering Groningen is this VC Feeder 1000, which claims the highest loaded container intake (75% at 14tonnes) of any similar vessel on the market. A minimum service speed of 18.50knots is expected from the first ships ordered; these are a series booked at the German yard SSW Schichau Seebeck, where the design will be known as the SSW Super 1000eco. More details appear in our special feature on The Netherlands, which begins on page 26.

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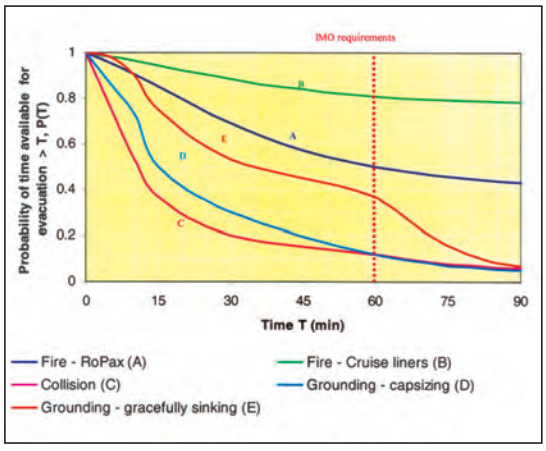
Citadels for next-generation passenger ships?

LAST month saw the completion by Aker Finnyards of the largest-ever, in gross tonnage and capacity terms, passenger ship: Royal Caribbean's 158,000gt *Freedom of the Seas*. This behemoth can absorb up to 3600 passengers, served by a vast crew of 1400. Two more ships of this class will follow, while in France at Chantiers de l'Atlantique, Mediterranean Shipping Co (MSC) has recently ordered a pair of sisters, which although of lesser gross, around 133,500gt, can carry more passengers - 3887, together with a crew of 1300. These figures are more than treble what the *Song of Norway* class – generally considered the prototype purpose-built cruise liners – could handle, when completed in the early 1970s (814 passengers maximum).

Technically, of course, there is no reason why even larger liners should not be built - in parallel with accountants' fervour to secure the maximum benefits of economy of scale. Indeed, these are already being planned by Royal Caribbean with its Genesis project, whose aim is to design and build a 220,000gt vessel for 5400 passengers! Before they actually pick up their pens to sign a contract, maybe directors should remember that when early-1970s oil fever gripped the shipbuilding industry, major shipbuilders around the world (including Harland & Wolff, in Belfast) invested vast sums in building docks capable of holding a one million dwt crude oil tanker.



Thought for the future: an interesting graph showing expected evacuation times from passenger ships, available under various emergency conditions, and showing IMO's current requirements. Taken from Erik Vanem and Rolf Skjong's paper on risk control, presented at RINA's recent Marine Design conference - 'Evaluation of Design Options Related to Evacuation for Enhanced Safety of Passenger Ships'.

Such a monster was never constructed, although hulls did reach nearly 500,000dwt. These ships were carrying cargoes of precious, but inanimate, oil. Cruise liners are carrying people, equally precious but also equipped with spirits. Some may question if people really do want to sail on holiday with 5398 others? There are already reports of six-hour check-in periods due to massive security checks following the events of September 11, 2001. Even worse is the headache for the cruise director of how to distribute 3000-plus passengers when they arrive at a port. While commercial businesses ashore may relish the potential income in valuable foreign currency, at what cost to the environment and spirit of the host nation is this being gained?

Alongside these major holiday problems are, for naval architects, the equally formidable technical hurdles associated with appropriate ship design and passenger safety, and especially allied to equipment and procedures for use in an emergency. The particular difficulties associated with safety and emergencies are occupying the minds of many at the present time, and particularly those members of IMO, whose Marine Safety Committee meets in early May to consider recent recommendations thrashed out at various subcommittees.

This work forms part of a massive and comprehensive review of passenger ship safety, initiated in 2000 - with special emphasis on the giant hulls being constructed today. Committee members' minds may well be helped to concentrate by the recent fire on *Star Princess* (only four years old), also by the sad ferry accident in the Red Sea, with the loss of *Al Salam Boccaccio 98*, and around 1000 passengers and crew. Disasters on passenger-carrying vessels – despite our best efforts – seem likely to continue, whatever the age of the ship.

Committee investigations have centred on whether SOLAS and Load Line requirements meet the needs of 21st century giant passenger ships, especially in an emergency situation, and perhaps also when a ship may be many miles from the nearest rescue centre. Work has included the use of such tools as formal safety assessment (FSA).

As has been pointed out before, many cruise passengers are 'of a certain age' and often well above, which can create considerable problems for crews, even on small liners. Readers are also referred to Erik Vanem and Rolf Skjong's paper (Det Norske Veritas) presented at The Royal Institution of Naval Architects' Marine Design conference, held last month in La Spezia.

Large numbers of lifeboats and rafts in the water – always assuming that they can all be launched – would additionally represent an awe-inspiring rescue operation. Delegations within IMO are pressing for a comprehensive review of lifesaving arrangements, also the interesting possibility of ships fitting air-band radio equipment in some areas.

The cue here is the alternative approach: a ship to act as its own lifeboat by formation of a onboard citadel or citadels. Indeed, this is the approach that IMO plans to adopt for next-generation cruise liners; similar thinking has been behind the European DESSO ro-pax project, reported in some detail in *The Naval Architect's* April issue. This aims to create a ferry that will stay upright and afloat for 24 hours after an emergency. One of the important proposals of DESSO is the provision of more real-time information for the master in the event of an emergency.

Others who will be pleased with such ideas include Captain Dennis Barber, who has advocated float-off accommodation units for bulk carriers, and the Norwegian lifesaving company Norsafe, creator of the Rescube concept (*The Naval Architect* June 2005, pages 3 and 59). IMO's citadel simultaneously promotes the idea of a ship still being able to reach port under its own power at a minimum safe speed.

Such thinking will, of course, imply prevention is better than cure, and therefore much effort will be directed towards improved fire protection and similar aspects. In this respect, IMO's Design and Equipment, Fire Protection, also Stability, Load Lines, and Fishing Vessel Safety subcommittees are working to support the concept that a passenger ship should be capable of remaining in control for at least three hours to allow for a safe, orderly evacuation and abandonment, should that eventually prove to be the necessary course of action. It has additionally been noted at IMO that the wide-ranging EU project SAFEDOR hopes to assist in this matter through the development of innovative new ship designs, including those for cruise liners and ferries. Inevitably, the wheels of research and legislation move slowly, but bright new lights for next-generation tonnage are visible ahead.

More innovation at 2006 Seatrade Awards

PROOF that innovation in the marine field is still alive and well is confirmed once again by the annual Seatrade Awards, the 2006 ceremony for which took place last month in due style, with dinner at the Banqueting House, in Whitehall, London, and with *The Naval Architect* as one of the many guests. This was the 18th such event, with awards given in four categories (plus a personality and a cruise personality); candidates are carefully examined by a panel of assessors before being judged by a separate panel.

This year, a total of 67 candidates (including very small companies with few employees) put their products and services forward, and to an observer, the judges must have had a difficult time selecting winners from the eventual short list. Winner in the safety-at-sea category was the **Sea Fish Industry Authority**, with Rob Reid's man-overboard rescue cage for recovery of personnel in the water alongside a vessel. Runners-up were Det Norske Veritas, with the PULS computerised buckling code for ship hull panels (improved control of safety margins against structural failure), and the PS4173 combined helicopter transportation and immersion suit from Viking Life-Saving Equipment.

In the protection of the marine and atmospheric environment section - a very topical subject today, the winner was the **OceanSaver** ballast water treatment system, from the Norwegian company of the same name. Runners-up were the JLMD Ecologic Group, from France, with its pre-installed FOR (fast oil recovery) pipe and coupling system for removing cargo and bunker oil from sunken ships (a most useful innovation already reported in this journal on a number of occasions), and TMC Smart Air, a system from Tamrotor Marine Compressors, Norway, using a frequency-controlled motor which enables a compressor to adjust air production precisely to requirements. Energy savings up to 40% are claimed.

In the category for innovation in ship operations, there were four contenders: Det Norske Veritas, with its SeaSkill concept for development of competence standards for key maritime positions; Force Technology, Denmark, for its SeaSense real-time onboard monitoring and decision support system for management of wave-induced structural loads and ship motions; Ulstein Design, from Norway, with its X-Bow hull form, and Van der Velden Marine Systems, from The Netherlands, with its EPS rim-drive thruster, for which very low noise levels are claimed (*The Naval Architect* April 2006, page 41). The winner was **Force Technology**.

Finally, **World-Link Communications** won the IT Applications category with its ShipForms free software documents to enable ships to submit notices of arrival and departure to the US Coast Guard - a problem for many because submission relies on the Internet and software not commonly onboard ships. Runners-up were Holland America Line with its MatTrac electronic waste management system, and UK company Seamanship International, for its navigational skills assessment programme.

Aker Finnyards has delivered from its Helsinki site the first of a new series of special Arctic cargo ships to Russian company MMC Norilsky Nickel. The 14,500dwt *Norilskiy Nickel* features the double-acting principle, whereby the ship will sail astern into heavy ice, with her Azipod propulsor turned through 180deg. She is specially designed to transport semi-finished plates of nickel and other rare metals from Dudinka on the Yenisey river to Murmansk, returning with general cargo. Full details of this pioneering design, intended to replace the earlier SA-15 class, were reported in our February 2006 issue, page 20.

COMMON STRUCTURAL RULES CONCERN - The International Association of Classification Societies (IACS) has responded to concerns expressed by the Union of Greek Shipowners over the newly introduced Common Structural Rules for tankers and bulk carriers. IACS' current chairman Robert D Somerville (from ABS) points out that extensive efforts have been made during the last 18 months to explain the fundamental differences from the previous rules, and feedback has been sought.

IACS' response to the Greek concerns reconfirms its belief that the radical new rules will result in a new generation of tankers and bulk carriers that will be at least as robust - and most probably more robust - than comparable vessels built to previous rules.

MAN B&W POWER FOR Q-MAX LNG SHIPS - After lengthy negotiations, the Qatargas 2 shipping requisition team has placed an order in Korea for six large LNG carriers of the Q-Max size - 250,000m^3. These will be the largest-ever such vessels. Each will be powered by twin MAN B&W 7S70ME-C slow-speed engines burning heavy oil exclusively, with all boil-off being reliquefied. Each engine is rated at 21,770kW at 91rev/min. Four gensets using MAN B&W Holeby 9L32/40 engines will also be installed. Qatargas 2 is a joint venture between Qatar Petroleum and ExxonMobil.

NEW CHINA OFFICE FOR DELTAMARIN - The Finnish privately-owned company Delta-Sigma Ltd (owner of Deltamarin Ltd and Deltamarin Contracting Ltd) has set up a new joint-venture company in China in association with the state-owned company Shandong New Shipbuilding Heavy Industries. The aim is to provide technical and engineering services to the Chinese shipbuilding and marine industry market. The new company is named Shandong Deltamarin Ship Design Co, based at Weihai City. Although initially, services will be provided locally, the intention is to expand the market and to encompass the entire field of engineering including project management, planning, and procurement support.

KRONODOC FOR BMV - Finnish specialist Kronodoc Oy is supplying its Logistics Solution information software to the Norwegian yard Bergen Mekaniske Verksted (BMV), part of the Bergen Yards group. The system will first be used to provide central project management and document control on newbuilding project 160, a large state-of-the-art seismic ship for E Forland.

PRESSURE FOR CLEANER AIR - Last month, pressure was being put on IMO at its MARPOL Annex VI review meeting, to make extra efforts to provide cleaner air around ports by reducing further exhaust gases and particulates from ship funnels. Various groups, formally represented by Friends of the Earth International, called for nitrous oxide reductions of between 70% and 90%, and between 70% and 80% for sulphur dioxide. Proposals included switching to cleaner fuels (1.5% limit for heavy fuel at sea and 0.5% in coastal zones and ports), shutting off diesel-alternators in port, and installation of more pollution control technology. Some of these limits and moves are already in process or in action.

ELECTRICAL DESIGN PROJECT - The Canadian consultancy ShipConstructor Software is taking part in the US National Shipbuilding Research Programme to develop specifications for an electrical design module package as an additional part of the larger Second-Tier Shipyard Design Enhancement Project 2. The project is headed by Bender Shipbuilding & Repair Co, and the aim is to examine requirements and to develop details suitable for integration into the ShipConstructor software suite. Electrical designers will then be able to work with a product model along with other design team members.

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Selecting the optimum hull definition package

Following his special introduction to purchasing a hull definition package, published in our April 2006 edition, consultant Patrick Couser here gives a price guide and reviews the first of several suites on offer. Further reviews will appear in following issues.

A LARGE number of software vendors were contacted and asked to provide working versions of their hull-definition software for review; only those that provided software that was relevant to the design of larger vessels have been included. Some well-known suites, and especially those that are comprehensive, integrated, and really only suitable for large bureaux and larger shipyards (such as Catia, Defcar, Foran, and Tribon) are not reviewed. Other special packages not reviewed at present are: MasterShip, GRC, Ship Shape (Wolfson), Prolines (Vacanti Yacht Design), and FREE!ship.

The following software has been included:

Autoship	Autoship Systems Corp
Fastship	Proteus Engineering
Hullform	Blue Peter Marine Systems Pty Ltd
Maxsurf	Formation Design Systems Pty Ltd
MultiSurf	Aerohydro
Naval Designer	Verre-Mer
ProSurf	New Wave Systems
SeaSolution	Sea Tech Ltd
Rhino	Robert McNeel & Associates (available from Simply Rhino Ltd in the UK).

This is by no means an exhaustive list but does cover a wide range of products that are suitable for a range of users - from the enthusiast naval architect through to medium-sized shipyards and design consultancies employing an entire design office. A reasonably high-end computer from mid-2004 was used for the review (Asus P4CG800-E; Intel Pentium 4 with Hyperthreading running at 3.0GHz; 1GByte DDR SDRAM, dual channel RAM; 160Gm SATA hard disk drive; nVidia GeForce FX 5700 video card with dual 17inch LCD screens, 1280 x 1024; Microsoft XP Professional). This system was sufficient to effectively run all the software tested.

In the following sections that describe the programs in more detail, only the key hull-definition features have been discussed. The programs have many other features, details of which can be found on the vendors' websites.

Pricing

Approximate prices for various versions of the software reviewed are given in the accompanying table. In some cases, these have been converted to Euros from the quoted currency. These should be used as a guide only, and it is always worth obtaining a quotation for precise requirements.

Program	Available from	Cost	Notes
Autoship Pro	**Autoship Systems Corp**	contact Autoship: sales@autoship.com +1 604 254 4171	Unlimited surfaces. Includes IGES translator, surface match tool and parts library
Autoship Standard		contact Autoship	40-surface limit; foil library; developable surfaces
Autoyacht		contact Autoship	20-surface limit; no developable surfaces; 20m maximum model length; IMS VPP export
FastShip	**Anteon Corp/ Proteus Engineering**	€827 to €6652 (US$995 to US$8000)	Price varies depending on modules purchased
FastYacht		€827 (US$995)	Two-surface version
Hullform Pro with Hullstat	**Blue Peter Marine Systems Pty Ltd**	€681 (AU$1100)	Includes hydrostatics package Hullstat
Hullform Pro		€464 (AU$750)	-
Hullform Student		from €62 (AU$100)	Student version
Maxsurf Pro	**Formation Design Systems Pty Ltd**	€5445 (AU$8795)	400-surface version with parametric transformation
Maxsurf Plus		€1814 (AU$2930)	Six-surface version
Maxsurf T		€631 (AU$1020)	Three-surface version
Maxsurf academic		Free	Non-commercial licence of three-surface version for full-time students and educators
MultiSurf	**Aerohydro**	€2491 (US$2995)	Hydrostatics, advanced modelling, flattener, and SolidWorks integration
MultiSurf Basic		€827 (US$995)	-
Naval Designer Pro	**Verre-Mer**	€868	-
Naval Designer Std		€479	-
Naval Designer Light		€276	-
Naval Designer Student		€289	40% off standard version for fulltime students for non-commercial use.
ProSurf	**New Wave Systems**	€661 (US$795)	-
ProBasic		€329 (US$395)	Ten-surface version
ProChine		€162 (US$195)	Ten-surface version, chine hulls only
ProSurf Student		€245 (US$295)	Full version for students
SeaSolution 6	**Sea Tech Ltd**	€7994	Includes plate development
SeaSolution 6		€5495	Includes hydrostatics, DXF/IGES, developable surfaces and shell expansion
SeaSolution 6 std		€999	Basic modeller
SeaSolution 1		free	Version 1 of the SeaSolution software
Rhino	**International: McNeel & Associates**	€895	UK: Simply Rhino Ltd
Rhino Educational		€195	Same as commercial software. Proof of status as student, faculty, or educational institution required
Rhino Marine (plugin for Rhino)	**Proteus Engineering**	€1685	Four modules: hydrostatics, stability, sections; hull design and fairing; performance analysis; model management.
Rhino Marine Student		€410	As above, non-commercial student licence
Prices converted to Euros for comparison			

A guide to software prices, plus various notes, for the systems reviewed.

Autoship: Autoship Systems Corp

www.autoship.com
sales@autoship.com
Suite 312, 611 Alexander Street,
Vancouver, BC, V6A 1E1, Canada.
Tel: +1 604 254 4171
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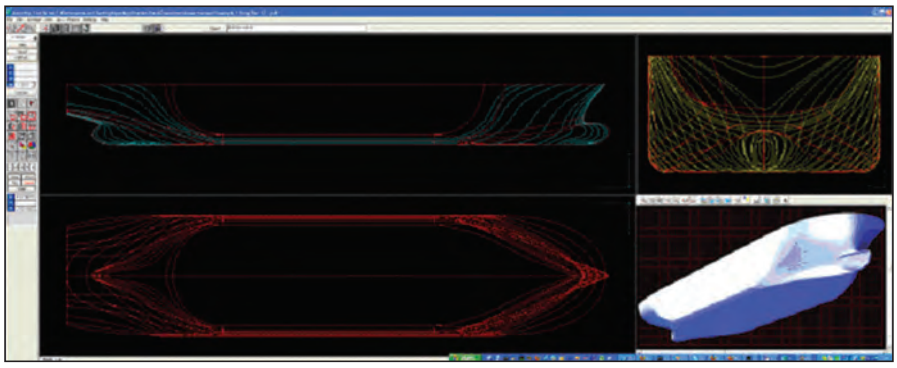


Autoship version 8.3.3 (demo).

AUTOSHIP is a NURB-surface modeller which can also include points and curves. Surfaces may be generated directly or constructed from existing curves. There are a number of different ways in which surfaces may be generated, including developable surfaces (that may be flattened and exported) and lofting a surface through master curves; a surface match command exists which generates master curves from offset data and then lofts a surface through these curves. Surfaces may contain any number of control points also non-uniform knot-vectors.

Surfaces may be manipulated by using either the vertices of the surface control polygon or edit points interpolated onto the surface or curve (ensuring that the surface passes through the points used to manipulate it). With the latter option, some neighbouring edit points move with the edit point that is being modified. Two useful features are the edit boxes where numerical values can be entered directly together with the controls for stepping along the surface's control points.

Despite not being totally standard Windows, the user interface is reasonably easy to use after some familiarisation, although having to switch between select and edit modes to edit different objects can be a little frustrating. The toolbars are not customisable, and several of the buttons have letters rather than icons which may be less meaningful to non-English speaking users. Hydrostatics can be calculated for the vessel either by specifying draught and trim or by balancing the hull to a specified displacement and centre of gravity.

Surface trimming is flexible, allowing trimming with arbitrary curves embedded on the surface. Surface/surface trimming requires the intersection curve to be calculated, and this does not update if the cutting surface is moved. The intersection curve is a parametric one in the trimmed surface, meaning that if the trimmed surface is modified, the intersection curve (and hence the trimming region) may change shape, too. For these reasons, it is probably best to leave surface trimming until the rest of the model is completed and faired.

Developable surfaces can be generated between two edge curves. The developable surface is not automatically updated as the edge curves are adjusted (as it is in some of the other programs, eg, MultiSurf), hence a manual process of updating the edges surfaces and recalculating the developable surface between them is required to produce an acceptable surface.

When a surface or curve is being edited, fairness can be visualised with dynamically updating curvature porcupines (which can be made proportional or inversely proportional to the radius of curvature) on surface parametric and contour curves. If the latter is chosen, porcupines are shown on all visible contours. There is no fore-shortening tool. A 3D rendered view of the vessel may be displayed, and false-colour plots of mean, absolute, and Gaussian curvature can also be shown.

The help and user guide (which contains six tutorials) were approximately average, with tutorials facilitating the familiarisation process. A slight frustration with the tutorials was a lack of screen shots indicating the toolbar buttons or menus for the required commands; this sometimes required searching out a particular command in the online help, thus slowing down the learning process. Six sample files are included, one of which was not particularly fair. A range of NACA foil sections can be used to generate curves, which can be extruded or revolved to form surfaces.

Although the program did not crash, several minor bugs were discovered during evaluation of the software. Technical support was good.

FastShip: Proteus Engineering, Anteon Corp

www.proteusengineering.com
flagship@anteon.com
345 Pier One Road, Suite 200,
Stevensville, MD 21666, USA.
Tel: +1 410 643 7496.
Fax: +1 410 643 7535.

FASTSHIP is a NURB surface modeller where the surfaces are adjusted by direct manipulation of control points. It has an area for the viewports and a docking tree window for managing parts and surfaces. The viewport area has a number of standard layouts but these cannot be modified. The interface itself is not as refined as it could be, often requiring quite a lot of mouse clicks, although use of keyboard shortcuts can alleviate.

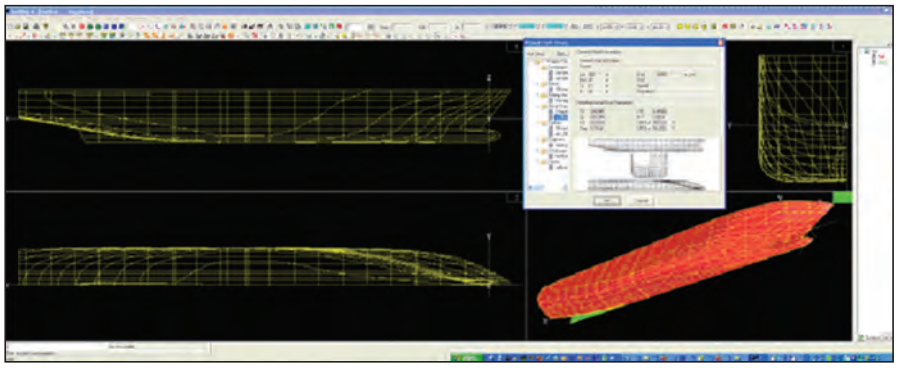
A few commands require a high level of user interaction. Surface trimming is dynamically updated so that if the intersecting surfaces change shape (within certain limits), the trimmed regions update automatically. This does require the user to first define the trimming curves, which can be either sections or surface/surface intersections.

FastShip has the possibility of modifying the surface knot vector to introduce creases into the surface, with an 'insert chine' function. By suitable positioning of neighbouring control points, the chine may be made to fade out so that it only runs along a portion of the surface.

