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THE NAVAL ARCHITECT
International Journal of The Royal Institution of Naval Architects

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Published by:
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Printed in Wales by:
Stephens & George Magazines
Merthyr Tydfil

A one-year subscription in 2004 to *The Naval Architect* costs £95 (UK), £100 (Europe), and £110 (Rest of the world).

Audited Circulation 9838
JAN - DEC 2003
ISSN 0306 0209

THE NAVAL ARCHITECT

One of a number of interesting new products that were launched at the recent SMM Exhibition, held in Hamburg, Germany, was this new-design captain's chair from Rolls-Royce, planned to be suitable for all kinds of vessels. It features an updated attached touch-screen, whose controls are linked to others on the armrests, and the associated floor-mounted console screen displays can show parameters relating to a wide range of shipboard systems. A special report on this exhibition starts on page 14.

PRINCIPAL ARTICLES

SPECIAL FEATURES

REGULAR FEATURES

The Bodyguard

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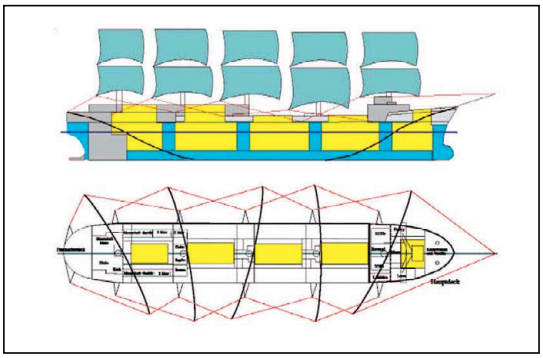
TRANSOCEAN COATINGS

Time to seek fossil-free propulsion?

IS the demise of the oil-fuelled ship on the horizon? There are some indications that this may be so, if studies by various bodies into oil and gas supplies are to be believed; these include predictions that the world population and corresponding energy consumption will double by the middle of this century but that oil production will peak during the current decade. Many may also be alarmed at current political events in oil-producing parts of the world (eg, Iraq, Saudi Arabia, and Nigeria) that could threaten supplies, alongside high crude oil prices and very high - and very attractive for tanker operators - freight rates today, approaching Worldscale 200. It is well known that fuel accounts for approximately 50% of a merchant ship's running costs. This is all happening at a time of record new-ship orders - mostly in the Far East.

As noted by Richard Dryden in his September article (page 112) on modular sailing rigs, concern is additionally growing over environmental damage and climate change, probably the result of burning of fossil fuels, although, to be fair, great efforts are being made to improve emissions by leading engine builders and others. In view of the considerable time that it will take to agree, develop, and perfect new technology (even if sails are considered 'old' technology), time is relatively short.

In the late 1970s and early 1980s, huge oil price hikes stimulated much interest in wind-assistance for merchant ships, and several interesting vessels were built from new or converted. These include a 1600dwt tanker *Shin Aitoku Maru* and a 26,000dwt bulk/log carrier *Usuki Pioneer*. In Denmark, Knud E Hansen has designed a 50,000dwt-class bulk carrier, and today in Germany, more research is being handled by Sail Log into a 50,000dwt Panamax bulker with 20,000m^2 of sail. Traditional square rigs have been chosen by this company because they are known to work satisfactorily, but alternatives do exist, including the more revolutionary Walker Wingsail.



Modern automated windjammer. An outline profile and plan view (upper yards omitted in this view) of a 50,000dwt sail-assisted bulk carrier, as proposed by the German company Sail Log. Sails would be hoisted from their positions on stowed lower arms. Arms could be folded in port to aid cargo working.

The long-haul bulk trades (traditionally not in need of express service) have been identified by the German team as most suitable for sail assistance, or even full sail, because the principal bulk trades run more or less in a north-south direction in parallel with the globe's principal wind systems. Sail Log is part of Schwab-Orga GmbH, which holds the patent to a modern square-rigged design with automated sails. Capt Hans-Bernd Schwab has sailed as master of various bulk carriers and is therefore well positioned to comment on the suitability of sails. He is supported by Prof Zanjoc and Prof Petermann from Bremen University.

Capt Schwab notes that due to the age structure of the bulk carrier fleet, many more will have to be replaced during the next 10 years (despite the boom in that sector a few years ago), and Sail Log claims that the running costs of an automated sail-assisted bulk carrier could be 22% lower than those of a fully diesel-powered vessel, although in general, it has to be said that figures appear to vary quite dramatically, depending on the source. Sail Log estimates that sails could normally be used for two-thirds of a voyage. A model has been built and has confirmed all propulsive predictions.