FastShip uses a multi-step technique to produce developable surfaces. The surface edges are first modelled and then ruling lines (generators, based on Kilgore's algorithm) computed. A manual process of updating the edge curves and re-computing the ruling lines is required to obtain suitable edge curves and rulings. Then the surface can be automatically fitted to the ruling lines.

The standard fairing tools are available: foreshortening, Gaussian curvature rendering, and display of curvature porcupines on surface curves. Porcupines may be set to update automatically when a control point is moved, and the length of porcupines may be set independently for each contour - this is useful when the curvature on different contours varies considerably.

An interesting concept in FastShip is that of metapoles: these organise groups of surface control points so as to keep them in a certain relationship. Metapoles are subtly different from merely grouping control points since, once defined, the metapole may be manipulated whilst still maintaining the underlying relationship of the control points. Three types of metapoles are available: vectors (maintains control point positions relative to a vector), planes (maintains control point positions relative to a plane), and corners (maintains control point positions so that an opened out, smooth corner is maintained).



FastShip version 6.1.28.

FastShip has a reasonably comprehensive library of parent hull forms to which the user may add his own models; these can be scaled linearly when loaded. Also available are three Wizards for generating planning, round bilge and containership forms. The capabilities of the hull modification functions are somewhat let down by a number of the sample models which are not as fair as they could be.

Intact upright hydrostatics and transverse stability may be calculated and numerical data provided in tabulated form as a text file, web page, or Microsoft Excel spreadsheet (in this last case, the data are also graphed). The sectional area curve and basic hydrostatics may be displayed and these update as the model is modified.

Hull modification functions (FastGen) are available to allow automatic manipulation of a parent hullform to adjust the sectional area curve and form coefficients. The parent design consists of a single surface for the main hull and, optionally, a second surface for the skeg. A file containing a topological description of the surface layout of the main hull is also required, allowing the user greater control over the way in which the hull is modified. This file contains, for example, a definition of which columns in the control net bound the parallel midbody.

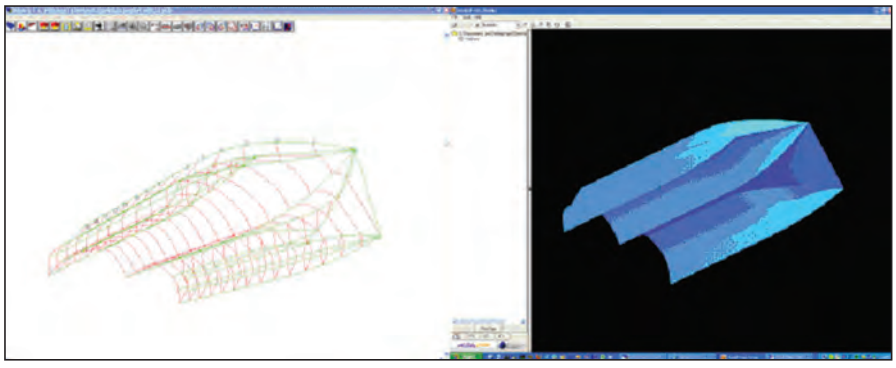
To assist with fitting surfaces to hull offsets, FastShip includes a function to automatically modify the control net so that the surface matches the offset data in the best least-squares sense. There are also tools for fitting surface edges to polyline data.

The online help is relatively comprehensive and provides a number of tutorials covering various aspects of hull modelling.

There were a number of reliability issues including a crash when exiting the program, crash on pressing F1 for Help after an error dialogue, and an inability to read hull files back in on one computer. However, excellent technical support was available, and assurances were made that these difficulties were extremely unusual.

Hullform: Blue Peter Marine Systems Pty Ltd

www.hullform.com
support@hullform.com
92 Dyson St, Kensington, WA 6151, Australia. Tel: +61 8 9474 1288.



Hullform version 9.

HULLFORM was developed in the aftermath of the 1986-1987 America's Cup in Fremantle, Western Australia. It is available on Microsoft Windows and Linux. The hull is defined by sections (quadratic Bezier curves) and longitudinals (cubic splines). Bezier curves are not rational so it is not possible to exactly model arcs of circles or other conic curves. Sections other than the stem must be in a vertical plane with constant longitudinal position.

Only one 'section' - the stem, can lie on the centreline so this makes the design of vessels without transom sterns more complex. Unfortunately, this method of defining the hull is not widely used and since Hullform is unable to export IGES surfaces, compatibility with other CAD packages will be limited to line drawings and polygon meshes. A rendered view is available or the model may be exported in VRML format for a suitable third-party viewer.

The general appearance deviates slightly from the Windows standard but this is probably because it is written to operate under Linux as well as Windows. The toolbar may be customised with any of the menu commands. Window updating after changing display parameters (eg, the number of extra points between sections/lines) was not always automatic and required changing of views to activate.

Little is particularly intuitive, and a number of procedures must be followed and learnt to be able to use the software; it is quite hard to get anywhere without first reading the manual in some detail. Editing of sections is done in a special window and although the section being modified updates dynamically, users will have to manually click 'Redraw', to refresh the slave sections.

Hullform does include a surprisingly large number of additional functions, including intact upright hydrostatic and stability calculations; tank calibration; resistance prediction using a number of common regression-based methods; shell expansion drawings with stringers, and expansion of developable plates.

Plate development is for plates with single curvature only; ruling lines may be calculated between two longitudinal edges, but these are not dynamically updated and so it is quite hard to see how adjustments in the edges affect the ruling lines. Once a user has his own rulings, guidance for fitting an actual surface to the developable surface is given in the form of indicators showing where each ruling line intersects the section; the designer then manually fits the section to those points.

Essentially, the design is done on one surface at a time, but due to the nature of the modelling method, quite complex vessels can be generated. It is possible to combine several files into one to generate even more complex models. Surface trimming is not supported.

The manual contains descriptions of all the commands and some information on the design approach, but is a bit light on step-by-step instruction for achieving a certain design feature. Again, there were reliability issues: the program crashed when the 'Extra points' between sections was too high (100), and the program stopped responding during a stability analysis. The software also crashed without warning on a number of other occasions.

2006 RINA
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Entries close 1st January 2007

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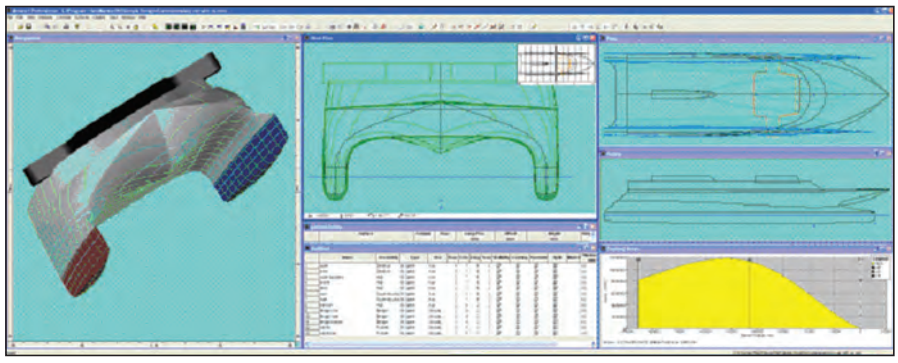

Maxsurf version 11.12.

MAXSURF is a NURB surface hull-modelling program that has been in development since the mid 1980s. At that time it was known as MacSurf and available only on the Apple Macintosh. Since the mid 1990s, it has been available on Microsoft Windows PCs and is now up to version 11.

Maxsurf uses NURB surfaces to define the model, and the surface control points are manipulated directly to adjust the surface shape. Reference points, DXF files and images may be displayed in the background. Up to 400 surfaces may be used in a single hull model. Surfaces may be joined together about a common edge, making them move as one. The join may be specified to maintain tangent continuity between the surfaces (by automatically adjusting the necessary control points) or not.

Surfaces may be dynamically trimmed against one another, though it is not possible to choose which surfaces should be used to produce intersection lines, and this can making trimming fiddly on surfaces which have many intersections. Having said that, trimming simply requires clicking in the portions of the surface a user wants to remove.

As well as graphical interaction with control points and other objects, Maxsurf also provides all data in easily accessed numerical tables. The table of control point positions is particularly useful for any numerical adjustments, since data may be copied to and from spreadsheets, opening many possibilities. The surfaces making up the model are managed in a tree, which provides a quick way of setting display and edit options for groups of related surfaces. A graph of the sectional area curve (along with tabulated data) is also provided.

A useful feature, when editing control points in the body-plan view (where control points tend to appear on top of one another), is a control box which allows a user to display a single control point column at a time. The control box also allows viewing of a single section though the hull and when a control point column is selected, the single section is automatically changed to that closest to the longitudinal position of the column - the area of the hull which is most affected by movement of these control points. Fairing visualisation tools include: false colour rendering of curvature; dynamic updating of curvature porcupines on curves; and foreshortened display. In addition, a patch of control points on a surface may be automatically smoothed to varying degrees.

Developable surfaces are not generated directly in Maxsurf. Instead, ruling lines are drawn between the longitudinal edges of the surface. The ruling lines update dynamically as the shape of the edges changes, assisting in defining edges between which a developable surface exists. Once the edges have been defined, marker points may be generated where the ruling lines intersect the sections and these serve as a guide for adjusting the NURB surface to fit the developable surface.

Assistance for fitting surfaces to offset data (markers) is provided with a number of tools in the Markers menu. These include: automatically generating the grid of sections, waterlines and buttocks from the marker data; sorting markers into stations and sorting the markers on each station so that they are sequential (if they are provided as random data); fitting a surface marker to a selection of markers; and fitting surfaces to markers. This last command uses the existing surface mesh as a starting point and attempts to adjust the mesh to the markers so as to minimise deviation but also maintain surface fairness. The fitting uses only the markers that have been assigned to that surface; it is also ideal for fitting surfaces to the markers generated from the ruling lines on developable surfaces.

Maxsurf is able to calculate upright hydrostatic data at the design waterline. A sectional area curve (with tabulated data) is updated as the model is modified. The add-on module Hydromax provides comprehensive intact and damage stability analysis.

The parametric transformation function in Maxsurf may be applied to any model. It uses a non-linear transformation of the surfaces to achieve specified hydrostatic parameters: midship area coefficient, LCB position and either block or prismatic coefficient. In addition, constraints for up to three of the following: displacement, length, beam, and draught, may be specified; these are achieved using linear scaling of the vessel dimensions. The transformations preserve the fairness of the parent design.

A reasonably comprehensive manual is provided in pdf format. This includes a tutorial to guide a user through his/her first design as well as detailed explanation of some key features.

A key feature in Maxsurf is the VBA interface. This allows a user to write macros in Visual Basic (say an Excel spreadsheet) to open a design and manipulate it as required. Coupled with the parametric transformation capabilities available in Maxsurf, this makes it very quick to generate a series of vessels from a parent hullform.

There were no reliability issues with Maxsurf during the review. Technical support was very good.

Seen here shortly before her completion last month by the Rauma yard of Aker Finnyards is the newest cruise-ferry for the expanding Estonian operator Tallink. The 22knot *Galaxy* is capable of carrying 2800 passengers in luxurious surroundings, mainly between Helsinki and Tallinn, with space also on board for cars and lorries. The ferry has been built to Bureau Veritas standards, including the highest ice class, 1A Super, and is fitted with catalytic converters to limit exhaust emissions. More details appear in our February 2006 article (page 32).

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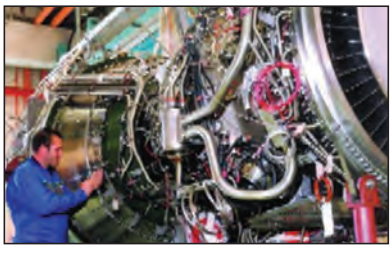

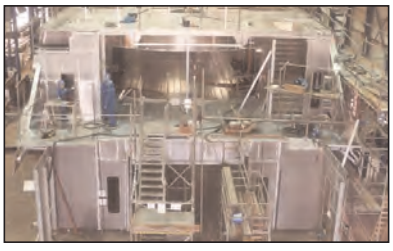

In a world of rapid changing technology, the education, training and professional development of a modern engineer will start at further or higher educational establishments but must continue throughout the engineer's professional career.

This conference will provide an opportunity through presentations and panel discussions to identify the maritime industry's needs, today and in the future, and to discuss how these might best be met by education and training providers

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Glass-bottom cruise concept searching for builders

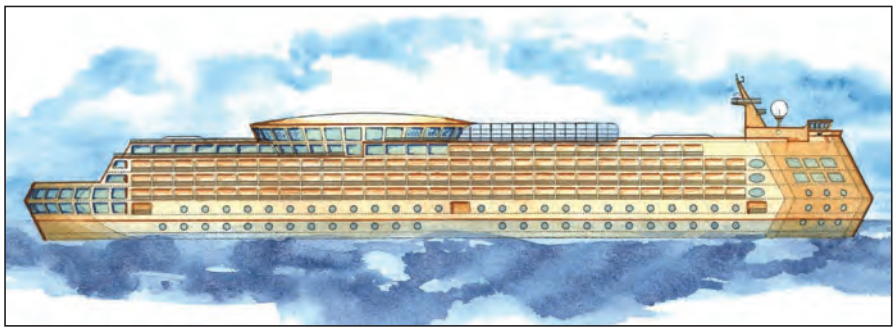
A NEW 'ocean-living' concept in cruise ships is currently being developed into a workable functional design, and which is provisionally being known as the UnderSea Resort and Residences. The Cala Corp, based in the USA, is in the processing of conducting a survey of shipyards which are capable of building a number of vessels of this size (210.00m x 48.00m), which will not be a cruise ship per se, but a 'floating resort'.

Cala Corp tries to avoid using words like 'cabin' and 'passenger' because it does not see this ship as a cruise vessel, and the company does not transport passengers. People using the vessels are referred to as clients. It is anticipated that, eventually, all key drawings and documents will be approved by Lloyd's Register.

This ship has been designed with a 'glass bottom' concept. There are two horizontal rows of circular water-tight windows, but only the lower row is below the water. Inboard of the side shell, with a similar set of windows, is a double hull. The space between the double hull is accessible from the living spaces. For safety, in the event that an outer window leak, water is automatically drained to a bilge tank which in turn, is automatically pumped overboard.

Normal operation of these vessels is planned to be stationary, ie, moored/anchored in specific locations. Everyday electrical supply is bought from the local shoreside authorities; however, the vessels will have generators onboard capable of 100% back-up in the event that the shoreside supply is interupted.

If the vessels are moored in the projected path of a hurricane, clients will be evacuated as if they were living on land. The onboard electrical supply will then be diverted to four thrusters, and the vessel will sail away from the hurricane path under its own power. Only the operating crew will onboard under these circumstances.



An impression of Cala Corp's innovative 210.00m 'glass-bottom' cruise ship, that will actually be static most of the time.

TECHNICAL PARTICULARS
UNDERSEA RESIDENCE SHIP

Length, oa	210.00m
Length, bp	201.60m
Breadth moulded	48.00m
Depth moulded 3rd floor (design)	9.50m
Depth, moulded 7th floor (max)	23.50m
Depth, to top of mast	42.80m
Draught, design	4.00m
Speed	7knots-8knots
Generators	4 x 1655kW each at 900rev/min, 1 x 350kW
Emergency generator	1 x 350kW
Cabin units, 1000ft²	303 (606 passengers)
Timeshare units, 2000ft²	145 (470 passengers)
Residences, 2500ft²	120 (400 passengers)
Classification	Lloyd's Register +100 AT, Ocean Residences, LMC, OIWS, PM
Flag	USA

The seven-deck ship will have one-third of its residences below sea level and the average suite size will be 279m² (3000ft²), all which will be supplied with expected cruise-style amenities. Underwater visibility will be extremely clear, so passengers will have a direct aquarium view of the sea. Passenger accommodation will be in cabins with a minimum size of 93m². Underwater cabins, however, will be marketed only with the unit located directly above, resulting in a minimum size of 186m².

An important technical feature of the vessel, designed by Ray Francis and which has a length of 210.00m, a breadth of 48.00m, and a speed of 7knots-8knots, will be specification of Intelligent Engineering's Sandwich Plate System (SPS) construction technique. This will ensure that passenger units are separated, without having stiffeners protruding into the space.

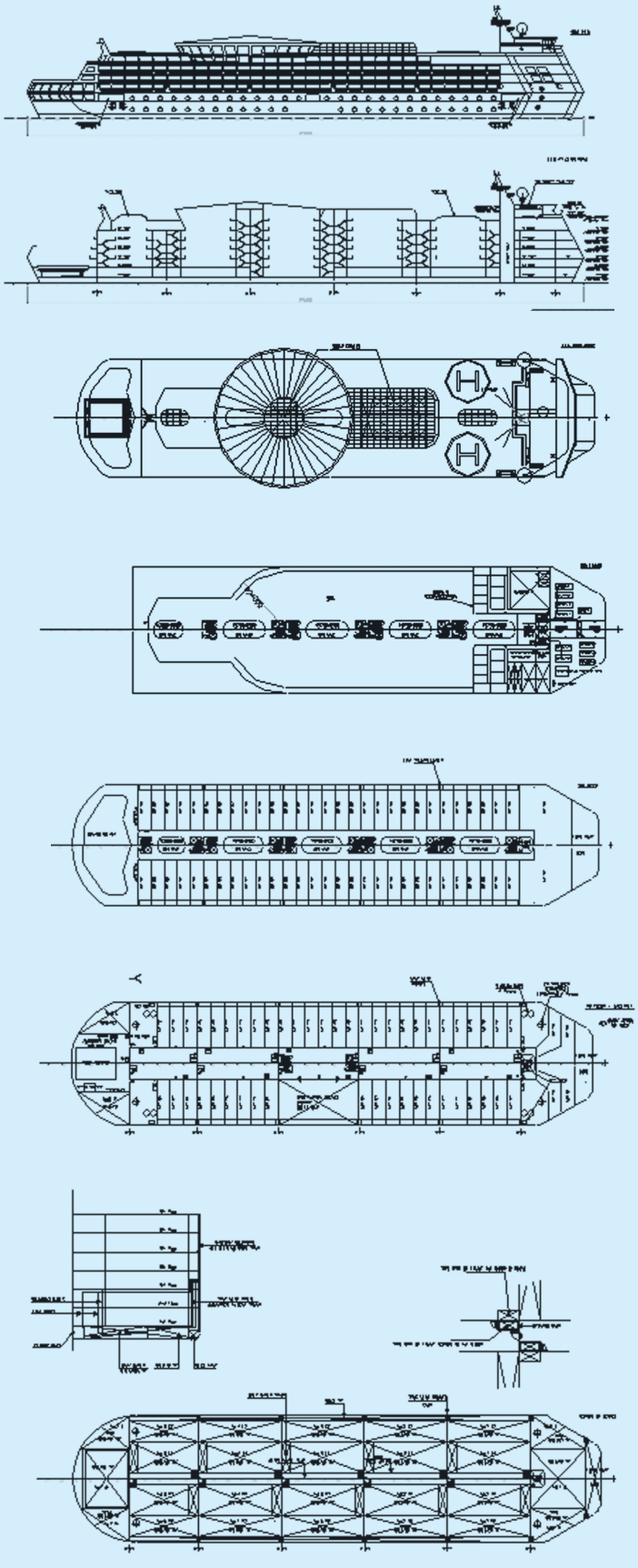
The ship will be constructed from carbon steel to classification requirements. The underwater glass area will be made from acrylic, as used in modern aquariums, and the glass areas above water will be made from a commercial grade, similar to material used in cruise ships.

Passenger facilities include a swimming pool at the aft end, and a waterfall, which will be incorporated into the superstructure at the forward end of the pool area. A disc-shaped dome superstructure will be located between frames 19 and frame 29 containing part of the spa (claimed to be the largest ever built), as well as shops, restaurants, and conference rooms. Extensive use of glass will be incorporated. The roof will also support solar panels for hot water, which will assist that obtained from electrical power from shore supply or generated onboard. 'Bubble' domes will be located over the openings in the 6th floor located between frames 4 and frame 11, and frame 31 and 34. There will again be the use of glass all around.

A helicopter landing area will be located on the 7th floor in the forward part of the ship. The platform's design will be in accordance with classification requirements and will accommodate a Sikorski SK76 helicopter for minimum operational requirements. The designer plans that his vessel will be installed with four Rolls-Royce ducted CP-propeller retractable and azimuthing thrusters, with 360deg rotation. Each electric drive will absorb a minimum of 1500kW each at 1800rev/min, and each will be powered off a 690V switchboard.

Clients will be able have a choice of cabin/suite ownership: timeshare; fractional; permanent; or annual, month, or life. The Undersea Resort and Residences vessel may be dedicated to just 'time share' (weekly ownership) or 'fractional' (three week ownership) or 'Residence' (permanent ownership), or a combination of all three. If a 'client' buys a 'time share' or 'fractional' unit at one location, it includes all locations, ie, if 'clients' buy a time share in Cacun, they then have the use of the equivalent 'time share'/'fractional' located in New Zealand or any other location.

General arrangement plans of Cala Corp's proposed floating resort, which would have underwater windows as a novelty.



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6, 8, 9 cylinder
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339–747 kW

3400
6, 8, 12 cylinder
187–1,044 kW

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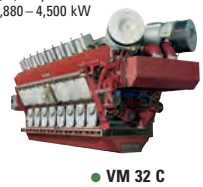
254–526 kW



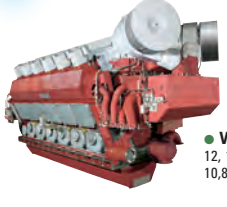
VM 32 C
12, 16 cylinder
5,760–8,000 kW

C9
6 cylinder
375 kW

M 43 C
6, 7, 8, 9 cylinder
5,400–9,000 kW

C7
6 cylinder
187–339 kW

3100
6 cylinder
187–339 kW



VM 43 C
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Noordam sets off on maiden voyage

THE Holland America Line ship, *Noordam*, recently began operating, powered by one LM2500 gas turbine-generator set in a COmbined Diesel and Gas turbine (CODAG) configuration, supplied by GE Marine. *Noordam's* maiden voyage was on February 22, 2006.

This 290m-long ship can carry 1918 passengers and a crew of 800, with a maximum speed of 24knots. *Noordam* is the last of four ships in Holland America Line's Vista class; the three others - *Zuiderdam*, *Oosterdam*, and *Westerdam* - are also powered by GE LM2500 gas turbines in a similar configuration.

The GE gas turbines in cruise ship service are configured in two different types of arrangements: 16 LM2500+ gas turbines are the basis for a COmbined Gas turbine and steam turbine integrated Electric drive System (COGES) used aboard four Celebrity Cruises and four Royal Caribbean International cruise ships; and six LM2500+ and four LM2500 gas turbines are used in CODAG arrangements aboard four Princess Cruises, one Cunard Line, and four Holland America Line cruise ships.

High reliability of gas turbines aboard cruise ships is due to preventative maintenance programmes in place. Routine, preventative maintenance is scheduled to complement cruise ship itineraries; the Royal Caribbean/Celebrity Cruises fleet now has accumulated over 30,000 hours without maintenance.

Average time between maintenance activities, including hot section refurbishment, has significantly exceeded initial estimates. As a result, ship operators are claimed by GE to have experienced reduced maintenance costs and increased flexibility in maintenance planning. Through normal inspections and monitoring, maintenance events have been able to be planned. For instance, gas generator exchanges have been scheduled during port stays, with the plant ready to return to service in less than nine hours.

There are now a total of 17 cruise ships powered by GE gas turbines, with 22 LM2500+ and four LM2500 GE gas turbines being used, logging over 400,000 hours in service.

The cruise liner *Noordam*, which recently started her maiden voyage from Venice, is powered by one 14MW GE Marine LM2500 gas turbine-generator set plus five diesel-alternators (49,780kW) in a COmbined Diesel and Gas turbine (CODAG) configuration.

Bigger might not be better

DURING a panel discussion on megaships at the Seatrade Cruise Shipping Convention, the cruise ship chief designer, Maurizioi Cergol, at Fincantieri, reportedly said that there is no technical reason that ships will not become even larger. This sentiment was agreed with by Tom Degerman, vice president of cruise vessels at Aker Finnyards.

It has been reported that Cergol went on to say that cruise lines have economic incentives to build huge ships because of the 'economies of scale' they provide, such as reduced investment, crew expense, and operating expenses per berth, compared with smaller ships. The downside to these larger ships includes a lack of ports able to accommodate their vast size, the high building cost, long queues for passengers and less cabins with windows, as well as less open deck space.

To put the growth of cruise ships into perspective, Degerman also noted that in 1999 a new generation of megaships was led by Royal Caribbean's *Voyager of the Seas*, which is 137,300gt and has 1557 cabins. Today, the largest ship is Royal Caribbean's *Freedom of the Seas*, at 158,000gt with 1816 cabins, which was scheduled for end-April handover. In comparison, Royal Caribbean's *Genesis* ship, scheduled for delivery in 2009, will be 220,000gt with 2700 cabins. Such huge ships of the future will be too big for many ports, and may require passengers to be shuttled by boats to and from the vessels.

Royal Caribbean International's president Adam Goldstein went on to say that his company is focussing on bringing the large *Freedom of the Seas* series into service, while planning for the arrival of the even larger Genesis in several years time. It was also noted however, that check-in times at cruise terminals have doubled or tripled - now taking four to six hours - since the increased security resulting from September 11, 2001.

The huge ships of the future also pose challenges for ports, commented William Tatham, vice president of the port authority of Jamaica. Already, larger cruise ship crowds disembarking in Jamaica have resulted in operators 'funnelling off passengers in many directions' for on-shore excursions, by finding alternatives to the traditional tours and attractions.

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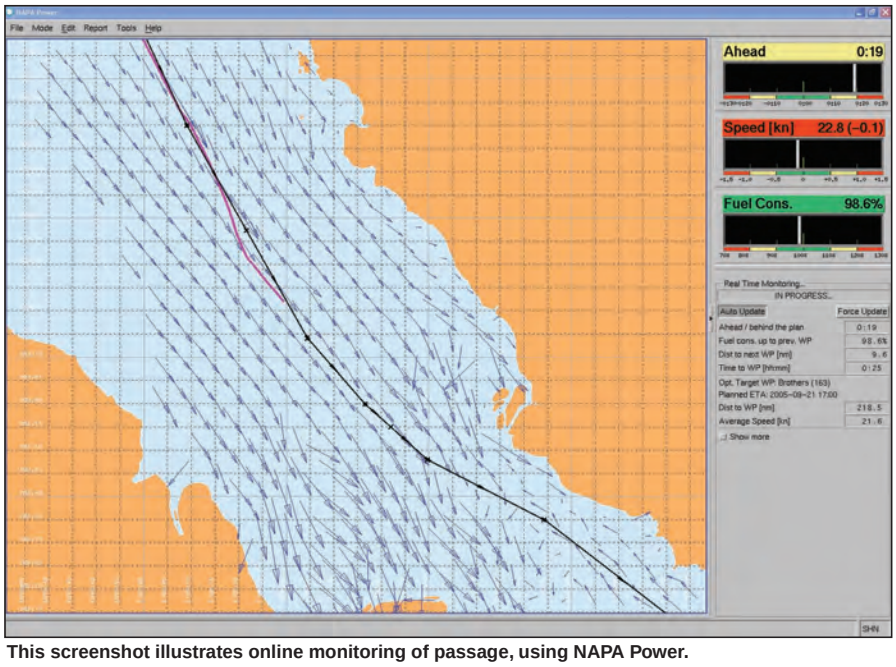
Fuel savings with optimisation software

FUEL savings have been reported by Star Cruises, the leading Asia-Pacific cruise line, onboard *SuperStar Virgo*, due to the use of the NAPA Power fuel economy software system developed by Onboard-Napa Ltd. During a pilot run, high annual cost savings were substantiated for the vessel and Star Cruises has already decided to expand the use of NAPA Power throughout its fleet in 2006, in order to maximise these benefits. First in line will be installations on *SuperStar Gemini* and *SuperStar Libra*.

Star Cruises' decision to look more closely into the NAPA Power software system followed the line's use of the Onboard-NAPA loading computer which has been in use since the late 1990s. Rising bunker prices have also meant there is a need to adopt all possible fuel-saving measures.

NAPA Power was taken into use onboard *SuperStar Virgo* in 2004. Star Cruises achieved positive results through consistent use of the system. Onboard the vessel, NAPA Power was directly connected to the propulsion controls, to enable its use as a speed pilot. This optimised the speed profile - calculated by NAPA Power - to be executed at a precision of 0.2knots.

Comparison of a six-month period of NAPA Power's use against a corresponding period without the system revealed savings of more than 21tonnes of heavy fuel oil (HFO) per week, which corresponds to 4.3% of HFO used for propulsion. These savings were achieved mainly by optimising the speed profile, finding the right engine combination for each part of the voyage, and by executing the optimal speed through the direct speed pilot connection.



This screenshot illustrates online monitoring of passage, using NAPA Power.

NAPA Power is claimed to be an easy-to-use tool for efficient operation of single ships and for monitoring of large fleets. The system assists the master in planning and executing voyages, the aim being to reach the destination on time at the lowest possible cost. NAPA Power finds the optimal way to operate the vessel by optimising the route, speed profile, and propulsion mode for each part of the voyage. The actual fuel consumption, engine and navigational data are collected and forwarded to the NAPA Power Office Module for further analysis and reporting purposes. When acting as a speed pilot, NAPA Power can execute the optimal plan safely, with minimum effort required from the user.

With strong tidal currents, varying water depth and diesel-electric propulsion with four main engines, many parameters need to be taken into account in order to find the optimal speed and engine mode for each part of the voyage. Skillful operation of NAPA Power can yield tremendous savings in fuel consumption.

The onboard system can be used for optimising speed, route, and propulsion mode; real-time monitoring of passage; executing the optimal plan by the speed pilot; simulating the cost effect for any arrival time or speed profile; rescheduling a voyage in order to meet changes in arrival time; and weather routing. In combination with the onboard system, the Office Module can be used for: follow-up of fleet performance; simulation of costs for a changed estimated time of arrival; reporting of fuel consumption and key performance indicators; reporting and follow-up of energy consumption throughout the fleet.

NAPA Power is based on an accurate NAPA model of the ship. The model combined with weather and current forecasts gives precise performance calculations. The calculation engine of NAPA Power is based on the same technology as utilised by the ship design NAPA system used by shipyards, design consultancies, navies, and classification societies. In addition to the NAPA model, all available model test and full-scale trial data are used to perfect NAPA Power's accuracy.

Engines chosen for post-Panamax ship

AN ORDER has been placed with Wärtsilä Corp for the supply of environmentally-sound diesel engines to Meyer Werft, in Papenburg, Germany, for the new post-Panamax cruise ship contracted there by Royal Caribbean Cruises Ltd (RCL) and to be operated by Celebrity Cruises, a subsidiary of RCL. The ship is due for delivery in autumn 2008.

Wärtsilä will deliver four 16-cylinder Wärtsilä 46 engines with a combined power of 67,200kW. The engines will be arranged in a diesel-electric power plant supplying all propulsion and electrical requirements of the vessel.

They will be equipped with common-rail fuel injection systems to ensure that the engines have no visible smoke at any power level while also meeting international regulations for NOx emissions.

The ship is the first of a new class of 117,000gt cruise designs which are able to carry 2850 passengers in 1425 cabins. It will be both the first ship operated by Celebrity and the first built at Papenburg that exceeds 100,000gt. It will have overall dimensions of 315m long by 36.8m wide.

Although these are the first Wärtsilä medium-speed engines for Royal Caribbean Cruises Ltd at Meyer Werft, Wärtsilä has supplied engines for a number of other RCL cruise ships, including the Voyager and Freedom classes.

New air filters improve safety and environment

A NEW concept in air filters has recently been released by Barwil Unitor Ships Service. This 3G Air Filter and tobacco smoke eraser is intended for public and indoor spaces, and said to remove practically all airborne impurities, including smoke, dust, spores, bacteria, gases, and viruses. Already tested by one of the world's largest cruise operators, these filters contribute to the improved health and welfare of crew and guests, as well as greater environmental performance.

The 3G Air Filter and tobacco smoke eraser technology is claimed to be completely new to the maritime industry. By removing particles from the scale of molecules (1/10,000th of a micrometer) up to dust and spores (100micrometers), the filter in effect does the job of a particle filter, HEPA filter, and gas filter. The 3G Air Filter removes 99% of the particulates and 95% of the gases associated with tobacco smoke, benefiting both smokers and non-smokers.

The new system has undergone trial tests onboard a major cruise ship and further tests are planned in the restaurant/bar area of another cruise ship. In all tests so far, the 3G filters have resulted in significantly improved air quality and also improved employee satisfaction. Because the filter removes airborne contaminates such as viruses, bacteria and spores, it also promotes the health and well being of passengers and crew.

Shell doors for Ultra Voyager

A SERIES of doors for installation aboard the latest Royal Caribbean Cruise Line (RCCL) Ultra Voyager cruise vessel *Freedom of the Seas*, just completed by Aker Finnyards, Finland, has been delivered by TTS Ships Equipment. At about 160,000gt, the new vessel is the largest cruise vessel ever built.

TTS Ships Equipment has already supplied similar systems to all five of the previous Voyager class ships. Under a design, build, and installation (turnkey) contract, TTS has provided side shell doors for various functions - passenger entry, luggage, bunkers, spare parts, provisions, and mooring.

Following the successful installation of a TTS-designed side shell door retrofit onboard Norwegian Cruise Line's (NCL) 75,338gt cruise ship *Norwegian Spirit* during 2005, NCL, headquartered in Miami, has again used TTS Ships Equipment for similar work onboard the 91,740gt *Norwegian Star*. This is the third such refit project carried out by TTS for NCL during the past 18 months.

The installation work was carried out in San Francisco Dry Dock during the vessel's scheduled drydocking operation in March. The work onboard *Norwegian Spirit* was also carried out in the same shipyard.

TTS Marine has recently expanded its US operations and has relocated its headquarters to Miami in order to better serve its customers and to meet the ever-increasing demands of the cruise industry. TTS Marine Inc now has three service stations located in San Francisco, New Orleans, as well as Miami.

Combined energy audits and training for fuel savings

FUEL efficiency is a key word today in practically all stages of shipbuilding and shipping. New projects are always developed with utmost attention on fuel efficiency related to hull geometry, hull openings, appendages, hull roughness, system configuration, and performance. RANSE-theory-based CFD is often applied for developing the hull shape with all its details before starting model testing. Model tests are carried out to try and reach the absolute state-of-the-art design, not only to fulfil specification.

Systems are configured and simulated to operate at maximum efficiency in typical operational conditions, not just dimensioned for certain maximum conditions. In many projects, energy audits are carried out during the design and building period of a newbuilding and during operation. These audits combined with efficient training will help to secure the most fuel-efficient use of a vessel, its systems and maintenance.

The Finnish consultancy Deltamarin has now built eight training programmes, held at its own offices, comprising 10-day courses to consider the principal sources of fuel consumption onboard cruise ships such as propulsion, air conditioning, and energy production.

Royal Caribbean Cruise Line and Celebrity Cruises were the first to take up these training programmes at the end of 2004, and about 120 persons will be trained by the end of 2006. This programme has been further developed into three/four-day courses.

Several other cruise and ferry operators are also taking up these training programmes. The new courses can be offered at a client's premises either onboard, ashore or combined, or at Deltamarin premises.

Energy audits of complete fleets are being carried out and in most cases they are combined with efficient officer and superintendent training. Typically, 10 to 15 fuel-saving actions are found and recommended, with low investment costs leading normally from two to six months payback time. The typical fuel saving potential is varying between 5% and 12%, but even higher figures have been found in certain specific cases.

MaK power chosen for Signature class

THE first Signature-class vessel building for Carnival company Holland America Line (HAL), at Fincantieri Cantieri Navali's Marghera yard will be powered by four MaK 12M43C engines plus two MaK 8M43C models to provide a total of 64,000kW for propulsion and onboard electrical power. In addition to this firm order, the contract includes an option involving another 12 MaK marine engines to power two more vessels. This contract marks yet another important advance into the cruise liner sector for Caterpillar MaK, following last year's contract for two new Aida ships at Meyer werft.

On the technical side, the Signature class vessel will feature state-of-the-art navigation and safety systems including dynamic positioning capabilities. The six MaK M43C diesel engines will drive AC generators to provide all the energy needed for the comprehensive onboard facilities, all the auxiliary systems as well as for the Azipod propulsors. Every engine will be fitted with MaK's Flexible Camshaft Technology (FCT) to guarantee invisible smoke and nitrogen oxide emissions below current IMO regulations.

Caterpillar Marine Power Systems' focus on safety and emissions fits cruise companies' strategy to expand their operations in emissions-sensitive areas and their increasing focus on environmental protection. In addition to these aspects, the average size of cruise vessels is growing continuously, in parallel driving the demand for propulsion and onboard power supply to new heights.

New simulator for Carnival

BMT Seatech, a subsidiary of BMT Ltd, has announced the installation of PC Rembrandt, the real-and fast-time ship-handling and manoeuvring simulator, as part of Carnival UK's state-of-the-art simulation facility in Southampton, UK. The system became operational at the end of March this year.

As part of a commitment to providing training for crew and officers, Carnival UK has chosen PC Rembrandt for its training platform that also features Simutech Radar Simulation and a SAM Electronics integrated bridge system. The training suite will also benefit from three massive plasma screens to allow unparalleled versatility for display options including 'out-the-window' views for the simulated training vessel.

The latest version of PC Rembrandt features enhanced 3D graphics and an expanded mathematical model, allowing for claimed unrivalled accuracy in simulating the manoeuvring of any Carnival vessel under a range of environmental conditions and locations. PC Rembrandt is also easily adaptable to combine both 2D and 3D vessel simulation.

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ICSOT 2006 - Design, Construction & Operation of Natural Gas Carriers and Offshore Systems

14 - 15 September 2006, Busan, Korea

Second Notice

There is considerable optimism about the future of the natural gas market. A significant growth in the number of gas carrying vessels is expected, resulting from both an increase in demand and the current programme of scrapping older vessels.

While some companies are looking at the possible economies of scale of larger vessels (in the range of 175,000- 250,000 cu.m.) others are looking to develop options for developing small vessels to exploit shortsea and coastal trades in natural gas.

New alternatives to LNG including compressed/pressurised natural gas (CNG/PNG), where the gas is stored under pressure at ambient or semi-refrigeration temperatures, are also being developed. There is also a growing interest in floating production, storage and offloading systems for offshore oil & gas developments and re-gasification tankers and plants designed to avoid the need to construct huge land-based processing and distribution centres.

RINA invites papers on all aspects of the design and operation of gas carriers & other offshore systems, including the following topics:

- Design of larger capacity vessels
- Design of Shortsea & Coastal Vessels
- Greater flexibility in design to cater for spot market trading
- Floating plants/vessels
- Alternatives to LNG - CNG, PNG etc.
- Optimisation of power plant in gas carrying vessels
- Issues associated with the partial filling of tanks

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Bigger ships call for innovative evacuation solutions

CRUISE ships, as *The Naval Architect* readers are no doubt aware, are getting larger and larger. The new superliners currently being built, or on the drawing board, will soon be carrying upwards of 5000, 6000, and even 7000 passengers. This is more than double the size of a current 'normal' large cruise liner which can carry around 2000 passengers. And because of this increase in capacity, such vessels will present a new safety challenge for designers, builders, equipment companies, and regulatory authorities.

Danish company Viking has supplied mass evacuation systems to the largest of superliners, and designs systems that are potentially able to evacuate all onboard within the required 30 minutes - no matter what the design of the ship. Deck space and sea view are important factors when designing a vessel and the safety equipment onboard. Space is a premium and evacuation equipment needs to be not just compact but also discreet. Mass evacuation systems by Viking are claimed to be compact and can be either fitted into the ship's side, between decks, or free standing.

Additional liferafts can be placed almost anywhere onboard - even in otherwise inaccessible areas - and remote released. Davit-launched liferafts, an alternative to mass evacuation systems, are also designed to be as compact and discreet as possible.

Propulsion system order for MSC giants

A MULTI-million Euro contract to supply electric propulsion systems for the next two MSC Cruises vessels, *MSC Fantasia* and *MSC Serenata*, has been awarded to APC Power Conversion, a division of the Alstom group.

To be delivered respectively in 2008 and 2009, these new cruise ships, to be built at Chantiers de l'Atlantique, in St Nazaire, will be among the largest ever ordered in the world and will be much larger than *MSC Musica* and *MSC Orchestra* which are currently under construction, and also fitted with APC's electric propulsion systems. They are due to be delivered by Chantiers de l'Atlantique in 2006 and 2007.

The latest mega liners, 333m long and 38m wide, will carry up to 3887 passengers and more than 1300 crew members. They will each be equipped with two synchronous motors, 20.2MW each, supplied through synchroconverters. APC's scope of supply will also include the propulsion transformers, an advanced digital propulsion control and a remote control system.

New management system for fleet

AIDA Cruises is now using the Ship Administration Management System (SAMS) from Ms Logistik Systeme, a subsidiary of Germanischer Lloyd, on all ships in its fleet, including the newbuilding *AIDAdiva* and sisterships. SAMS permits comprehensive management of a ship for the areas of technology, ship operation, and crew. Over 200 ships worldwide are already being administrated by SAMS but AIDA Cruises is the first customer from the cruise shipping segment.

SAMS covers the primary areas of technical management, crew management, and ship management with a total of 17 application programs (modules). For example, the SAMS Port Clearance Module reduces the time needed to prepare all the necessary port documents, while improving their quality and accuracy. With the aid of SAMS, shipowners and managers can increase the availability of ships, reduce downtime and repairs, and also optimise the procurement and stocking of spare parts - thus reducing the administrative effort and trimming the costs.

Network-compatible shipboard and office versions are available. The datasets are synchronised to the scope required by the customer, so that the volume of data to be exchanged as e-mail attachments can be optimised.

New Brazilian agreement signed

Norway's TTS Marine Cranes and Germany's TTS Kocks are set to sign a production agreement with the Brazilian company Techlabor Engenharia Equipamentos e Servicos Ltda, at Sao Goncalo, for the local production of TTS designs covering such equipment as deck cranes, winches, capstans, and other deck equipment.

It is widely believed that newbuilding orders from leading Brazilian owners, such as Transpetro, will take place within the newly revitalised Brazilian shipbuilding industry, with equipment supplied from Brazilian sources. Transpetro, a wholly-owned subsidiary of state-owned oil major Petrobras, is believed to be about to commence a newbuilding programme involving some 22 tankers, all to be built in Brazil. A number of such ships now on order in South Korea and China have included TTS Crane designs for such equipment.

TTS Kocks, Bremen, which became part of the TTS deck machinery division during 2005, designs and manufactures a wide range of deck machinery, including anchoring and mooring equipment.

Contact: TTS Marine ASA, Laksevågneset 12, PO Box 32 Laksevåg, NO-5847 Bergen, Norway.
Tel: +47 55 94 74 08.
Fax: +47 55 94 74 01.
www.tts-marine.com

New software for document management

Kronodoc Oy, the software solutions provider for improvement of information logistics and document control, has concluded a purchase contract with Evac Oy, the Finnish supplier of shipboard vacuum toilet systems. The contract includes product delivery and services to implement the Kronodoc system for product document management and project collaboration. The information logistics solution provides a platform for enhancing the efficiency of document operations internally and externally in the partner network.

Kronodoc will be the centralised product and project information management system at Evac. It also provides means to analyse and improve information processes aimed at increasing the competitiveness of Evac's global operations.

Contact: Raimo Jalonen, chief executive officer, Kronodoc Oy, Finland.
Tel. +358 9 2291 7806.
www.kronodoc.com

New navigation system pilot scheme a success

The Transas Group has successfully completed the pilot project carried out in collaboration with Korean shipbuilder Hyundai Heavy Industries (HHI). Project 1599-1603 outlined the construction of five Aframax tankers built to Det Norske Veritas ice class 1A for PRISCO and Sovcomflot. The vessels are capable of all-year-round navigation in severe climatic conditions.

From September to December 2005, the Transas team installed a new integrated navigational system, known as the Hyundai-Transas intelligent bridge system (HTiBS), onboard *Pavel Chernysh*, *Captain Kostchev*, *Viktor Titov*, *Yuri Senkevich*, and *Viktor Konetsky* (*The Naval Architect* January 2006, page 24, and *Significant Ships of 2005*). The new integrated navigation system is comprised of five multi-functional stations. Each can be used as a radar, ECDIS, or conning display depending on a navigator's requirements, thus improving the working conditions and productivity on a bridge. Besides the multi-functional stations, the five tankers are additionally equipped with three slave workstations.

The Hyundai-Transas intelligent Bridge System (HTiBS) is currently in the final stage of examination by classification society Det Norske Veritas, and this joint development by Hyundai and Transas is set to become the first navigation system of its kind to be certified by DNV, to NAUT-AW class C.

Contact: Transas, 54-4 Maly pr, V O, 199178 St Petersburg, Russia.
Tel: +7 812 325 3131.
Fax: +7 812 325 3132.
www.transas.com

UK economiser manufacturer set to move into marine products

Yorkshire, UK, metalwork fabrication specialist A&J Fabtech is celebrating a boom in business and is looking to expand into the production of marine boiler economiser units. With over 32 years' experience in large-scale fabrication projects including biomass and low-NOx projects for UK power stations, investment in new technology and expertise has enabled A&J to become a player in the industrial economiser market, and the company is now looking to broaden its horizons.

The closure of Greens Economisers, in Wakefield, earlier this year, opened a gap in the market and left the UK with no specialists at all in the design and manufacture of economisers and associated equipment. The company is now targeting smaller scale applications including marine and commercial boiler systems.

All aspects such as welding quality, accuracy of tube fin alignment, and quality of component materials are controlled in-house. The only external element is finned tube manufacture. This component is brought in from specialist manufacturers around the world, allowing A&J to maintain strict control over quality and to speed-up production schedules, matching the supply of tubes to the specification and price required by each project.

Contact: A&J Fabtech Ltd, Walkley Lane, Heckmondwike, West Yorkshire WF16 0PH, UK.
www.ajfabtech.com

Record orders for rescue systems company

Norsafe, a leading provider of maritime rescue systems and high-speed rescue boats, has announced record sales for 2005. During the last two months of 2005, Norsafe received orders with an estimated value of more than NKr150 million (€44 million), a new record. According to Norsafe owner and managing director Geir Skaala, orders have been submitted from maritime clients all across the world, and the surge in demand for Norsafe products was driven in part by developments in the offshore industry in Norway and abroad.