An altogether different idea, also from Germany, is the SkySail, which was on show at the recent SMM exhibition in Hamburg. This unusual concept uses a towing kite, working at heights of up to 500m and in association with an autopilot and wind-optimised route management. The kite has an aerodynamically optimised aerofoil profile, comparable to the wing of an aeroplane.

Control cables steer and trim the SkySail, which can have an area up to 5000m^2, and power is transferred to a ship through a patent mounting. Satisfactory operation at angles of up to 50deg to the wind is claimed, together with potential fuel savings of up to 50%, alternatively a 10% increase in ship speed. Systems can be retrofitted if required.

In the UK, Richard Dryden is working on a different sailing rig, specially designed to be fitted to existing tankers, bulk carriers, and part-loaded container ships. A stylish jointed and rotating mast is proposed, together with a boom and radially supported battens for the upper part of the Bermuda-rig-type fore and aft sail. When not in use, each mast and sail folds into a deck-mounted case.

Sails will probably not eliminate totally the burning of oil fuel but there is at least one technology that will: the controversial nuclear option. A new case for specifying the latter in modern merchant ships has been made by a retired engineering captain in the Royal Netherlands Navy, Gulian Crommelin, who has presented a logical reasoning for implementation of such a propulsion plant, as part of the Dutch NEREUS (an acronym for naturally safe, efficient, reactor, easy to operate, ultimately simple and small) steam-free project. Instead, helium is used to cool a pebble-bed reactor; this is passed to a heat exchanger, from where compressed air is used to drive one or more gas turbines.

These turbines can drive a propeller mechanically or through an electric motor. Such a plant could fit inside a typical 22,000dwt multipurpose cargo/container ship, taking up approximately the same space as a conventional diesel-powered vessel. Two difficult hurdles will need to be overcome: nuclear waste storage and prohibited entry to ports, but Capt Crommelin believes that these can be overcome.

Richard Dryden considers that our industry should be examining oil-free alternatives - or at least part-oil-free - as a matter of urgency. While not wishing to appear unduly alarmist, if oil and gas really do run out, we shall have no practical alternative than to return to the windjammer - or follow the controversial path of nuclear fuel. Recent history has shown how dramatically fast events can move.

It is a pity that more radical technical ideas for our industry's problems are not being promoted by industry, including at this institution's jointly held conference at the beginning of November on the subject of future paths for European shipbuilding. Naval architects, in their powerful position at the leading edge of future ship designs, should perhaps be taking a stronger lead in proposing radical commercial alternatives now!

Canadian ferry contract for Flensburger

ONE of the few shining stars on today's troubled European shipbuilding scene, **Flensburger Schiffbau**, in Germany, has brought off yet another remarkable coup: a contract to build three large double-ended ferries for the Canadian operator, **BC Ferries**, based in Vancouver. Traditionally, this company's new ships have been built in Canada, normally on the west coast, but the industry there has been in turmoil and dire straits for several years now - the last major newbuilding project there, the trio of large fast catamarans, built by a consortium of yards and headed by *Pacificat*, *Significant Ships of 1998*, ended in disaster. A fleet replacement programme is overdue by up to 10 years, according to some.

Despite complaints in some quarters, BC Ferries opted to go overseas for its newest project, although three domestic yards did take part in the bidding, along with 11 foreign yards. All three vessels of this Super-C class are designed for routes between the mainland and Victoria island, running from Horseshoe Bay or Departure Bay to Swartz Bay or Tsawwassen, and each ferry will be able to accommodate up to 370 vehicles and 1650 passengers (more than existing ships). Dimensions will be 160m length, 28.20m breadth, and 5.75m draught, with a service speed of 21.00knots.

The first ferry should leave the yard in October 2007. The fixed-price contract value is €206.40 million or Can$325 million - approximately Can$130 million less than Canadian bids, and Flensburger will be responsible for all design, construction, and delivery risks. There will be penalties if the new ferries are more than one-tenth of a knot below contract speed. A total of 80% of the cost of each ship will not be paid until completion. BC Ferries plans to build a further 19 replacement ships over the next 15 years, mainly in small or intermediate sizes. As reported in our September issue, some of these could be built in Canada.

In Italy, **Fincantieri's** list of cruise liner orders continues its ascent, with the signing of an 'unprecedented' cooperation agreement with **Carnival Corp**, which is expected to result in the building of four new liners and - in a most unusual step - the redesign and lengthening of Cunard's *Queen Victoria*, already ordered from the Marghera yard at Venice. The new vessels are expected to comprise a 110,000gt Conquest-class ship at the Sestri Ponente yard and a 116,000gt *Caribbean Princess*-class hull at Monfalcone for Princess Cruises, also a further two ships with the same characteristics for Carnival's European brands.