A significant order book in 2005 of NKr260 million (€32 million), represents an increase of 30%, compared to 2004. In 2004, the end of year result was NKr8.5 million (€1 million) before tax.

This current year promises to be another good one; and the company (including subsidiaries) expects to deliver approximately 600 lifeboats and rescue boats also approximately 275 davits. To help keep pace with increased demand, Norsafe purchased more than 90% of the stock in Watercraft Greece SA, a manufacturer of lifeboats, high-speed rescue boats, and davits, based north of Athens.

Following this purchase, lifeboat production will take place at Norsafe's facilities in Norway, China, and Greece. In addition, certain boat models will be produced by licensed manufacturers in Mexico. The davits will be manufactured in a separate factory in Greece, using sub-suppliers in Norway, China, and Mexico, when appropriate.

Contact: Geir Skaala, managing director, Norsafe, P O Box 115, NO-4852 Faervik, Norway.
Tel: +47 37 05 85 00.
Fax: +47 37 05 85 01.
www.norsafe.no

Revised standards for metal hardness tests

Metals need to be rigorously tested for strength and hardness in order to conform to industry standards. Current users of the Brinell, Rockwell and Vickers tests contained within BS EN ISO 6506:1999, BS EN ISO 6507:1998, or BS EN ISO 6508:1999, should be aware that the existing standards for metal hardness tests are being revised and replaced by a new series. Standards should be updated to keep up to date with industry changes by adopting the guidance provided in the following revisions from BSI Business Information.

For each of the tests, all parts should be used. The standards provide guidance on: test method, verification and calibration of testing machines, calibration of reference blocks, and tables of hardness values.

These standards replace the BS EN ISO 6506:1999, BS EN ISO 6507:1998, and BS EN ISO 6508:1999 series respectively. Some parts are available to order now and the rest on a pre-order basis. Pre-ordered standards will be delivered upon publication.

To find out more about the complete series, visit www.bsi-global.com/metaltests, or for more information about metals in manufacturing industries, visit www.bsi-global.com/EWM.

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There is a good demand for providing a wide range of support services such as towage, anchor handling, fire fighting, pollution control measures, loadout, transportation and installation activities, and logistics support for offshore oil and gas industry.

A 2 day event comprising of technical papers presentations and an experts' panel discussion, the conference will provide a platform for designers, builders, OSV owners, operators, drilling contractors, installation contractors to present and discuss future needs and challenges, as the search for hydrocarbons moves into deeper waters.

The conference will consider a wide range of vessel types including and anchor handling tug/supply vessels, offshore supply vessel, multi purpose support vessels, diving support vessels, multipurpose construction vessels, pipe laying vessels, accommodation barges, crew boats, crane barges, etc.

Technical papers are invited on the following areas:

- Design & Construction
- Future Operational Needs of OSV Owners, Operators, Drilling contractors
- Research & Development for specialized equipment for position keeping, underwater inspection & maintenance
- Classification & Statutory requirements
- Logistic Economics for deep water offshore support services
- Patrolling & security of offshore assets
- Installation and maintenance of FPSO moorings
- Future Innovative Technology

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Tel: (65) 6516 5113
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Refining container-carrying designs at Vuyk Engineering

A PARTICULAR expertise of Vuyk Engineering Groningen (the consultancy has other offices in Rotterdam and Romania) is creating and refining multipurpose cargo and container ships for optimum loads and speeds. Thus, the VC Feeder 400 type has been carefully honed for an intake of more than 70% loaded containers, with optional possibilities of cranes, folding hatch covers, and heavy fuel operation. First discussed in this journal two years ago (at a time of much lower demand), the VC Feeder 400 remains a project, possibly because it is too small for European owners at the current time; however, new attention for this design is coming from operators elsewhere, because the hull is able to reach small ports.

However, another example, for which orders have been secured (one plus one option at an unspecified yard for a Mediterranean owner), is the 84.90m length bp VG 4500 type. This 4550dwt ship (also a larger 5200dwt version) is claimed to offer a high level of stability, good cubic capacity for its deadweight, and a relatively high speed for its full hull form.

The VG 4500 is optimised for 226 loaded TEUs, can optionally be brought below 3000gt, is fitted with stools for containers, and comes in various engineroom options for popular Caterpillar MaK and Wärtsilä engine types. Most owners normally request a flap rudder and bow thruster for optimum manoeuvrability.

A further design in between the VC 400 and the VG 4500 types is the VG 4200 sea/river model, with one large box-shaped hold and a hull form optimised at MARIN with the help of Parnassos calculations and associated extensive CFD calculations for best-possible aft-body water flow. This hull offers a low air draught and a high deadweight with a speed of 11.50knots possible from a 1500kW MaK power plant. Six examples are already on order in Romania for an investment group, and the first will be delivered next year.

Recently delivered from the Instalho yard at Werkendam, in The Netherlands, is the first of three 2900dwt multipurpose ships, which are updated designs from the former Tille Scheepsbouw. These are sea-going vessels that have been upgraded for improved damage stability.

A brand-new order for Vuyk Engineering is a contract placed at SSW Schichau Seebeck, in Bremerhaven, Germany, for a series of 16 of the Dutch consultancy's VC Feeder 1000 design. This will also be known as the SSW Super 1000eco. Service speeds of at least 18.50knots will be possible, and Vuyk claims the highest loaded container intake (75% at 14tonnes homogeneous load) of any similar vessel.

An impression of the Vuyk Engineering VG4500 feeder container design. The first order (plus one option) has recently been placed by a Mediterranean owner.

Orders for a fast 1000-plus TEU model

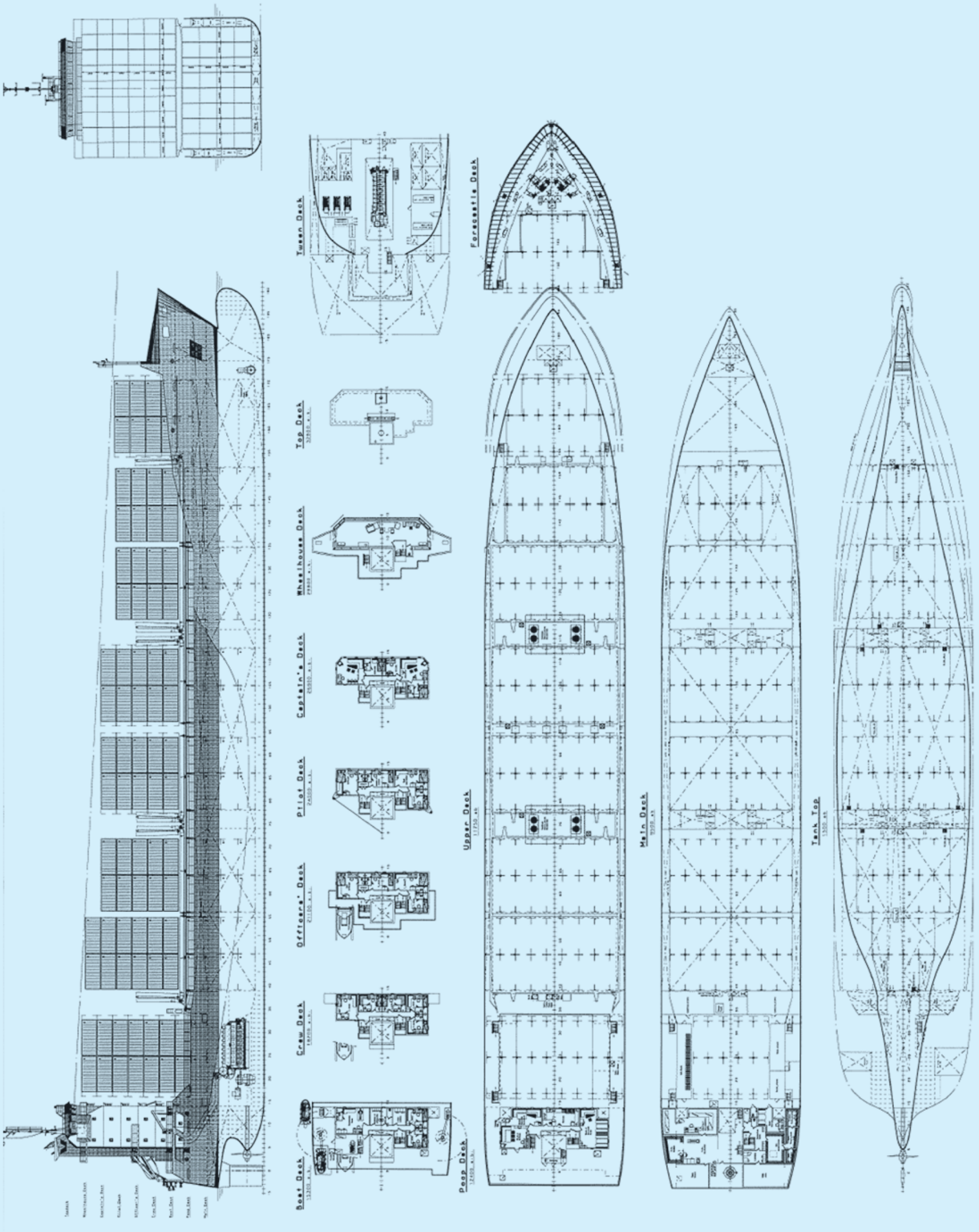
At the time of writing, the collaboration between Vuyk and SSW Schichau Seebeck Shipyard, in Bremerhaven, Germany, has resulted in the first contracts for a lengthy series of 16 fast container ships of a much larger design: the VC Feeder 1000, also named the SSW Super 1000eco. For this type, the consultancy claims the highest loaded container intake - 75% at 14tonnes - of any similar ship currently on the market, with a total nominal capacity of more than 1000TEU boxes, including 250TEU refrigerated containers.

The hull has a length bp of 142.00m, a breadth of 23.40m, and a design/scantling draught of 7.60m/8.00m. The contract speed would be 18.50knots from the 9000kW propulsion engine, but Vuyk believes that 19.50knots is quite feasible. Cell guides are fitted as standard, while options include ice-class strengthening, folding hatch covers and cranes, and the hull is engineered for later lengthening if required.

Apart from activities in the cargo/container sector, Vuyk designers are involved in the currently buoyant superyacht market, and are creating some of the more complicated sections, such as aluminium superstructures. Vuyk has recently contracted the engineering for a new yacht in Turkey. Other work in different sectors includes a proposed new so-called 'sub-Handymax' cargo/bulk carrier in the 20,000dwt-30,000dwt range, an IMO Type II tanker of 16,000m^3, and a 17,500m^3 gas carrier.

The latter is being developed by the German engineering consultancy HB-Hunte, with whom Vuyk has had a relationship for some 10 years. Vuyk is wisely venturing into these other markets to prepare itself for any possible downturn in the cargo/container market.

Preliminary general arrangement plans of the new VC Feeder 1000 design created by Vuyk Engineering Groningen. First orders have been placed for a series of ships to be built in Germany by SSW, at Bremerhaven, where the design will be known as the SSW Super 1000eco.



Busy times for Bakker Sliedrecht

LIKE many other marine equipment companies today, the leading Dutch electrical specialist Bakker Sliedrecht is involved in many interesting propulsion and auxiliary-drive contracts involving ships worldwide, including seven in China. This privately-owned company has developed much of its own cutting-edge technology, such as the new BIMAC (Bakker integrated modular alarm monitoring and control) concept for ship automation, which was first employed on TESO's Damen-built double-ended ferry *Dokter Wagemaker*, presented in *Significant Ships of 2005*. The BIMAC system, which features flexible and modular architecture, is approved by both classification societies and IMO.

In-house-designed frequency control systems are a speciality, able to deal with powers up to 10,000kW, and other products include submersible motors and custom-built designs up to 20,000kW, winch automation systems, and large switchboards of all voltages. Submersible motors (up to 10,000kW) are most frequently used for deep dredging suction pipes or to drive cutter heads; their speed, torque, and power can most commonly be adjusted by Bakker Sliedrecht water-cooled frequency converters, which are convenient for linking to remote control and automation systems. If required for special projects, all electrical controls can be built into a container. Oil-filled submerged motors up to 6500kW - with medium-voltage, frequency-controlled drive - can be assembled for special dredging work at depths down to 155m.

A propulsion motor and switchboard onboard the ferry *Dokter Wagemaker.*

Desks for the Bakker BIMAC system.

Large contract for two pipelayers

Contracts are normally arranged on a turnkey basis, and an especially interesting one currently under way is that to supply the complete electrical installation, in association with Croon Marine & Offshore, for a large rigid-pipe laying vessel being constructed at the nearby IHC Holland Merwede Shipyard for the underwater engineering and construction contractor, Subsea 7. This fully-redundant and dynamically positioned vessel will have a total installed generating capacity of 21,600kVA (six 3600kVA diesel-alternators supplying 6.6kV current).

These gensets will supply power to three 2950kW FP azimuthing propellers in ducts aft, also to a 2200kW tunnel thruster and two 2400kW retractable azimuthing thrusters, all placed forward. The high-voltage network also supplies, through transformers, the pipe-laying equipment and a large deck crane. In addition, current is transformed to 440V and 230V for smaller consumers.

All propellers and thrusters are controlled by Bakker direct-water-cooled frequency converters, which are linked to a Kongsberg Maritime ship automation system. Recently, Merwede signed a contract for a second ship for Subsea 7, but this is slightly different, being designed for handling flexible pipes. Bakker Sliedrecht will also supply the electrical package for this vessel. Also for the IHC Holland group, Bakker Sliedrecht is manufacturing all the electrical equipment for an open-hatch container ship being built at the Kinderdijk yard for Wagenborg Shipping.

Current and recent work in China has included electrical packages for seven dredgers and split hopper barges, of various kinds, at the Xinhe yard in Tianjin for Belgian operator Jan de Nul, also a heavy cutter dredger at Wenchong Shipyard for Long Won Dredging. Full details of these projects appeared in *The Naval Architect* November 2005, page 34. A further contract involves new equipment for the 1984-built Boskalis dredger *Oranje*, now called *Phoenix*, which will be upgraded in Singapore

Bakker is keen to maintain the quality of its current technology and the trust of its existing customers before launching into any revolutionary techniques; therefore, technical evolution advances carefully on a step-by-step basis. Nevertheless, it is possible that some new concepts may be launched soon.

JR Shipping strides ahead with new tonnage

A TYPICAL representative of a band of small but enterprising shipowners that abound in northern Holland and just across the border in Germany around Emden is JR Shipping, located in the Dutch port of Harlingen. The company is headed by Mr Jan Reier Arends, and its expertise is in the container feeder sector, where it operates in close cooperation with a Rhoon (Rotterdam) shipping and chartering broker, Confeeder.

In March this year, JR Shipping, which was visited at Harlingen by *The Naval Architect*, was running a fleet of ships of various sizes, mostly of recent and advanced design. Its newest examples include two open-top (partly hatchcoverless) models of 868TEU (approximately 612TEU at 14tonnes homogeneous load) capacity (*Elan* and *Elite*), which were completed last year by Sietas Schiffswerft and equipped with both a bow and stern thruster. Three larger vessels (*Endeavor*, *Endurance*, and *Ensemble*) of 750TEU (507TEU at 14tonnes), also entered service in 2005 from Volharding Shipyards (the last was actually completed in January this year).

A colour profile of JR Shipping's new 917TEU cellular container ships, which are being built in Turkey to a Volharding Shipyards' design.

TECHNICAL PARTICULARS
JR SHIPPING 917TEU SHIPS

Length, oa	154.85m
Length, bp	144.80m
Breadth, moulded	21.50m
Depth	9.30m
Draught	6.90m
Gross	8970gt
Deadweight	10,600dwt
Water ballast	5320tonnes
Heavy fuel	740tonnes
Gas oil	110tonnes
Fresh water	80tonnes
Containers	917TEU (621TEU at 14tonnes homogeneous weight)
Other lengths	534 x 30ft, 340 x 45ft, also 24.5ft and 49ft on deck
Refrigerated containers	200
Main engine	MaK 8M43
Output, MCR	8000kW
Fuel consumption, including 1200kW shaft alternator	35tonnes/24h at 18knots
Auxiliary diesel-alternators	3 x 441kW
Bow thruster	800kW
Classification	Bureau Veritas +Hull, +Mach, Containership, Unrestricted navigation, +AUT-UMS, Mon-Shaft, IWS, Finnish/Swedish Ice Class 1A

The last-mentioned designs are similar to the *B G Ireland* type from the same yard, which was presented in *Significant Ships of 2003*, being of 9100dwt and capable of an 18knot speed. Three of the six are strengthened to Finnish/Swedish ice class 1A standard.

Six new ships from Volharding

During 2006 and 2007, JR Shipping is scheduled to take delivery of six more ships ordered from Volharding, the first in November. These will be lengthened versions (154.85m length overall, compared with 134.65m) of the *B G Ireland* type with one extra hold and, like all the ships mentioned here, offering very good stowage flexibility and a fast service speed. Interestingly, the ships (together with a further four for another owner) are being completely built and outfitted at the Um Deniz shipyard in Turkey, under a 50/50 joint venture agreement signed in 2004 by Volharding.

This new cellular series will be constructed to Bureau Veritas class and will include ice strengthening to Finnish/Swedish 1A standards. Total container capacity will be 917TEU (approximately 621TEU at 14tonnes), and block stowage will be possible in all bays, while high-cube and wide bodies can be stowed at every position.

In addition, 24.5ft and 49ft containers can be carried on the hatches, and up to 70 refrigerated containers can be loaded in the holds, with a further 130 on deck. An 8000kW MaK 8M43 engine should ensure a service speed of 18knots. J R Shipping is discussing the possibility of equipping some of the ships with cranes. More details of these ships can be found in an article in this feature about Volharding Shipyards.

Meanwhile, the company is putting the final design touches to a new class of vessels of 600TEU capacity, which may be built in China. At the same time, projects for 1200TEU or 2000TEU ships (which would be the largest in the fleet and possibly the largest in the feeder sector) are under consideration. Mr Arends has much firsthand experience to inject into the technical design of any new ships, based on his time as an owner-captain since 1993 and prior to setting up J R Shipping in 2000. He sees good prospects ahead in a bullish market, especially for larger classes of container vessel.

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Positive progress for HRP

A PARTICULARLY interesting new project in the Middle East for HRP Thruster Systems involves the company supplying twin Z-drive units for four 6500dwt bunkering tankers, which are being built at Dubai Drydocks (as part of a strategy by this large repair and conversion yard to diversify more in new construction work) for a local owner, ENOC. Each azimuthing unit suits a rating of 750kW, and HRP will additionally supply a 350kW tunnel bow thruster. All three thrusters will be masterminded by HRP's new multi-thruster control concept, discussed in our May 2005 issue (page 14). It is interesting to record that the company notes a tendency today towards greater specification of azimuthing thrusters on merchant-type ships, and believes this is primarily due to the simple installation and the release of more hull space for cargo.

Back in Europe, another of HRP's new multi-thruster control packages is currently being commissioned on a new Danish Navy research ship, where it will control twin 400kW HRP Z-drive steerable propulsors. The software has been carefully designed using GPS technology, so that the ship can follow a track. A total of six ships are planned.

Overall, HRP reports a very good backlog of orders at the present time, including those for its relatively new shallow-draught thruster. Until recently, this particular design came in various models offering 360deg steering and up to 1000kW output, but today HRP engineers have evolved more powerful versions offering outputs up to 1600kW. The company is anticipating orders for these high-output models very soon, but meanwhile, two 1000kW shallow-draught units have recently been installed as propulsion plants in each of two new US casino ships operated by Blue Chip Casinos.

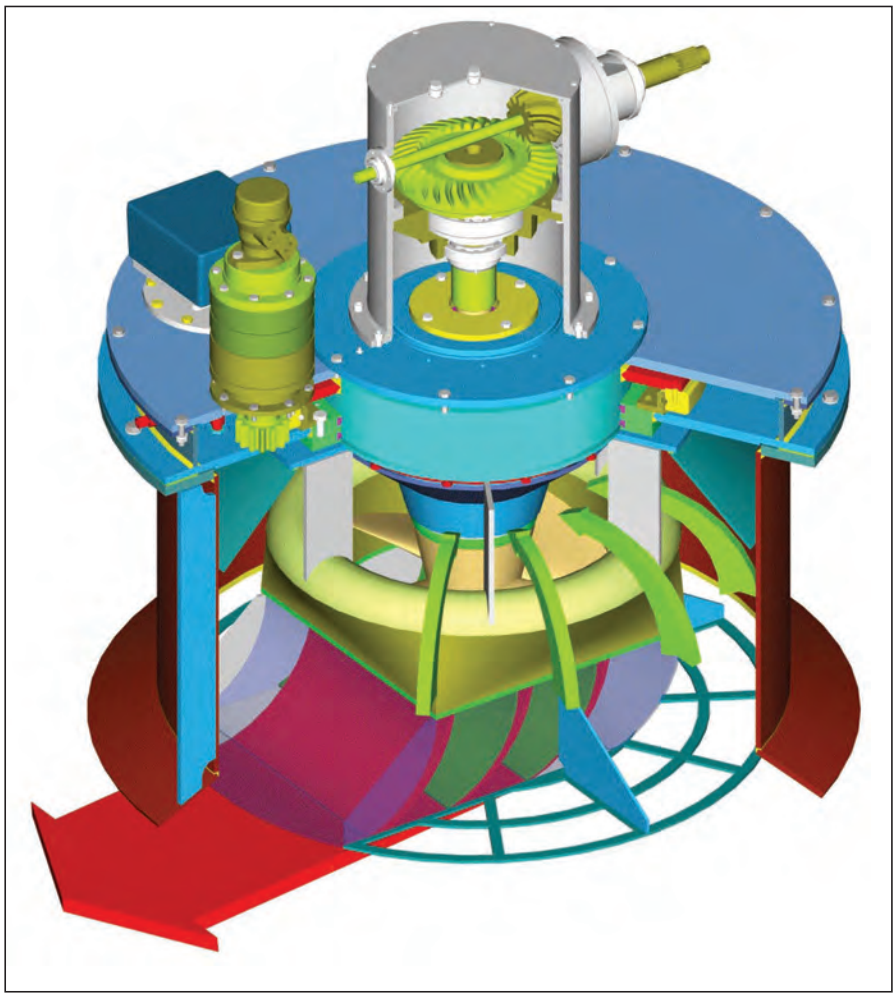
Part of the wheelhouse display for the new HRP multi-thruster control system (MTCS) on the first of a series of new Danish Navy research ships.

Three HRP 1500kW azimuthing thrusters ready for their journey to New Orleans, where the first push-tug is being converted to haul iron-ore barges 1500miles down the Parana river in South America. If this prototype is successful, further vessels, both newbuildings and conversions, are anticipated.

An interesting new project in South America involves a new design of push-tug planned to haul barges carrying iron ore for Rio Tinto on a long-haul route, 1500miles down the River Parana from a Brazilian mine to the port of Buenos Aires, in Argentina, for export. For the prototype tug (being converted in New Orleans), HRP has supplied three Z-drive well-mounted azimuthing thrusters of the HRP 7000 type (3 x 1500kW) for main propulsion, plus a shallow-draught bow thruster.

If the first train is a success, a fleet of newbuildings and more conversions is envisaged. All the propulsion thrusters will be designed for vertical withdrawal for maintenance, and due to the remote location, a spare unit will be carried onboard.

For the future, HRP intends to expand its power output for the Z-drive units beyond 2000kW for a single thruster, and the company has reported requests for these already. HRP also continues promoting the successful CP versions of its tunnel thruster. In addition, to serve the expanding Far East market, the company's service base set up three years ago in Batam (off Singapore but in Indonesia) is being expanded; small tunnel thrusters up to 500kW are already assembled there.



HRP's successful shallow-draught thruster is today being offered with much increased powers, up to 1600kW.

ALVAS: state-of-the-art PC-based bridge integration

TECHNICALLY, it is possible to navigate a large sea-going vessel today using only a PC tracker ball; however, no captain is keen on this option! He wants to see at least a few switches and levers on his bridge for controlling and operating the engine and other essential equipment, despite the fact that the helmsman's wheel has largely disappeared on modern ships.

For Joop van Dis, however, owner of Dutch shipping operator Hunze Lloyd, based in Midwolda, accepting a new PC-operated integrated bridge from Alewijnse Marine Systems was apparently an easy choice to make. He has sailed on all kinds of sea-going vessels, and is used to adopting innovations.

Although he had previously used a double ECDIS system on an earlier cargo ship, *Aquatique*, which allowed operations without paper charts, his new 3850dwt cargo ship, the Damen Combi Freighter 3850 *Ammon*, is believed to be the first short-sea ship with a completely integrated bridge system.

This employs ALVAS (an acronym for Alewijnse vessel automation system), a new PC-operated bridge system, developed by Alewijnse in collaboration with another Dutch company, Praxis Automation. The heart of this concept consists of a network of five PCs, of which four are located on the bridge and one in the engineroom. This last PC works as an alarm monitor.

As on many state-of-the-art ships today, *Ammon* mainly uses screens for key information, instead of various kinds of equipment and panels. A radar screen, an electronic sea chart (ECDIS), engineroom information, and sailing/navigation information (conning display) can be viewed simultaneously on the four screens.

The navigating officer can decide for himself what he wants to view on which screen. The radar screen can also be overlaid on the ECDIS screen or *vice versa*. In addition, information from the automatic identification system (AIS) can be viewed, and process control and monitoring can be seamlessly integrated into this. On the sea chart, a route can also be plotted, and the ship will then sail this course. ALVAS is an open system, which is ready for future advances, such as automatic updating of sea charts, and further sets will be installed by Alewijnse Marine Systems on various other ships in the near future.

Alewijnse Marine Systems' new integrated PC-based bridge system Alvas, seen here installed on the Hunze Lloyd cargo ship *Ammon*.

Shipowner Joop van Dis explains: 'An important argument for choosing Alewijnse, in my opinion, is the safety of the ship. A bridge system such as this allows a master to navigate more safely, especially in bad weather, and the electronic sea charts save the helmsman a huge amount of work. All that is necessary is to insert an updated CD-ROM into the system each week and the ship is ready to go.

'The market value of a ship was also important. If one of these ships sails for 10 years and then the owner wants to sell it, a prospective purchaser can expect to ask why the ship does not include an integrated bridge system. It can already be seen that more and more of these systems are being sold, so I think it will soon be a real advantage to have one of these when I eventually sell *Ammon*' .

Certification

Development of ALVAS was a major project. This was especially true for the special software, which allows all the PCs to communicate with each other. The certification also required a great deal of attention. Nautical equipment needs to achieve EC Wheel Mark certification, and many requirements are placed on this. Intensive discussions were held on this matter with both the Dutch Shipping Inspectorate and Lloyd's Register. During the latter phase of this process, *Ammon* was put through several tests.

Future advances

Alewijnse has now sold various integrated bridge systems, to both shortsea vessels and megayachts, amongst others. The company predicts a positive future and believes that soon it will be able to supply an ALVAS system for the same price as a conventional bridge arrangement. If enough can be sold, it is possible that prices will be even more economic, and the company will be able to provide more functionality and services. It is believed that Hunze Lloyd has decided to commission a sister ship to *Ammon*, which should also have an integrated bridge system.

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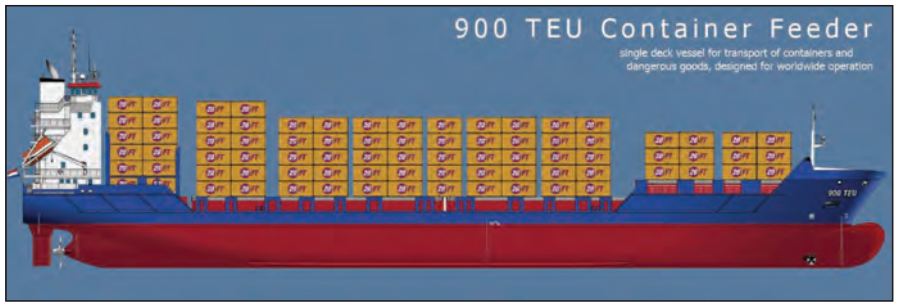
Two new vessel types from Volharding

VOLHARDING Shipyards has two new interesting designs added to its portfolio. A 917TEU series of 10 container feeder vessels will be built at the Um Deniz Shipyard, Izmit, Turkey. Volharding has had a joint venture cooperation with this yard since the end of 2004. These vessels, which have been designed for worldwide operation, will be fully built in Turkey.

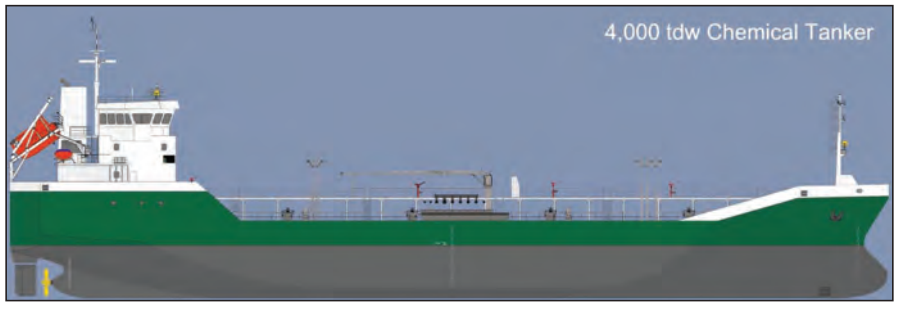
Although this ice strengthened 900TEU series is based on an earlier 750TEU type, the enlargement in container capacity has not just been achieved by lengthening the vessel. In order to maintain the speed of 18knots the lines of the forebody of the hull had to be faired to reduce the negative influence of the hull lengthening in such way that the installed power of 7200kW could be kept.

The ships will be equipped with a main engine that can supply 7999kW at 500rev/min, and a 140rev/min CP propeller, with a diameter of 4600mm; speed will be 18.50knots. A free-hanging balance type rudder will also be installed, along with an 800kW bow thruster.

The containers are placed in and on four cargo holds which are covered with hydraulic folding hatches. The middle two holds are designed with movable cell guides in order to transport 40ft and 45ft containers in the hold. Accommodation is in individual cabins with private sanitary facilities for 14 persons. More details of these ships can be found in our article on JR Shipping in this feature.



Ten examples of this 900TEU container feeder ship will be built at the Um Deniz Shipyard.



A series of four of these 4000dwt chemical tankers will be built at Volharding's yard in Harlingen.

TECHNICAL PARTICULARS
4000DWT CHEMICAL TANKER

Length, oa	90.00m
Length, bp	85.00m
Breadth, mld	13.50m
Depth	7.70m
Draught, design	5.50m
Deadweight, design draught	4000dwt
Gross	2700gt
Cargo capacity	4500m³
Main engine	2500kW
Speed	12.00knots
Classification	Det Norske Veritas +1A1, Tanker for Oil Products and Chemicals, Ice 1B, ESP, EO

Another interesting new vessel from Volharding's portfolio is a four-ship order for 4000dwt chemical tankers, to be built at its Dutch yard in Harlingen. These are for an unnamed Norwegian owner.

These ships will have a length overall of around 90m, a length bp of 85m, a draught of 5.50m, and a deadweight of 4000dwt. Speed when loaded will be around 12knots from a main engine supplying 2000kW and a CP propeller of 2800mm diameter. A bow thruster will supply around 300kW, and the rudder will be of the flap type.

The vessels will be equipped with 10 stainless steel cargo tanks suitable for cargo with a maximum specific gravity of 1.87tonnes/m³. Six segregations will be possible, and individual electric cargo pumps will be fitted: nine of 150m³/h and one of 60m³/h. Modern and air-conditioned accommodation for a complement of 10 crew will be fitted in the deckhouse aft.

Groot Ship Design: an active newcomer

A NEWCOMER on the Dutch marine scene is a small but active naval architectural consultancy based in the north of the country near Groningen. Groot Ship Design was set up only at the end of last year by Mr Bart Groot, former head of the design department at Damen Shipyards' cargo ships division in Hoogezand. With offices at Norg, the company consists of five employees and is currently working on several interesting projects.

These include work on design aspects of a series of modified 7600dwt multipurpose ships for the UK owner Carisbrooke Shipping, which are being constructed in China at the Yangzijang yard. These were originally based on an earlier Schiffko concept but by refining various aspects and raising the forecastle, deadweight has been increased to 8200dwt. Later examples in the series will also be equipped with deck cranes.

Groot is using its Damen connection to continue doing tasks for that enterprising builder, and has been working on various documents for new ships, such as stability booklets and cargo securing manuals. The consultancy is additionally working on some new creations of its own for various owners and shipyards, including 6300dwt and 11,500dwt multipurpose designs, 500TEU and 1200TEU container carriers, and also a 2400m^3 bunkering tanker. Initial designs and class drawings are being created at Norg, while workshop drawings are being subcontracted to an engineer in Poland.

The Groot consultancy uses SARC's PIAS software for hull form and stability development, together with BRICSCAD for drawings, also various packages from class societies, such as Lloyd's Register's RulesCalc and Germanischer Lloyd's Poseidon. With the large numbers of small shipowners based in northern Holland and over the border in Germany, very good prospects for the future are envisaged, including new designs of simple ro-ro freight ships. Much existing tonnage in the latter category was completed during the 1970s and 1980s, and is therefore due for replacement soon. Extra possibilities could also open up through Mr Groot's membership of the Lloyd's Register Western European Area Technical Advisory Committee for rules evolution.

Profile of the Feeder 500, a fast (18knots) container feeder ship fitted with both bow and stern thrusters for speedy manoeuvring in ports.

Profile of Groot Ship Design's Freighter 6300, a 13knot ship mainly geared towards the forest products trades.

A further creation from Groot Ship design is the Freighter 11500, a multipurpose hull fitted with two cranes and capable of a speed of 15knots.

SEC: an expert in deck machinery and lifesaving equipment

A LEADING exponent of the skill of designing and manufacturing all kinds of deck machinery and equipment, anchors, also lifeboats and davits is Ship's Equipment Centre Groningen BV, a member of the Central Industry Group - a cluster of marine companies in the northern part of The Netherlands. SEC, as the company is colloquially known, is particularly noted for its Pool anchors and Ten Horn winches, which are built to customers' individual specifications. Pool stockless anchors, which are fabricated from welded plate, have been marketed now for approximately 30 years and are known for their high holding power (super-high versions can also be supplied). There is virtually no limit to the size that can be made.

A number of interesting contracts have been secured recently for mooring packages. These include orders for installation on both the new pipelayers/offshore construction ships for Subsea 7 at the Merwede Shipyard, also for the New Zealand Navy multirole ship at the same yard, which is being largely constructed to commercial standards (both these ships are discussed elsewhere in this feature). For the former vessel, an interesting SEC design of electro-hydraulic anchor windlass/mooring winch will be employed, whereby the hydraulic power unit is integrated with the gearbox, thus no external power pack is needed. Two of these units will be installed on the Subsea 7 ship, along with four electric capstans.

SEC is additionally supplying export mooring packages to naval ships at the British yards of Vosper Thornycroft and Swan Hunter, also to a large series of 1100TEU container ships in China, and to the *Saipem 3000* pipelayer under construction at Sembawang in Singapore. In addition, various ships currently being built at the Volharding yard in The Netherlands, including six 900TEU designs for J R Shipping (discussed elsewhere in this feature), will all have SEC mooring equipment.

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New Combi Freighter for Damen portfolio

THE energetic Damen Shipyards has added yet another string to its standard-ships portfolio with the arrival of the Combi Freighter 7200 1A-G design to the existing family of cargo vessels. This is a multipurpose workhorse - the result of an owner's enquiry - with two box-shaped holds without cell guides and a nominal container capacity of 336TEU. Two movable grain bulkheads can be placed at any of 10 positions and can additionally be fitted horizontally to create a tweendeck. A total of 13 pontoon hatch covers are positioned by a travelling gantry crane in typical Dutch fashion. Strengthening to ice class 1A standard can be included, and two 40tonne deck cranes are optional.

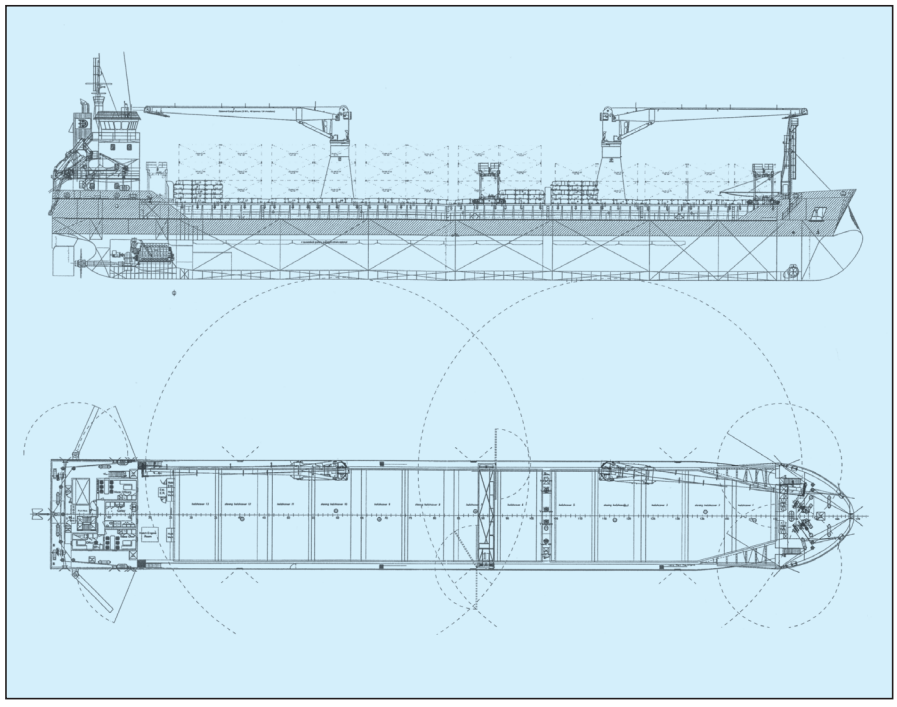
Wherever possible, Damen tries to remain with one propulsion engine make (MaK) and one auxiliary type (Caterpillar), since this makes for more economic engineroom engineering. Thus, the Combi Freighter 7200 1A-G will be powered, in its standard version, by a heavy-fuel-burning MaK 8M25C model. This develops 2640kW at 750rev/min and drives a CP propeller plus a 435kVA shaft alternator off the gearbox, while the auxiliaries will comprise two 325kVA gensets burning gas oil. Alternative MaK models (9M25C or 8M32C) can be installed if a higher service speed is required (13.70knots or 14.50knots respectively).

At the time of writing, the first orders had just been secured - four vessels for Dutch owner UniSea Shipping; hulls will be built not at one of Damen's Eastern Europe yards - Galatz, in Romania, or Okean, in Ukraine, but at the Nevsky yard in Russia. The contract is being handled by the small Damen Shipyards Bergum, with outfitting carried out at a quay at Harlingen by the Bergum yard.

In March this year, the cargo ships division, at Hoogezand, was relocated to the headquarters at Gorinchem. The group still operates one larger and one smaller yard in China (Yichang and Changde), as well as an impressive list of small sites carrying out various activities in Holland and around the world.

Meanwhile, Damen's design team is examining the possibility of re-launching a new 5000dwt Combi Freighter - today the earlier model is considered obsolete because of the introduction of new damage stability rules. Another recent arrival, the Container Feeder 800 (and the only one in the series with cell guides), has notched up a total of 16 orders since the first, *Geeststroom*, was delivered at the end of 2004. A total of four have been delivered, with two more, also for Geest, scheduled for completion at the end of April and others booked through to 2008.

Damen reports a continuing high level of enquiry for new ships, even some for vessels to carry refrigerated cargoes on pallets, although no orders have yet materialised for the proposed simple RoRo 1800 freight design. In any case, capacity would be stretched at present with the large number of existing orders, while a prototype such as this would require careful project management - a ro-ro ship is much more complicated to build than a container or cargo vessel. In early March, the group's most satisfactory order book stood at 27 cargo ships (including seven sea/river ships at the Okean yard in Ukraine for local owner Ukrrechflot) and six tankers.



Profile and upper deck plan of the new Damen Combi Freighter 72001A-G multipurpose cargo/container ship.

One of the latest examples of the Damen Container Feeder 800 fully cellular container carrier: *Smaland* (launched as *Jork Racer*). She was completed last October at the Galatz yard in Romania.

TECHNICAL PARTICULARS
COMBI FREIGHTER 7200 1A-G

Length, oa	117.15m
Length, bp	115.70m
Breadth, moulded	15.90m
Depth	8.80m
Draught	6.54m
Deadweight	7120dwt
Cargo capacity	371,155ft³ (10,510m³)
Containers	336TEU
Main engine	MaK 8M25C
Output	2640kW at 750rev/min
Speed, trial at max draught	13.30knots
Accommodation	11 persons
Classification	Lloyd's Register +100A1, +LMC, UMS, Strengthened for Heavy Cargo up to 17tonnes/m², Equipped for Dangerous Goods - SOLAS Reg 19-II-2 excluding Explosives and Nuclear Cargoes, Ice Class 1A (Finnish/Swedish rules 2002)

Export market grows for Veth

THE leading thruster manufacturer Veth Motoren continues to build on its success in a hectic market, especially with exports, which today account for some 50% of production. Much effort and investment continues to be invested in ensuring quality production and in the development of new technology. This task will be assisted by the current construction of Veth's own 18m boat for testing new thrusters.

A fast-growing sector is azimuthing propulsion units, especially those with twin contra-rotating propellers - the Veth-Z-Drive. By employing a set of blades at each end of the hub, the same level of efficiency can be obtained as two adjacent sets but with much better sealing efficiency.

As is well known, the contra-rotating principle additionally gives improved propulsion efficiency - up to 15% compared with a single open propeller - plus low levels of noise and a slow blade tip speed of only 24m/sec. At the present time, Veth-Z-Drives are built in powers up to 1250kW maximum, but the company anticipates launching a 1600kW model soon.

A typical customer for these drives has been the cruise operator Grand Circle, for which Veth has already supplied 24 units for powering inland passenger ships. A good export order for Veth-Z-Drives has also been secured from Norway, where the Fiskerstrand yard has decided to change to Veth products for a new series of double-ended ferries being built for domestic operator Fjord 1. Each of these will be fitted with four 780kW contra-rotating units. Both yard and owner are said to have preferred the flexibility of the Veth design, with a longer strut for less resistance.

In particular, Fjord 1 has specified a special hydraulic multi-plate clutch, so that propeller revolutions could be controlled at speeds from zero up to 650rev/min. This is required so that the master can hold a ferry securely against a shore ramp while loading and discharging vehicles - a well-established practice on Norwegian shuttle ferries.

One of a new fleet of relatively large double-ended ferries in Greece, which are powered by Veth thrusters. Seen is *Aiakos* for Mr Akouros, which has four single-propeller azimuthing thrusters; however, another Greek operator, Mr Papaioanidis, has ordered a somewhat similar ferry which will be powered by quadruple Veth-Z-Drive contra-rotating propulsors, each of 1250kW output. This will give the ferry a speed of 19knots.

An example of Veth's contra-rotating Veth-Z-Drive units, which have been much in demand recently for new ship projects.

Z-Drives for new Greek ferry and Stena tanker

Another interesting project involves a new double-ended ferry in Greece - one of the largest of its type in that country, with speeds up to 19knots. This is being built locally for an enterprising Greek owner, Mr Papaioanidis, to run a service from Piraeus to Salamina, and will be powered by four Veth-Z-Drive contra-rotating units, each of 1250kW - one in each corner of the hull. This is the owner's third ship with Veth products and was scheduled to be delivered in April.

A further interesting contract has been that to provide twin 800kW Veth-Z-Drive contra-rotating propulsors in ducts (VZ 1250 models) for a new diesel-electric sea-going tanker, which has been built at Aas Mekaniske Verksted, in Norway, for the Stena group. Primary power is supplied by five Scania-driven gensets, delivered by the local Scania agent (Veth itself has a longstanding parallel business as a supplier of marine diesel-alternators based on Scania, Sisu, and Iveco engines, coupled to Newage Stamford alternators). The Stena tanker, which has now been in service for approximately half a year, has been built to Ice 1B standards.

Veth's Compact-Jet main propulsion unit, first launched three years ago for domestic shipping, is now being promoted on the international scene. In this design, the propeller is mounted at an angle and thrust can be in any direction. The design is particularly suited to shallow-draught ships since there are no projections beneath the hull, and where high manoeuvrability is required. Since both the suction side and the outflow side rotate together with the housing, equal thrust can be achieved over 360deg. The first export contract was for twin units, plus two booster units, to power a new Swedish Maritime Administration catamaran workboat.

A brand-new product introduced by Veth at the beginning of 2006 is a shallow-draught steering grill, with water flowing from the impeller in a U-shape. This equipment borrows half of its technology from the well-established Veth-Jet but is specially intended for easy fabrication as well as easy installation in a hull; the design offers a gradual build-up of water thrust. The housing is fitted at a 45deg angle to the centreline to overcome 'blind spot' that is a feature of the construction. At the time of writing, a total of 10 units had been sold for inland vessels.

Success at Merwede with 'top-end' niche contracts

THESE are interesting times for the Merwede Shipyard at Hardinxveld-Giessendam, with a number of exciting projects in hand. Today, Merwede is part of the IHC Holland group and aims to attract contracts in 'top-end niches'; recently, the yard has been most successful in this strategy, and orders have included special inland passenger cruise ships, a diesel-electric offshore supply vessel, a multi-role naval ship, two large offshore construction ships, and a very new contract for a diving support vessel.

Following its recent completion of the special inland cruise ship *Zonnenbloem* - laid out to provide waterborne holidays for chronically sick patients, Merwede completed for the Swiss owner Waterway Management (KMVH), another inland cruise ship planned around golfing holidays! The 110m-long ship, named *Sound of Music* and designed by the shipyard, is intended to sail, in theory, between golf clubs anywhere from Amsterdam to the Black Sea.

The ship will carry fewer passengers than normal, thus providing more spacious accommodation, and is powered by twin Veth azimuthing propulsion units driven by Caterpillar engines. Classification is to Lloyd's Register standards, +100A1, IWW, Passenger Ship, Zone 3.