Queen Victoria is to be lengthened by 11m and its tonnage increased to 90,000gt, to serve as what is called 'Cunard's superliner of the future'. Another major plank of the Fincantieri/Carnival agreement is expected to include the creation of a brand-new Pinnacle-project cruise liner; at 180,000gt, this would be the largest modern passenger vessel ever built. These new moves means that the current Carnival order book comprises 12 ships and provides work for Fincantieri through to the end of 2008.

An impression of the new Super-C class double-ended ferries that will be built by Flensburger Schiffbau for BC Ferries.

NEW SECU-CARRYING SHIPS FOR FINNYARDS - A welcome letter of intent to build three special 15,000dwt container carriers for the Swedish operator B&N Nordsjöfrakt has been won by Aker Finnyards, part of the new Aker Yards group. The new vessels are planned for sailing year-round in the Baltic area, between Kemi and Oulu in Finland and Gothenburg in Sweden; they will therefore be heavily ice-strengthened. The main cargo is expected to be carried in SECUs (Stora Enso container units) with end and side doors; up to 155 can be loaded. SECUs first appeared as a cargo unit on Cobelfret's *Spaarneborg*-class ro-ro ships (*Significant Ships of 1999*). Delivery is expected in 2006.

NEW CRUISE LINERS FOR MSC - Two new 3000-passenger cruise ships have been ordered from Chantiers de l'Atlantique (Alstom Marine) by MSC Cruises for Mediterranean and Caribbean operation. Around 80% of cabins will have windows overlooking the sea, and three-quarters of these will feature balconies. Alstom has already completed, in 2003 and this year, two smaller ships for MSC, *MSC Lirica* and *MSC Opera*. Delivery of the new vessels will be in June 2006 and spring 2007.

LARGE LNG CARRIERS FOR BP - BP Shipping has placed an order at Hyundai Heavy Industries, in Korea, for four large membrane-type LNG carriers of 155,000m^3, with four options. They will follow the new trend of non-steam turbine propulsion and will have dual-fuel diesel-electric systems instead. Hyundai has been a latecomer to the membrane sector and is only now delivering is first such ship, to Golar. Prior to that, this leading yard has concentrated on Moss spherical-type designs.

NEW FIRE TEST FACILITY - A new building for large-scale fire-testing to IMO and other standards has been opened by Chiltern International at High Wycombe in the UK. The company is approved by Lloyd's Register for testing water-based firefighting systems, and equipment is in place for cabin and corridor tests, as well as those for machinery spaces; additional equipment can be installed to suit individual requirements. Calibrated instruments will measure all the necessary parameters.

ADHESIVES FOR MORE COMPETITIVE SHIPBUILDING - European shipyards could be become more competitive if they switched to adhesives for bonding lightweight materials. This is one of the results obtained by the BONDSHIP part-EU funded project, run under the EU's sustainable surface transport programme. Passenger ships, ferries, and high-speed craft are considered the best candidates, and one major benefit would be a reduction in welding slag, but less weight will also result. Cost savings of at least 20% are anticipated for fastening operations.

PEOPLE

HANS G PAYER, a leading light in technical advances at Germanischer Lloyd until his retirement at the end of last year, has been awarded Germany's Cross of the Order of Merit for his distinguished services.

DONALD LIU, recently retired executive vice-president and chief technology officer of ABS, has been awarded the David W Taylor Medal - SNAME's highest honour, for his success in building the technical foundations of modern ABS rules, and particularly the development of SafeHull.