Following this, and scheduled for end-March delivery, was *Viking Helvetica*, the second of a series of 'post-lock' ships for Viking River Cruises (*Viking Sun* was the first). These are of 132m length - the largest such inland ships in Europe - and unable to navigate on Rhine tributaries or on the Rhine-Main-Danube canal, where hull length is limited to 110m because of lock dimensions. The ships are thus optimised for sailing between Rotterdam, Amsterdam, or Antwerp and Basel on the river Rhine, with 198 passengers.

The most notable feature of this class is the construction of three main decks for public rooms and cabins, instead of the more normal two. Such an arrangement, which allows, for example, the main lounge to be positioned above the galley and restaurant, means that the operator can run the ship with the same number of crew as on a 110m-long vessel, but still offering the same standard of service. Overall, more space is available.

The superstructure of the New Zealand multi-role naval vessel being placed on its hull in Rotterdam. Special hydraulic equipment from Enerpac was used to ensure positioning to within ±1mm tolerance. This is a most interesting vessel, being not only based on a highly successful ferry hull form first introduced some 15 years ago by the former Van der Giessen-de Noord yard, but also built to generally commercial standards.

Naval auxiliary ship to commercial standards

A different contract altogether is one which would gladden the hearts of the design team at the former IHC Holland group member Van der Giessen-de Noord (now sadly closed, but some members of the team are today employed at Merwede). This involves the construction of a multi-role amphibious transport ship for the Royal New Zealand Navy (a subcontract from the Australian prime contractor Tenix, as part of a fleet replacement programme). This uses the hull form of Van der Giessen's highly successful ferry, the prototype of which first appeared some 15 years ago in a series of ro-pax ferries built for the Italian operator Viamare (the first, *Via Ligure*, was presented in *Significant Ships of 1992*).

Since then, this form has been both lengthened and shortened for several projects, most recently for the two Bornholmstrafikken ferries *Hammerodde* and *Duoedde*, completed by Merwede in 2005; by using a proven hull form, construction was completed in a very short period. Now yet another life has been found in providing an economic and cost-effective naval vessel!

The 9000tonne displacement ship, which is scheduled for July completion (when the ship will sail to Australia for installation of her military equipment), will be able to carry vehicles, containers, two medium-size helicopters - plus storage space for a further five, its own pair of landing craft, and 300 troops. Because an existing hull form is being employed, construction will be spread over only 24 months, with assembly to Lloyd's Register standards; this time is half of that if a new hull had been developed. Since a commercial-concept approach has been adopted, costs are estimated at a quarter of a full custom-built military design. Not surprisingly, Merwede reports that this concept is attracting the attention of other navies.

A hybrid propulsion plant has been chosen, featuring twin Wärtsilä (Lips) CP propellers, driven by Wärtsilä diesel engines. From each reduction gearbox, an alternator is also driven. Each of the latter can be converted to a 1000kW motor (the power take-off/power take-in principle) to provide an economic continuous slow-running speed of 8knots/9knots. In the latter mode, electrical current will be supplied by three Auxpac alternators driven by Volvo engines.

The ship's 600tonne superstructure was fabricated separately in Rotterdam by Maatschappij De Maas (operating from the former Rotterdam Dockyard site), to where the hull was towed and where the all-steel superstructure was lifted onboard by sheerlegs fitted with a special spreader to ensure that neither structural movement nor stress took place during the lifting operation.

Since only one floating crane proved to be available (Merwede had planned fabrication of the superstructure for a two-crane lift), a special SyncHoist hydraulic system from Enerpac was employed; this provided precise horizontal and vertical movement, and the superstructure was positioned to within a tolerance of ±1mm. Eight lifting points were used, with the four on the outer edges (four x 85tonnes) fitted with double-action hydraulic cylinders - the double-action allowed for precise control.

Offshore construction ships

Different again are two large offshore construction vessels - a rigid-reel pipelayer and a flexible pipelayer - which have been ordered by a leading underwater engineering and construction contractor, known as Subsea 7, which is a joint Norway/UK organisation with

The Royal Institution of Naval Architects

Design and Operation of Container Ships

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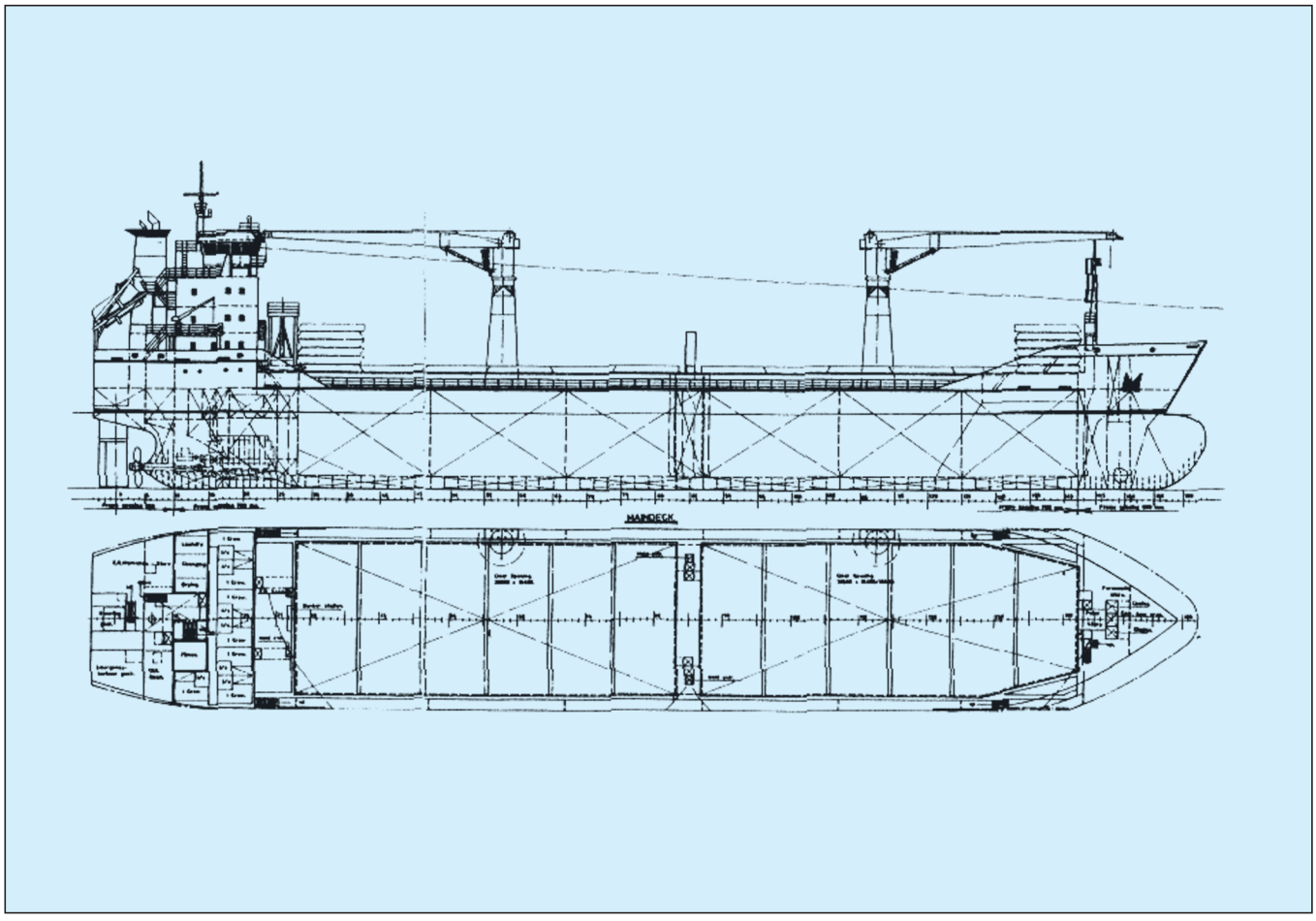


Profile and deck plan of the new 10,000dwt multipurpose cargo ship.

TECHNICAL PARTICULARS 10,000DWT MULTIPURPOSE VESSEL	
Length, oa	114.00m
Length, bp	107.50m
Breadth moulded	18.50m
Depth	10.40m
Draught	7.93m
Deadweight (approx)	10,000dwt
Speed	13.50knots
Main engine	3680kW
Bow thruster	450kW
Shaft generator	550kW
Cargo capacity	441,000ft^3
Tanktop load	15tonnes/m^2

TECHNICAL PARTICULARS *DEO VOLENTE*	
Length, oa	105.10m
Length, bp	98.20m
Breadth moulded	15.60m
Depth	7.40m
Draught	5.81m
Deadweight (approx)	3500dwt
Speed	18knots
Main engine	3500kW
Bow thruster	400kW
Shaft generator	650kW
Cranes	2 x 120tonnes
Cargo capacity	153,943ft^3
Tanktop load	15tonnes/m^2

range of cargoes such as containers, project cargo, forest products, and bulk. The cargo hold section consists of two box-shaped compartments, with ballast tanks in the double bottom and double hull. The obstruction-free holds can be subdivided into several compartments by two adjustable grain bulkheads.

Another design which Conoship International has recently launched is of a 10,000dwt multipurpose vessel. This has cargo holds with a clear opening of 38.50m x 15.40m, each closed by six pontoon-type hatch covers and equipped with a gantry crane for cover handling. The hull construction is prepared for installation of hydraulic deck cranes. Modern accommodation is provided for a crew of 12, all in private cabins with their own shower and toilet facilities.

New breed of heavy-lift cargo vessel

Currently on order for owner Hartman Seatrade, of Urk, The Netherlands, is the heavy-lift vessel, *Deo Volente* (*The Naval Architect* February 2006, page 38). This ship, it is claimed, will be the fastest coaster with heavy-lift capacity below 3000gt. It is set to be delivered towards the end of this year.

The owner specified a speed of 18knots, two cranes of 120tonnes each, tonnages of 3700dwt but less than 3000gt, and a maximum propulsion power of 3000kW. Conoship designed a vessel with a length overall of 105m, a beam of 15.60m, and a draught of 5.81m.

Model tank tests were carried out at MARIN'S facilities in Wageningen. According to the findings, a speed of 18knots could be reached using less than 3000kW of power. Compared with a similar ship of the same tonnage and volume, engaged in similar work, total fuel consumption per mile will be less, it is claimed. This is due to a high speed in combination with a relatively low power input.

Deo Volente is equipped with two cranes and can lift 240tonnes in tandem. The obstruction-free cargo hold with a length of 61.60m gives the ship the flexibility to load long pieces of project cargo.

offices around the world. This contract is especially interesting for two reasons: first, that the hull is the largest ever built at Merwede - the width is 28.40m, so it will only just fit inside the covered hall at the Hardinxveld-Giessendam site, which is 28.90m wide. Secondly, the owner has agreed to share risk responsibility for the vessels and their equipment during construction, and therefore minimise any financial exposure - a useful and attractive agreement.

Subsea 7 is considered a most progressive owner, and these are among the first new-build vessels of this type. Their construction fits very well into Merwede's philosophy.

The second, flexible-reel, ship, although of more or less similar size - 13,699dwt at scantling draught - has a redesigned midships section to house different pipelay and crane equipment, all of which will be supplied (on both vessels) by the Dutch crane manufacturer Huisman-Itrec. Cranes will include one large mast crane able to lift 400tonnes.

Each ship will be fully equipped for dynamic positioning and will feature a diesel-electric power plant of 21,600kVA, with the electrical turnkey contract awarded to Bakker Sliedrecht. There will be three FP propellers in azimuthing nozzles aft, plus a tunnel thruster and two retractable azimuthing thrusters at the bow.

The vessels are planned for deepwater work down to 3000m depth, especially off the coasts of West Africa and Brazil. Their hulls were model-tested at MARIN and will be constructed to Lloyd's Register standards. To follow on from these ships, Merwede has very recently secured a new contract from Toisa Ltd for a diving support vessel.

An artist's impression of the second of the two new pipelaying/offshore construction ships ordered at Merwede by Subsea 7. This vessel will differ from the first in being arranged for flexible reel pipelaying.

New multipurpose vessel designs launched

A LEADER in multipurpose vessel design, Conoship, has been carrying out design assignments for shipyards and shipowners on a direct basis since the start of 2004. The company also brings clients and shipyards together; after basic design preparation, it can assist owners in finding the most suitable yard for the needs of a particular project.

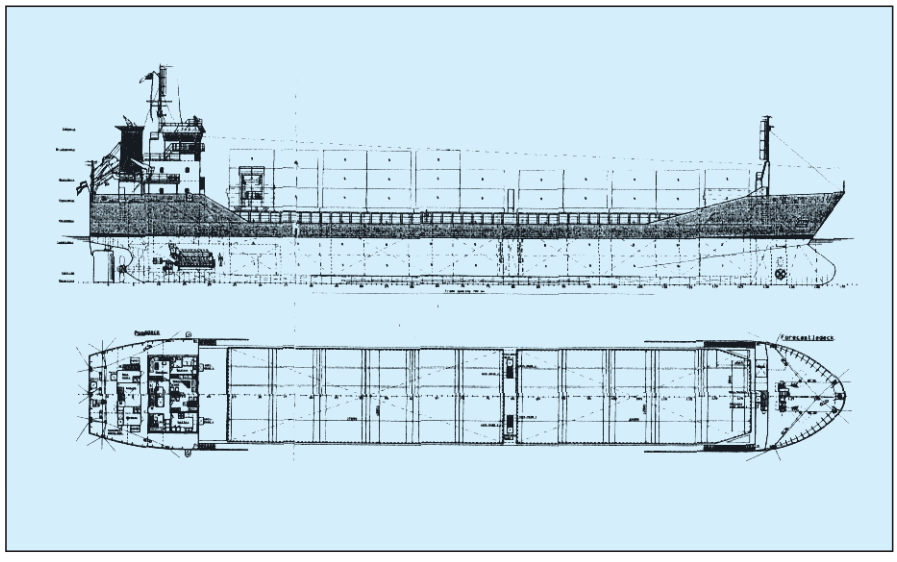
There are three member shipyards in the group, Royal Niestern Sander, Barkmeijer Shipyards, and Bodewes Shipyards, and the current combined orderbooks stand at 45 vessels. In addition, Conoship's associated shipyard, Chowgule & Co Ltd, based in Goa, India, has export contracts for 12 ships (4450dwt multipurpose vessels), plus options on six of the same newbuildings. Another associated yard, Tunisian company Mednaval SA is also introducing new facilities.

New designs recently launched by Conoship include a 6000dwt ice-strengthened multipurpose vessel. This has been created based on market demand.

It is intended for worldwide services, as well as the Baltic Sea and Panama Canal. The design offers excellent stowage flexibility for a wide

TECHNICAL PARTICULARS
6000DWT ICE STRENGTHENED MULTIPURPOSE VESSEL

Length, oa	104.43m
Length, bp	97.88m
Breadth moulded	15.40m
Depth	8.35m
Draught	6.40m
Deadweight (approx)	6050dwt
Speed	13.00knots
Main engine	3000kW
Bow thruster	350kW
Shaft generator	400kW
Cargo capacity	274,800ft³
Tanktop load	15tonnes/m²



Profile and deck plan of Conoship's new 6000dwt multipurpose design.

The Tankship Tromedy

By Jack Devanney, published by The CTX (Center for Tankship eXcellence) Press, 212 Tarpon Street, Tavernier, FL 33070, USA. 2006. 393 pp. ISBN: 0-9776479-0-0, ISBN 13: 978-0-9776479-0-3. Soft back. US$30.00.

The author uses the term 'tromedy' (his own creation - a union of tragedy and comedy), with a sub-title *The Impending Disasters in Tankers*, to denote the current system for regulating the tanker industry. This system of regulation, and how it developed, is described and is regarded by Devanney as a tangled web, or auction, in which the regulators (classification societies and flag states) depend on and compete for the shipowners and shipyards they regulate.

Devanney's credentials are unusual and qualify him to speak with authority on these matters. He is a faculty member at the Massachusetts Institute of Technology (MIT), with 25 years experience as a tanker owner and operator, during which time he was responsible for constructing the largest double-hull tankers then created.

Whilst the book makes many criticisms of the present system of regulation, the author makes it clear that he is trying to explain the situation, not apportion blame. Nor does he suggest that there is corruption on any scale. Rather it is a matter of 'cosy relationships' developing and of commercial pressures applied, often to areas where the existing rules are capable of different shades of interpretation.

Even those rules he regards as inadequate to ensure good and safe practices, but the tendency is to interpret, and modify, these so that the end product is less safe than it should be. The introduction of 'harmonised rules' can mean dumbing down to a level acceptable to all.

These claims are not made in a vacuum. Devanney argues his case most carefully, using data on oil spillages, and loss of life, from a wide range of tanker incidents. Some readers of this review, particularly individual surveyors, will recognise situations that they themselves have experienced.

Many of his points are beyond dispute. For instance, he argues that too often the cause of a spillage of oil is stated to be due to grounding. Whilst the grounding may be the ultimate reason the tanker's hull is opened up, the basic cause of the incident is likely to be loss of power or rudder control, which leads to the ship's master being unable to control the ship. In the same way, it is too easy to blame the crew for an accident when the real fault lies with the designer, builder, or maintainer.

He argues that this is often due to the media, which concentrates on the final event and does not concern itself with what led up to it. He points out that ships would be much less likely to go aground if they had two propeller shafts and twin rudders. Whilst this costs more initially, it might well repay itself over the life of the ship. In the same way, more steel built in to the ship itself can make an inherently safer, and more reliable, vessel that will need less spent on it in later life. Unfortunately, this may not interest the buyer if it is intended to sell the ship on after a few years.

Another criticism made is of what the author calls 'the direct analysis downratchet'. He points out that tankers built some 15 years ago still have thicker scantlings (even after corrosion) than would be found in a new design. This is due to modern finite-element methods allowing structures to be designed 'closer to the bone'.

Devanney argues that instead of using the analysis to make weak elements stronger, it has been used to bring much of the structure too close to the point where it can fail. He says this is not justified in view of the uncertainties that still remain on the loadings a ship will actually experience, the corrosion levels in service, and so on. He is scathing of the modesty of many modern welds that, although in accord with the rules, fail when the ship is damaged.

Clearly different people will view a given situation in different ways but it cannot be denied that there are too many failures in modern tankers, both in terms of structure and machinery. The author has referenced well the cases on which his views are based. He presents very useful statistics, explaining how he has interpreted them. It is well known that statistics can be used to support different arguments, but at the very least, Devanney's conclusions deserve close study by all players in the game - and they should be considered with an open mind. For instance, he argues that some recent changes in the rules, aimed at reducing spillages, have concentrated on the many small spillages and may increase the probability of a major spill.

The author clearly states his reasons for that view. He is also critical of double sides as being effective only in the case of minor collisions. It is to be hoped that those responsible for regulating the industry take these views into account and take note of the requirements the book sets out for a good tanker, including inerting all double-hull ballast tanks.

This publication is intended to be read in conjunction with the CTX website, www.c4tx.org, which contains the database of tanker casualties. The CTX is a non-profit organisation devoted to improving tanker design and operation.

E C Tupper

At the beginning of April, a further example of ThyssenKrupp Marine Systems' 2700TEU container-ship class was handed over to her owner. *Conti Emden*, which was built at the group's Nordseewerke site in Emden, is owned by the Conti group, which today has a total of 71 ships in operation or on order (more than 3.3% of the world container fleet). Day-to-day operations are handled by Martime, of Elsfleth, Germany. Five more ships of this 37,950dwt size, plus two of a newly developed 3400TEU class, remain on order at Nordseewerke.

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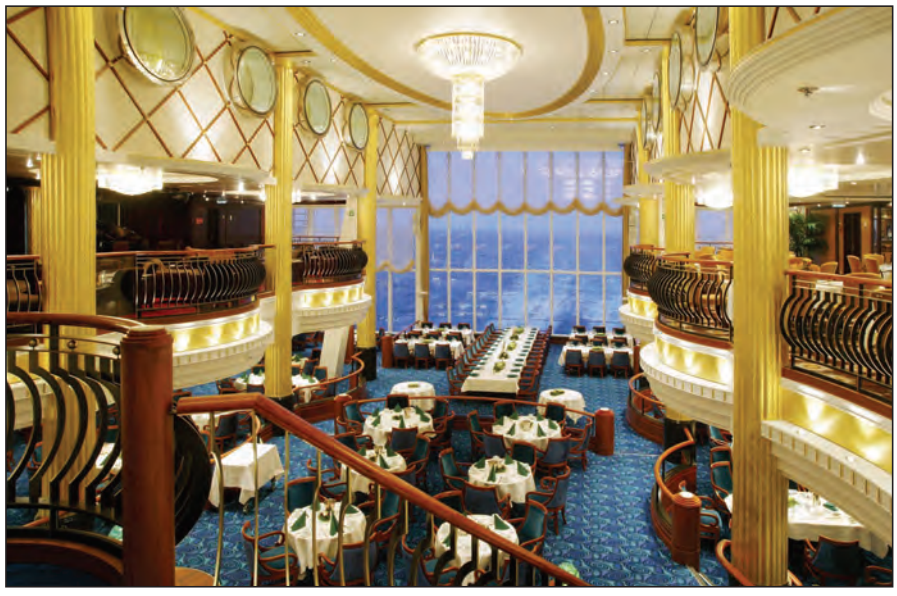
Hull and propeller design ensures cruise-ferry comfort

COLOR Fantasy, now in service on the Oslo-Kiel route, fulfils DNV Comfort Class I requirements, thanks largely to efficient and open-minded cooperation in hull and propeller design between all parties involved − the yard, owner, classification society, model basin, and propeller designer. In this article by R Hämäläinen and B Lönnberg, from Aker Finnyards, and P Arén and G Pettersson, from Rolls-Royce, the authors discuss the how the design of the hull and propulsion systems effected noise and vibration.*

Color Fantasy is the largest cruise liner built to date to have a car deck. A design requirement was that it should meet DNV Comfort I and Clean Class requirements. The challenge was made more interesting by the location of the Oceanic à la carte restaurant at the stern of the vessel - the restaurant has large panoramic windows and is positioned just above the car decks, the most difficult position from which to eliminate noise and vibration. The choice of twin screw propulsion, and the three different operating modes were other major influences.

Color Fantasy is a 75,000gt ship that can carry up to 2750 passengers and a mix of trucks, trailers, cars and caravans, and has a service speed of 22knots. A feature of the vessel is a 160m long and three-deck-high arcade − the longest shopping mall yet to be built into any ship. The passenger cabin numbers and space allotted are on a par with high-class cruise vessels.

Color Fantasy **meets DNV Comfort I and Clean class requirements, and is ice strengthened.**



This Oceanic à la carte restaurant is positioned at the very aft of the ship, and this area was a challenge for designers to reduce noise and vibration.

Oceanic restaurant

At the beginning of the design project, three different machinery alternatives were considered: diesel-mechanical, twin-pod diesel-electric, and a hybrid system with diesel-mechanical centre line CP propellers and two diesel-electric side pods. According to predictions made by Aker Finnyards, pod propulsion had about 7%-10% lower power consumption, and hybrid propulsion 10%-15% lower, but with higher costs and with less service friendliness for the given route, both comparisons relative to a traditional twin-screw ship with long exposed shaft lines, brackets and rudders.

It was felt that the highest Comfort Class design was easiest to achieve with a pod propulsion system and most difficult with a hybrid system. On the other hand, the owner's experience with proven traditional twin-screw propulsion was a factor in the selection process. Also, the owner wanted to operate the new ship in the same way as its earlier vessels, but with different engine operating modes using two, three, or four engines connected to the shafts. The choice of proposal was governed by the fact that the shipyard guaranteed compliance with the requirement of Comfort Class both regarding noise and vibration.

The final choice was four medium-speed engines coupled in pairs through twin input/single output reduction gears to twin shaft lines and Kamewa CP propellers. Each gearbox has a power take-off for a shaft generator, but the shaft generators supply power for the thrusters and are only used for manoeuvring, thus the arrangement does not limit the number of revolutions of the main propeller.

There are three operating modes, that is cruising, manoeuvring, and in port. In cruise mode all four main engines and both propellers run in combinator control. The shaft generators rotate without producing power.

In manoeuvring mode when entering and leaving harbour, two main engines and propellers are run in combinator mode. The shaft generators are connected to the other two main engines and run at nominal speed to power the thrusters. When in port, the main engines are in standby condition, heated but not running and with clutches open.

The hull design, particularly the aft body, and propeller design were both of importance in achieving the noise and vibration targets, as was the interaction between them. DNV Comfort Class Conf-V(1) calls for a noise level less than 55dB(A) in public spaces and 44dB(A)-49dB(A) in cabins. In vibration terms this means less than 1.5mm/sec in the passenger spaces.

Having more than one operating mode increases the challenge for the propeller designer, since different cavitation conditions have to be catered for. *Color Fantasy* also operates in both deep and shallow water on its regular route. In shallow water, ship resistance, and propeller loading is increased. As a consequence, suction side sheet cavitation on the propeller, as well as the cavitating tip vortex strength, will increase.

continued

Normal operating mode at sea uses two main engines per shaft at 85% power. The alternative mode of running one main engine on one shaft and two engines on the other shaft at a total of 67% power gives yet another cavitation condition, since the shaft line with one main engine will operate at a high rev/min and low propeller pitch, thus inducing a risk of pressure side cavitation. The task was to find the best compromise between these conflicting requirements.

Apart from the various operating modes, the propeller installation had to meet ice class in view of the operating route. Apart from the propeller blades themselves, the installation is designed to meet DNV Ice Class 1A. With the aim of achieving higher hydrodynamic efficiency, the propeller blades are designed to DNV Ice 1B which permits a thinner and more efficient blade section, but they can be changed to 1A if required.

The hull itself embodies a wave damping after body (WDA) developed from the shipyard's own experience and a combination of CFD and model testing. Aker Finnyards' early experience was based on the *Superfast Three* and *Superfast Four* ferries and Voyager-class cruise ships. More than eight hundred hull forms were analysed using CFD to identify the best possible WDA and bow form for both deep and shallow waters.

The result is a hull which greatly decreases wave generation and reduces the required engine power. Incidentally, WDA studies carried out on several vessel types show that with the right design a large cruise liner can save 3%-5% power, a medium-speed cruise liner can save 5%-7% while a fast passenger ferry can show a power saving of 7%-15%.

Hull and propeller cannot, however, be considered in isolation. The hull lines and appendages must produce the optimal inflow to the propellers; the propellers must, in this flow, absorb the power and produce the required thrust at high efficiency without generating any excessive pressure fluctuations on the hull. The contract committed Rolls-Royce to guarantee levels for propeller-induced hull pressures in the two principal operating modes, while the propeller open water efficiency and freedom from cavitation erosion are also guaranteed.

Propellers excite the hull in different ways. The low-frequency excitation is felt as vibration and the higher frequencies as noise. This excitation can be divided into two different types:

- fluctuating forces and moments transferred from the propellers to the ship via the shaft system (first order blade harmonics)
- pressure fluctuations transferred to the hull through the water which can be divided into pressures generated without cavitation, pressures generated by cavitation on the blades, and pressures generated by the cavitating tip vortex.

For a propeller for this type of ship, the latter is the most important factor in noise generation.

One typical propeller design problem - that of having a large enough propeller while still having adequate clearance between propeller blade tip and hull - was avoided in the case of *Color Fantasy* where a large clearance to the hull was available. Diameter, number of blades, and blade area had to be juggled to find the best compromise between efficiency and freedom from various types of cavitation. The final choice was two Kamewa Ulstein type 144XF5/4 CP propellers of 5.2m diameter. Each inward-turning propeller has four blades, rotates at 138rev/min, and has an expanded blade area ratio of 0.644.

The hull shape, large clearance and careful design of shaft brackets gave good inflow conditions to the propeller. The propeller hydrodynamic design point is the combination of propeller power, rev/min, and ship speed at which the propeller is hydrodynamically optimised with regard to cavitation and efficiency.

This design point was a balanced compromise between the different operation modes based on Rolls-Royce's experience of designing propellers for ro-pax and cruise vessels operating in different modes with stringent noise/vibration requirements. All operating conditions have to be analysed. For example, in the 2+2 ME mode (ME=main engine) the sheet cavitation on the suction side as well as the strength of the tip vortex has to be kept to a minimum.

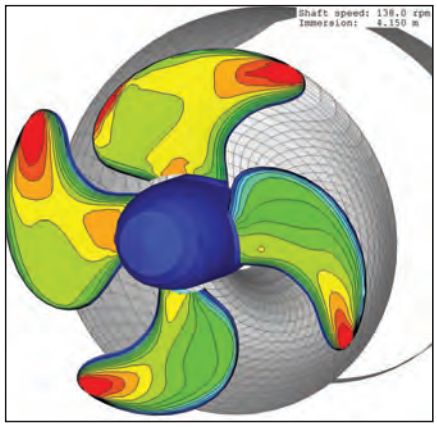
Sheet cavitation is the main source of pressure pulses, normally at 1st to 4th blade harmonics. These blade harmonics create vibrations in the hull structure at the corresponding frequencies. The suction side tip vortex creates broadband noise on board, normally in the frequency range between the 4th and 8th order of blade frequency, corresponding to 35Hz-70Hz for *Color Fantasy*. In the single main engine mode, some pressure side cavitation is normally allowed, however, this should be kept to a minimum.

The design was refined in an iterative process. Pressure distribution on the blade surface of the propeller operating in a wake field behind the ship was calculated by the potential flow boundary element method. Pressure pulses were calculated according to Holden's method, modified for the Rolls-Royce skew blade propeller design. The strength in the tip vortex was calculated using the tip vortex index method.

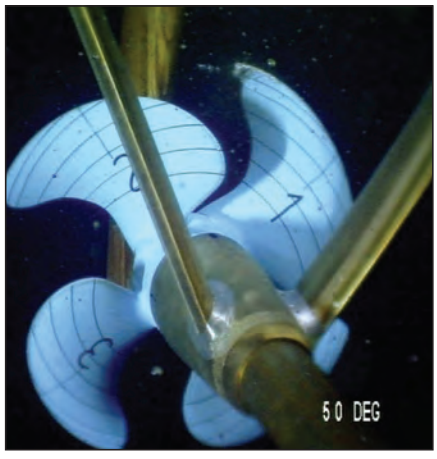
Extended model tests were carried out to reach the best possible hull lines and appendages in deep and shallow water. Wake measurements, propulsion and cavitation tests were made. The cavitation pattern on the propeller was video recorded and the propeller-induced hull pressures measured at three different conditions in MARIN's vacuum tank: 85% in deep water, 85% in shallow water, and asymmetric engine conditions. A crucial part of the test programme was to study the propeller cavitation, specifically the behaviour of the tip vortex and to investigate possible means of reducing it.

An additional noise reduction feature is a so-called MABS air blowing system. Air is injected along the hull surface above the propellers, reducing noise excitation on the hull. It requires little power to operate and is controlled from the bridge. The advantage is that noise characteristics can be improved under adverse conditions, for example when sailing in shallow water, operating with asymmetric shaft loads, or manoeuvring with large rudder angles.

When *Color Fantasy* was running sea trials, extensive measurements of cavitation, noise, vibration, speed, manoeuvrability and wave making were made. Speed trials were carried out in several different conditions to verify the model test power curves. In practice, the full scale power curves were better than expected from the model tests. Propeller-induced hull pressures were measured by 10 pressure transducers installed in the hull. Direct observations of cavitation were also made using the borescope technique for video recording and stroboscopic illumination of the propeller.



Propeller suction side pressure distribution, 2+2 ME 85% MCR.



Cavitation pattern at reduced cavitation number for model propeller, 2+2 ME 85% MCR.

For several years Aker Finnyards has installed its own continuous measuring system to capture key performance data on its ships during the guarantee period. The system ensures a deeper understanding of a vessel's operation and gives useful information should anything unexpected occur.

The conclusion of this article is that very low levels of noise and vibration can be achieved with a conventional twin-screw propulsion system using CP propellers, and that optimum results are dependent on good cooperation between hull and propeller designers, owner, and classification society.

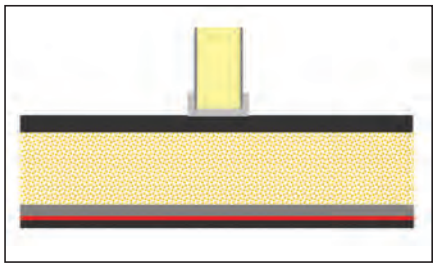
* This article is based on a paper first presented at the 1st International Ship Noise & Vibration conference 2005.

ScanVibra: a new noise and vibration consultancy

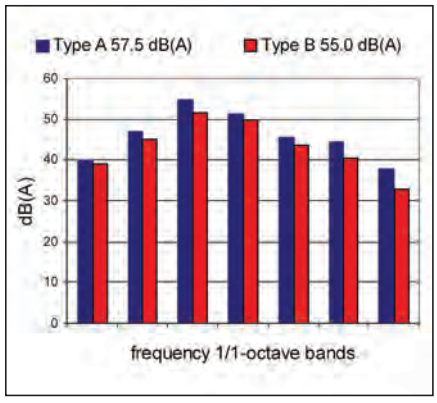
A NEW force in the specialist field of noise and vibration analysis/solutions is the Danish consultancy ScanVibra. This Copenhagen-based company was only set up in May last year but has already established a promising customer base - noise and vibration problems continue to cause difficulties for many ship operators, especially as demands and regulations become more stringent. Ship types on which the company has already worked have included passenger ships, megayachts, ro-ro ferries, offshore support vessels, and naval ships.

ScanVibra has expertise in all the common, as well as special, areas - propeller cavitation and pressure pulses, engine noise, ventilation systems, floating floor solutions, frequency analysis, and noise transmission and radiation (air-borne or structure-borne). A pertinent point is made by the company that many potential sources of both noise and vibration can be eliminated for only modest effort, if correct decisions are made at an early stage in a newbuilding project. Key solutions can include reducing noise at source (by component selection and correct mounting systems), structural design, insulation, silencers, and add-on devices such as vibration compensators.

Nevertheless, ScanVibra will attend sea trials - the first time when practical tests can be made - and take noise and vibration measurements, identifying any problem areas. Sometimes, solutions call for close collaboration between shipyard, owners, suppliers, and a specialist consultant. Typical examples involve accommodation assembly and some aspects of structural design.



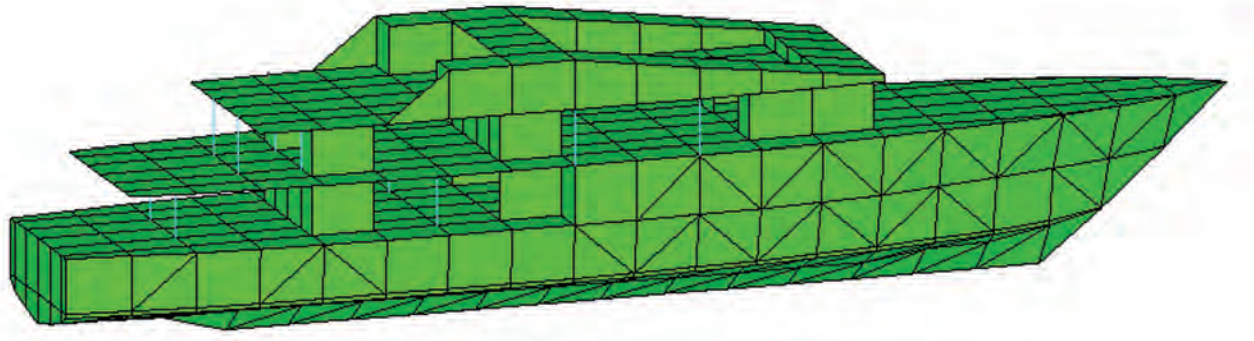
A typical floor solution from ScanVibra to limit noise and vibration transmission by including a sandwich damping construction. Linings and partitions can then be mounted on top to provide 'floating' accommodation.



Calculated noise spectrum figures using ScanVibra's own ShipNP software. The two bars simulate floating-floor alternatives in a crew cabin. Compared with a standard floating floor, an overall noise reduction of 2.5dB(A) is obtained by introduction of a moderately heavier version.

Meanwhile, investigative measurement surveys have been made easier by advances in instrumentation - particularly during the last decade. Today, ScanVibra can provide extensive data analysis onboard during an actual survey, rather than later in an office. This can result in major benefits for customers.

A global 3D model produced by ScanVibra for vibration analysis on a 55m long luxury yacht.



Workshop enables knowledge transfer

AFTER successful workshops in 2003, 2004, and 2005, the next international workshop 'Sound and Vibration on Board' takes place in Delft, The Netherlands, on May 17 and 18, 2006. This workshop is for all aspects of the marine industry and is a joint initiative between Holland Marine Equipment association (HME) in cooperation with the Dutch research institutes MARIN and TNO.

The workshop aims to link theory to daily practice and trains employees in the principles of sound and vibrations. This is of increasing importance to the international shipping and shipbuilding industry in aiming to reduce the impact on ships, ship systems, and the environment.

The workshop has been developed and adjusted to the needs expressed by the industry and deals with the origin and prevention of noise and vibrations onboard. The impact of the fast development and implementation of electronics onboard; ships with structural cracks due to vibrations impacting on the marine environment and the safety of those on board; as well as crew safety and fatigue will all be covered in the workshop.

The cooperation with MARIN and TNO offers the possibility of transferring knowledge between research institutes and the international marine industry, including small- and medium-sized enterprises; this is a successful concept, according to companies that have already participated in the previous events.

For more detailed information and workshop dates please contact Nick Wessels from Holland Marine Equipment (Tel: +31 10 44 44 333 or e-mail: nw@hme.nl) or see the website www.hme.nl on the Events page.

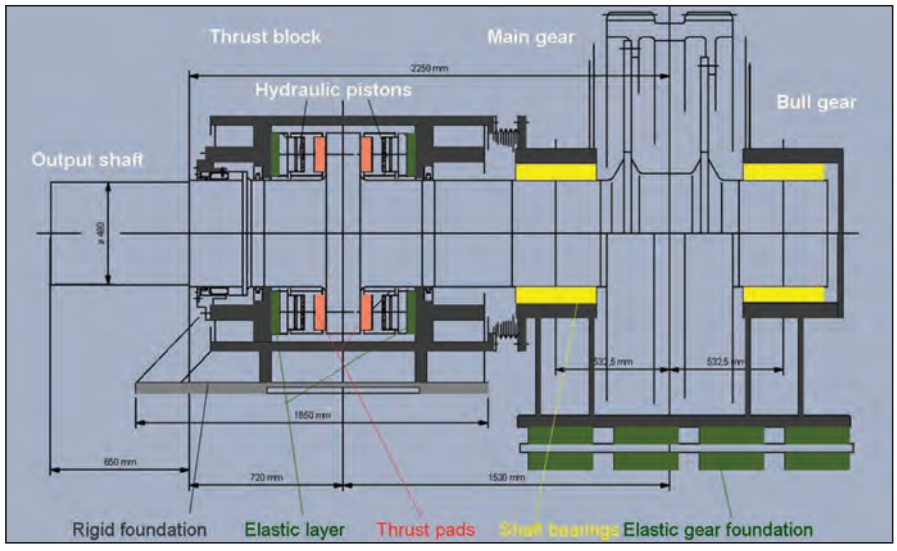
New hydraulic thrust block for noise-damped propulsion systems

MANUFACTURER of marine gears for naval and merchant vessels, Renk Aktiengesellschaft, based in Augsburg, Germany, also produces integrated thrust blocks. The design of these blocks are adapted to each individual vessel's design.

Usually the thrust block is integrated into the gear unit between propeller shaft and bull gear. The propeller thrust is transmitted via the rigid connection between the vessel's foundation and the casing. Front-end thrust blocks are also possible. A short design length is common to both types. These gears are suitable both for naval vessels equipped with CODAG or CODELAG propulsion systems, and megayachts with up to 35,000kW of input power.

Naval ship design, however, prescribes more and more an elastic support of the gears in order to achieve the lowest structure-borne sound. In this case the thrust block must be arranged as an individual unit in the shaft system. In view of higher weights and a separate oil system this will lead to higher costs, apart from the additional need of space.

For a while now Renk has offered gearboxes which combine the requirements of little space and elastic support with a thrust block directly attached to the gear unit. The core piece here is the ATB System (Advanced Thrust Bearing) currently waiting for its patent, which is offered for gears combining all power stages. It offers particular advantages for powers starting at 6000kW, if propeller thrust cannot be transmitted via the flexibly supported gear unit.



A schematic of the ATB (Advanced Thrust Bearing) thrust block with an elastically mounted gearbox.

Compensation elements in the thrust block enable unlimited effects of the elastic support of the main gear. Under deflection of the flexible support, slight angular misalignments of the propeller shaft transmitted to the thrust collar are compensated by individual oil pressure cylinders fitted aft of the tilting pads. The cylinders are supplied with pressure oil via a common system so that in case of different load and displacement conditions the axial force is identical on all pads. Moreover, an elastic support is mounted between the thrust block ring and casing, acting in axial direction and providing additional noise qualities.

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State-of-the-art design for new livestock carriers

THE transportation of live animals is an emotive issue conjuring up images of animals stuffed into holds on floating 'rust buckets'. While it is true that many of the vessels operating in the livestock sector are over 20 years old, those operating out of Australia, in particular, under the scrutiny of the Australian Maritime Safety Authority (AMSA), are normally well-maintained and safe. There is an argument, however, that considering the nature of the cargo, all old livestock carriers should be withdrawn from the market.

Thankfully, there is a move towards heavy investment in state-of-the-art ship design and technology to not only ensure the welfare of the animals but also help improve the image of the industry as a whole. Italian owner Siba Ships - which already claims to own the youngest fleet in the world for the transportation of live animals - is one such livestock carrier investing heavily in the design and construction of its vessels.

Animal welfare is important to Siba Ships, and it believes that only by investing heavily can this be achieved. The company claims that it has already achieved the lowest mortality rates in the world, and this is an expensive policy. The company's latest newbuildings are costing in the region of US$38 million each but for that it secures the latest advances in technology and the highest standards of animal care.

The two newbuildings under construction at Labroy Shipyard, in Singapore, are aiming to break the mould in livestock carrier design. Designed according to Australian, New Zealand, and Irish rules for the carriage of livestock, and due for delivery in 2007, the vessels will be fitted with a patented system that will allow the conversion of the seven high decks for cattle into the same area when carrying sheep, improving animal comfort normally jeopardised by double-tier design.

Many of the vessels working in the livestock sector today are double-tiered which can result in overcrowding and crushing - something Siba Ships believes should become a thing of the past. Taking away double-tiered and old ships, it is believed, will result in an immediate improvement in mortality rates.

Not only do Siba's latest vessels offer more space for their 'passengers', they also guarantee round-the-clock access to food and water due to a number of innovative systems. The fodder - which is stored in a 1600tonne capacity, purpose-built silo - is distributed to the animals directly into troughs by way of an unmanned and fully-automated system. Fresh water production capacity of 350tonnes a day is assured by way of four reverse-osmosis plants, manufactured by Rochem, in Germany, and an automatic water distribution system ensures that every single pen has fresh water available 24-hours a day. This will enable the vessels to perform a voyage of over 10,000miles fully loaded.

The ships are also breaking boundaries as the first vessels to comply with the new AMSA rules for air velocity within pens. The ventilation system has been designed in order to ensure no less than 80 air changes per hour in the enclosed decks and 40 air changes per hour in the open decks. They will also have a Pen Air Turnover (PAT) of around 280, assuring full capacity even at the hottest times of the year. PAT is a coefficient introduced by the Australian authorities which measures the amount of air introduced into the hold in respect to the area available for the animals rather than the volume alone.

Two of these livestock carrier vessels are currently building at Labroy Shipyard, Singapore, for Siba Ships.

***Becrux*, which is in service, is capable of carrying 75,000 sheep or 14,000 cattle, and is claimed as the world's largest purpose-built livestock carrier.**

Marking another first for the livestock industry, the vessels will be equipped with two separate and independent enginerooms. Even the complete loss of one space will not impede the vessel from safely continuing its journey and also continuing to provide full ventilation, feeding and watering services to the livestock, ensuring the safety of both the animals and the crew.

The main engines will burn low cost fuel (IFO 380) and drive one shaft alternator each while redundancy in each engineroom is guaranteed by a separate heavy duty generator also burning the same low cost fuel, even during loading and unloading. The vessels will also be classed by Registro Italiano Navale (RINa) with a Green Star Design notation, ensuring low emissions and low risk of oil spill.

Other features include decks covered in special resins and treated with a non-slip finish to guarantee long-lasting protection to the steel and comfort for the animals. For lightweight and corrosion-free operation, aluminium and other corrosion-free materials have been extensively used, particularly for pillars, pen rails, gates, troughs, and fittings on decks. The pipes carrying fodder to the animals are constructed of food-approved stainless steel, as is the entire drinking water system.

Not only do these materials help minimise maintenance costs, they also make cleaning easy and fast, an important aspect of hygiene for the animals. The vessels will have a crew of just 32, 15 of whom will be dedicated to the care and welfare of the livestock.

Another very important aspect in livestock carrying is stability. AMSA dictates the minimum standards for stability characteristics, which include breadth, GM location, and pitch and roll for animal comfort. Capable of carrying approximately 30,000 sheep or 6500 cattle, and with a deadweight of 7850dwt, Siba's two newbuildings are not the biggest livestock carriers built to date, but claim to be the most technologically advanced.

The world's current most modern livestock carrier is *Becrux*, which is also owned by Siba Ships. Capable of carrying 75,000 sheep or 14,000 cattle, it is also the world's largest purpose-built livestock carrier and incorporates numerous animal-friendly features including automated feed systems, temperature control and spacious one-tier enclosures.

Siba Ships wants to see tighter standards on livestock carriers, ensuring that ageing converted ships still used to carry livestock are withdrawn from service. Around 49 livestock carriers are used as charter ships for live exports and only five are under 10 years old, and the company believes that these ships over 20 years old pose a threat to the live export trade. Siba notes that the trade needs to improve its public image and transparency through significant capital investment and reduction of mortality rates.

Foam for acoustic and thermal insulation

SOLIBOARD products, obtained from Solimide polyimide foam, can be used as thermal and acoustic insulation on vessels, and this product is available as cut panels in sheet form, pipe coverings, and as profile shapes, with various types of finish materials.

Soliboard polyimide foam products, from Inspec Foams Inc, USA, and fabricated by Italian company Euroguarco SpA, insulate over a wide operating range, from -185°C to +300°C. Even at cryogenic temperatures, the foam is claimed to maintain its flexibility. Soliboard products are inherently fire resistant, emitting virtually no smoke or toxic by-products when exposed to an open flame.

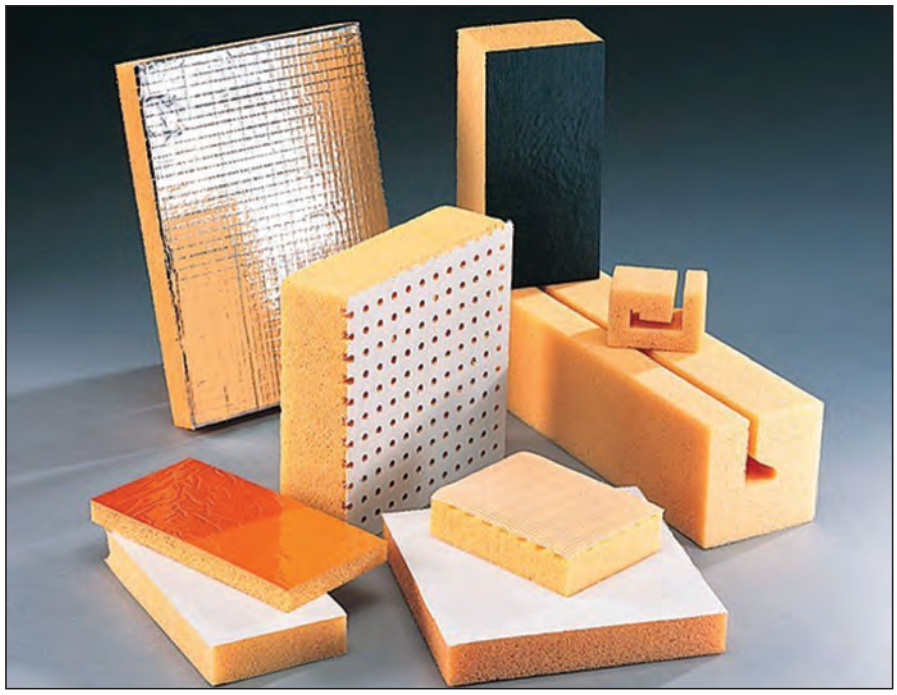
This non-fibrous insulation requires no special handling, and Solimide polyimide foams contain no halogens and are not manufactured with any ozone-depleting chemicals or heavy metals. The foams are also extremely lightweight, having a nominal density of 6.4kg/dm^3 (style TA-301). Polyimide foams also offer good acoustic absorption and thermal insulating properties for lightweight materials.

Considerable savings can be achieved in both handling and installation of this material. These fibre-free products are light and easy to handle, cut, and fit on-site and, in most cases, stud requirements are greatly reduced or eliminated. Polyimide boards show significantly greater resistance to damage than traditional insulating products and claim to maintain integrity after long-term usage.

Typical applications of this product include: thermal and acoustic bulkhead board, noise transmission loss blanket, acoustic ceiling panel, duct liner, pipe covering, duct wrap, clean room insulation, and expansion joints.

Over 15 navies and a number of marine commercial operators around the world have already used Soliboard as thermal and acoustic insulation systems on their vessels. The inherent fire resistance of the foam can provide a significant reduction in fire load and combustion products.

Soliboard has successfully been installed on war ships, patrol boats, high-speed ferries, and yachts, where the weight saving allows for greater speed and stability; tonnes of topside weight can be saved when Soliboard foams replace heavier fibrous insulation in such applications as bulkhead board, duct wrap, and acoustic ceiling panels. Recent references include US Navy patrol boats built at Bollinger Shipyards, vessels in the Taiwan frigate programme being built at China Shipbuilding Corp, and Norwegian Navy vessels built at Kvaerner shipyards.



Soliboard is made from a polyimide foam.

Soliboard is available with a variety of surface finishes, among which are:

- CF: faced with glass cloth, for generic thermal insulation systems
- VBD: faced with an aluminised polyester/aluminium foil laminate plus glass fibre mesh reinforcing, for a high-performance vapour barrier. Mainly used for duct liners
- RMW: faced with reinforced polyester film, to provide a tough, moisture- and oil-resistant acoustic interior finish
- PFG: faced with perforated glass cloth, for a tough, acoustic interior finish. The polyimide base board is grooved to provide a recess behind the perforations in the facing which allows the face to be painted without the loss of acoustic value
- PAF: faced with perforated and ribbed aluminium sheet, designed to provide a durable and attractive suspended ceiling. It makes metal shielding unnecessary.

Soliboard has been certified as CE-MED Surface Material, meeting part 2 and 5 of IMO FTPC; as a fire-restricting material as per IMO resolution MSC.40(64) for high-speed craft; and it has been certified by the Italian Navy as thermo-acoustic insulating material for bulkhead boards and decks. Soliboard products are manufactured under Quality Assurance System certified ISO 9002.

New risk-assessment initiative launched

ITALIAN classification society Registro Italiano Navale (RINa) has responded to demands for improved risk-based analysis in the shipping industry by launching a new risk assessment and management techniques initiative. RINa has for many years provided leading shipowners and operators with risk assessment and related training services in respect of, among other things, reliability and maintenance, safety management, personnel recruitment, management of change, and cargo operations.

Now, there is a growing awareness in the shipping industry of the importance of risk-based self-assessment techniques, as typified in the tanker management and self-assessment (TMSA) programme initiated by the Oil Companies International Marine Forum (OCIMF). RINa has responded by providing new technology which provides the risk analysis expertise demanded by TMSA and by other safety-aware organisations.

RINa's RAM (reliability, availability, maintainability) programme helps companies to learn from accidents and other incidents and significant near-misses, and to avoid a recurrence of them. The approach to incident investigation is aimed at defining procedures for reporting and analysing safety and environmental incidents, and thereafter identifying measures to be taken to prevent a recurrence of similar incidents.

This class society can also evaluate the hazards arising from changes made to company operations, ships' equipment, personnel procedures and other factors affecting fleet management.

The reliability centred maintenance (RCM) risk-based approach to machinery and equipment maintenance, meanwhile, focuses on items critical to ship safety and operation, such as propulsion, electrics, and steering gear. Other systems, not directly related to safety but nevertheless essential to the safe

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and efficient operation of the vessel, can also be analysed. RCM enables companies to optimise preventative maintenance tasks, with a positive effect on direct and indirect costs relating to maintenance and the whole ship life cycle.

RINa has been witnessing an increasing awareness in the shipping industry of the value of a risk-based approach to safety and efficiency, of the type already seen employed in other industries, including the nuclear and offshore sectors. With OCIMF's TMSA programme, for example, an increasing level of sophisticated analysis is required. OCIMF develops the guidelines in accordance with which owners and operators undertake the necessary self-assessment. RINa's role is then to be the 'calculator', the means by which to implement the risk assessment techniques.

First Green Passport issued

In other news, RINa has issued the first Green Passport to an Italian ship. Awarded to Mediterranea di Navigazione's *Ottomana*, the document and associated review scheme bring to life the voluntary IMO scheme to document all hazardous material built into a ship, leading to more environmentally-conscious ship recycling.

The 25,000dwt IMO Class II product/chemical tanker *Ottomana* was delivered from the Celik Tekne yard, in Tuzla, Turkey to Mediterranea di Navigazione on January 25, 2006. It is the largest tanker built in Turkey and comes designed and built to the highest environmental standards.

In 2002 Mediterranea di Navigazione was the first non-passenger company in the world to voluntarily opt for higher 'green' standards for its fleet, and was issued with RINa's Green Star logo. RINA has carried out a full inventory of all material on *Ottomana*, which will need to be considered when the ship is repaired or recycled, and has devised and put in place a regular review scheme to keep it up to date.

RINA's Green Passport scheme is applicable to all ships and can be implemented for both newbuildings and ships in service. It is an inventory of all materials which would need special handling during repair or scrapping, and an inspection system to maintain the listing for the life of the vessel. It is a voluntary application of the IMO scheme outlined in Resolution A.962(23) guidelines on ship recycling, which are expected to become mandatory in the near future.

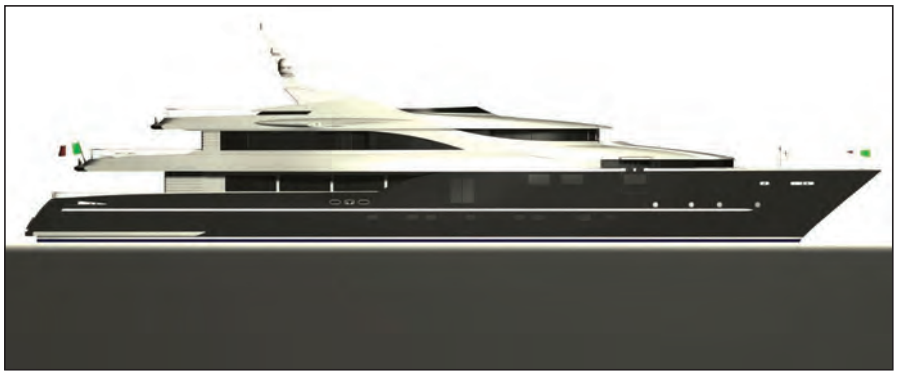
AMY - a new joint venture for megayachts

IN 2002, T Mariotti shipyard entered the yachting market with the launch of *Dionea* and in 2005 the yard signed a joint-venture with Admiral to build a new range of displacement megayachts.

The yard also recently signed a joint venture named AMY - Admiral Mariotti Yachts. This has been set up by the Ceccarelli family, proprietors of Cantieri Navali Lavagna, and by Mariotti Shipyard, and hopes to tap into the commercial and marketing resources of Admiral and the design and production capacity of Mariotti Shipyard, in order to build and sell steel and aluminium megayachts.

The new range of displacement megayachts produced by AMY will offer the Admiral design and style, research into materials and construction, personalised interiors, design of displacement vessels, stability at sea, and attention to detail and efficiency at all production stages.

Admiral Mariotti Yachts has already produced the design for four displacement Admirals measuring between 38m and 63m. A typical example is the Admiral 54, designed by Luca Dini for AMY production, which has a steel hull and aluminium superstructure. It has been designed with a spacious and clean-lined interior. The Admiral 54 is the next stage in the evolution of pleasure yachts produced by Admiral.



This new 53.80m vessel, the Admiral 54 series, has been planned for constructions by the new joint venture AMY, Admiral Mariotti Yachts.

TECHNICAL PARTICULARS
ADMIRAL 54

Length, oa	53.80m
Beam	10.50m
Draught	2.90m
Displacement	721tonnes
Main engines	2 x Caterpillar 3516 B
Main generators	Northern Lights 2 x 155kW
Propulsion power	2 x 2260bhp
Maximum speed	17.50knots
Cruise speed	14knots
Long-range speed	11knots
Range at economical speed	5000nm
Passengers	10
Crew	11 - 12
Stabilizers	Zero speed type
Classification	American Bureau of Shipping - MCA Compliant A1, AMS, ENV. Safe, CONF Y

The Admiral 54, which can accommodate up to 12 passengers in six cabins, spreads over four decks. The stern area, used as boat store and technical areas on previous Admiral designs, now offers a 'terrace on the sea'. Tenders and waterjets now reside in a side-accessed garage. Two Caterpillar 3516B engines power the Admiral 54, which can reach a speed 17.50knots and has a range of around 5000nm at economical speeds. Particular attention has been paid to the absolute comfort of guests on board, thanks to stringent standards for soundproofing and noise reduction. The International Certification of Ecological Compatibility, characteristic of the entire AMY line, assures compliance with the strictest regulations in terms of environmental protection while in no way compromising on the freedom of navigation.

Last year T Mariotti also carried out a number of significant drydocking tasks including repairs on cruise ships including *Costa Marina*, *Voyager*, *Aida Aura*, *Explorer*, and *Costa Classica*. A number of Moby Line ferries were also refurbished, and T Mariotti also carried out repair work on yachts and some container ships.

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- The case for the replication of key historic vessels
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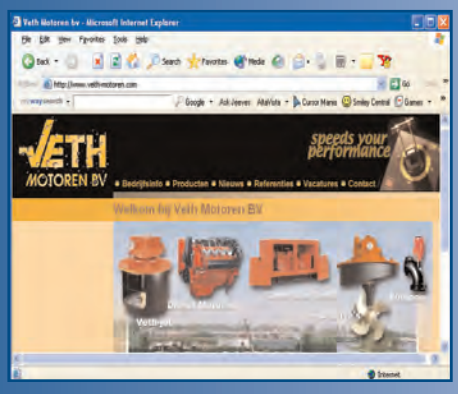

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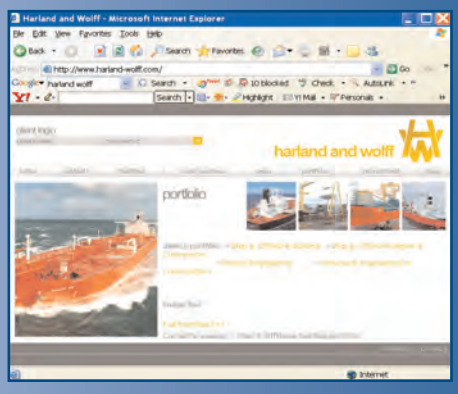

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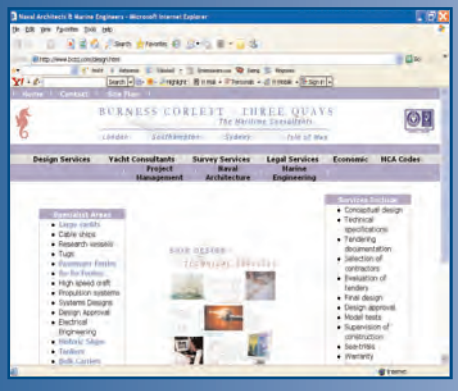

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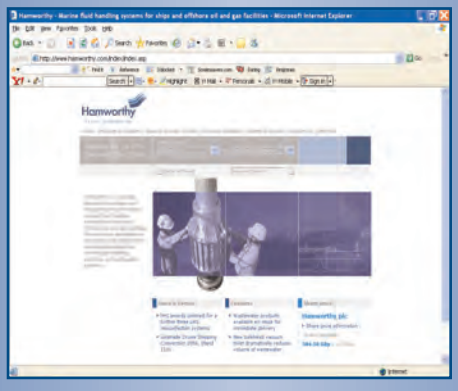

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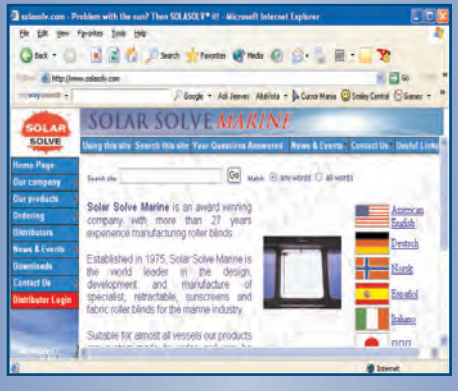

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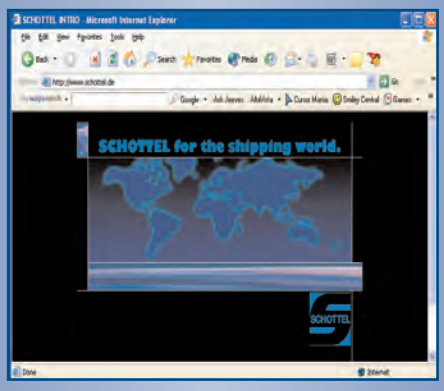

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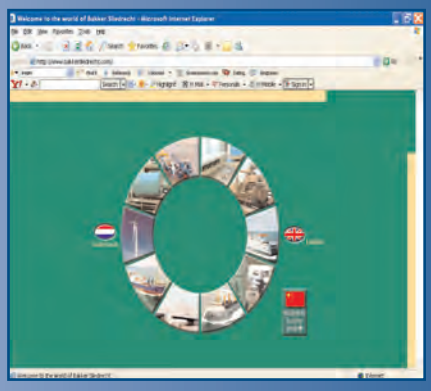

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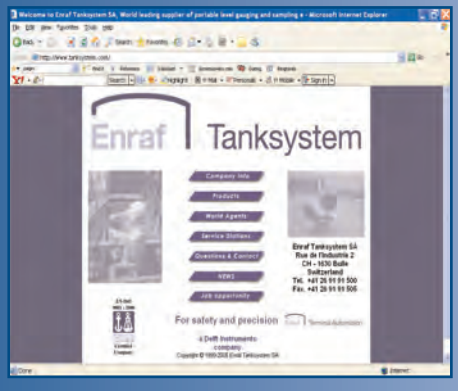

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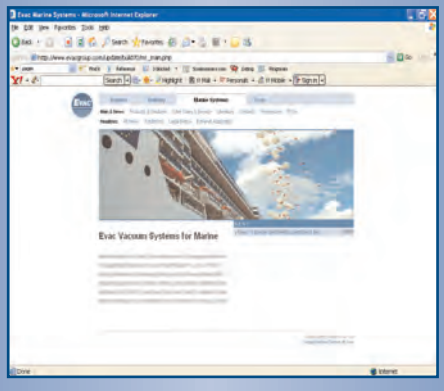

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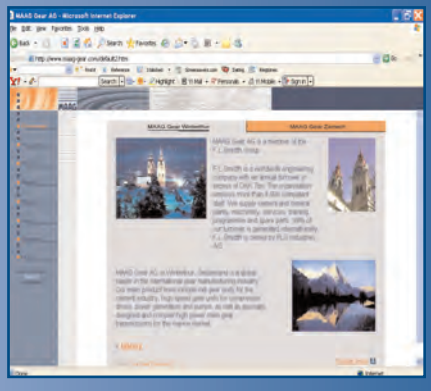

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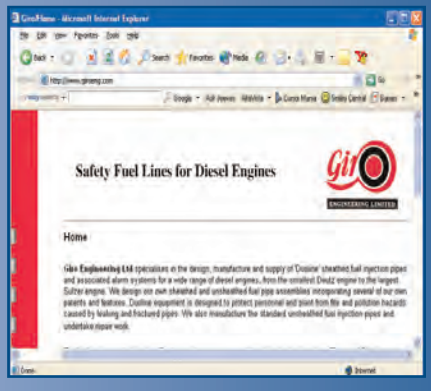

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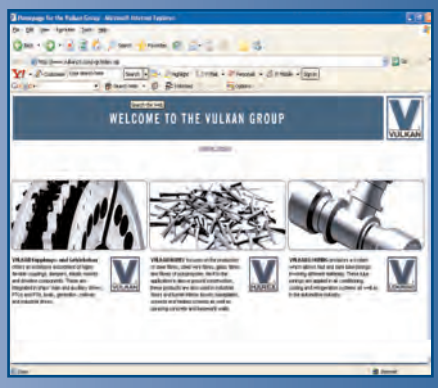

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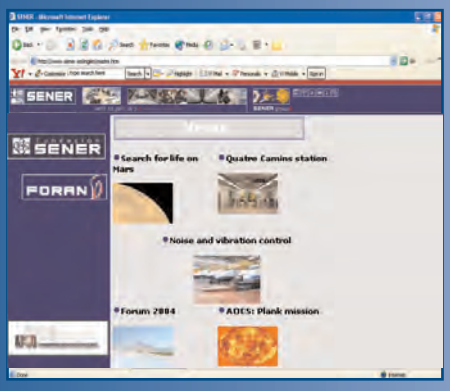

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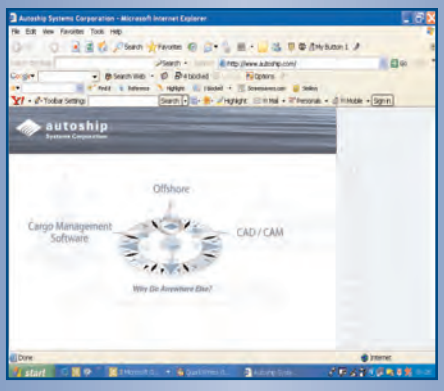

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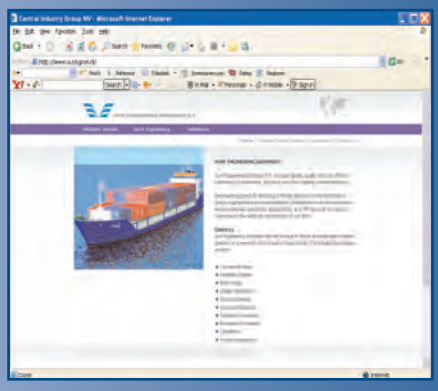

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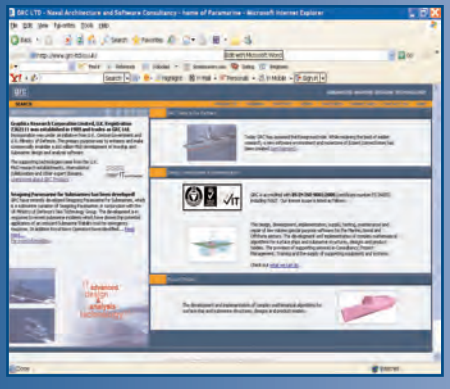

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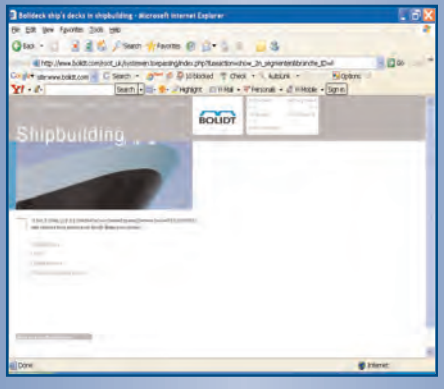

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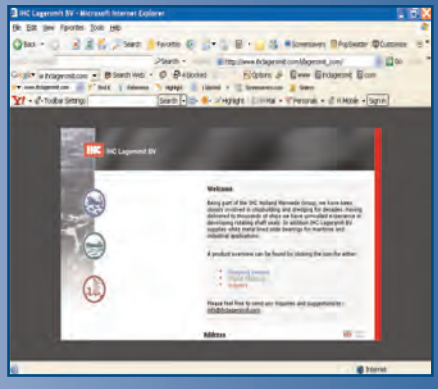

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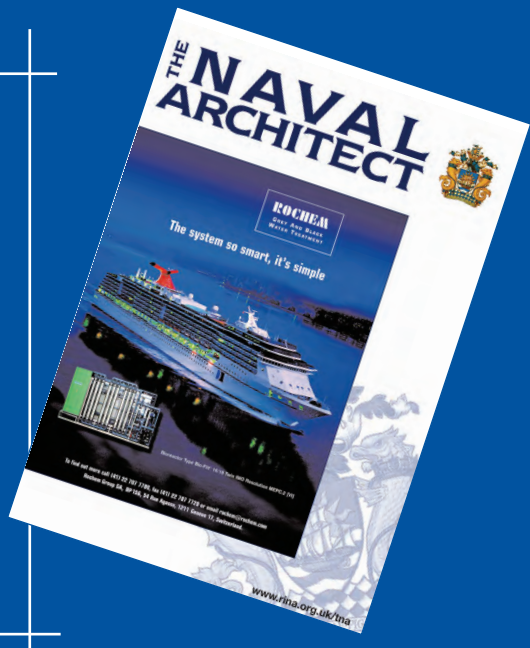

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