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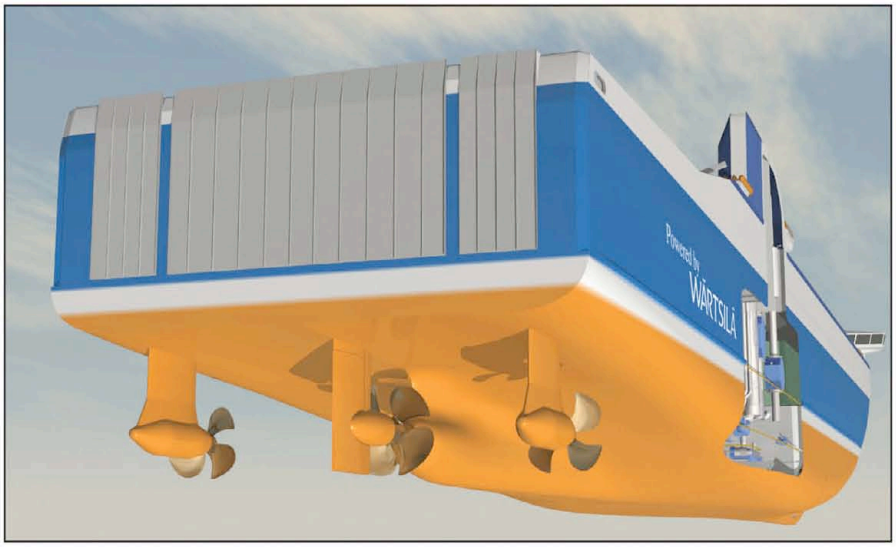
Cargo ro-pax ferry with wing pods - a new hybrid alternative

Oskar Levander, product and application development manager for Wärtsilä Corp, proposes a further application for the company's CODED hybrid propulsion concept.

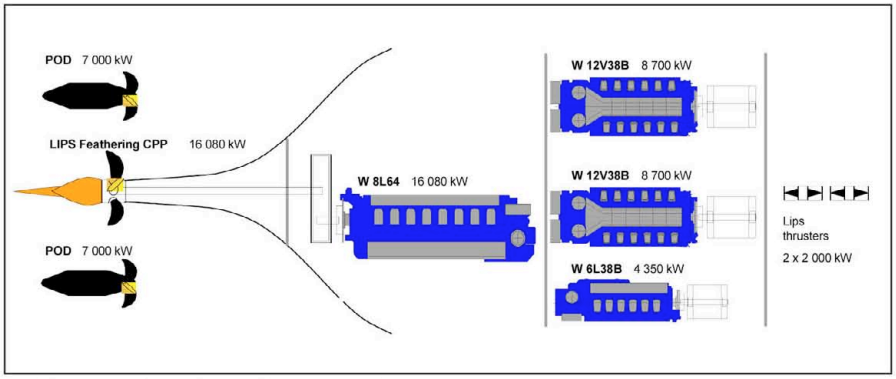
IN the September 2003 edition of *The Naval Architect*, we outlined the benefits of Wärtsilä's hybrid combined diesel-electric and diesel-mechanical (CODED) machinery for next-generation cruise liners. This concept features two electrically driven wing pods on each side of a mechanically driven propeller. Development work has been encouraging, and now the CODED machinery with wing pods has been applied to a cargo-oriented ro-pax ferry with a more moderate installed power level.

Diesel-mechanical propulsion with four-stroke medium-speed diesel engines has long dominated the ferry propulsion market, offering a highly cost-efficient and proven solution for most contemporary ferries. On the other hand, diesel-electric machinery has become the preferred choice for cruise liners, owing to clear benefits offered by electric propulsion. One of these is the possibility of using azimuthing pods, which today have established a strong position in the cruise market. Nevertheless, the high investment cost of electric propulsion has prevented its breakthrough in other parts of the commercial shipping business.

To try and overcome this dilemma, Wärtsilä has developed a new combined diesel-electric and diesel-mechanical (CODED) machinery arrangement, which combines the good characteristics of electric propulsion with the lower price associated with mechanical propulsion. It shows clear improvements in both ship performance and total economics.



An impression of a proposed ro-pax ferry featuring Wärtsilä's proposed CODED propulsion plant. When operating in low-speed mode, the centre propeller can be feathered.



Machinery configuration for the proposed ferry.

TECHNICAL PARTICULARS
CODED RO-PAX FERRY

Length, oa	205.00m
Length, bp	190.00m
Breadth	30.00m
Depth, to main deck	10.00m
Draught, design	7.00m
Gross	36,000gt
Deadweight	9000dwt
Speed, service	24.00knots
Trailers	3000 lane metres
Passengers	200
Passenger cabins	100
Crew	35
Crew cabins	24
Main engines	1 x Wärtsilä 8L64 (mechanical drive) 1 x Wärtsilä 6L38B (pod and harbour power) 2 x Wärtsilä 12V38B (pod power)
Output	1 x 16,080kW; 1 x 4350kW; 2 x 8700kW

CODED machinery features

CODED machinery offers most of the benefits normally associated with conventional diesel-electric machinery:

- flexibility - the installed prime mover capacity can be used for different purposes in different situations
- no need for the separate small auxiliary generator sets normally used with diesel mechanical solutions
- no need for large shaft generators to power bow thrusters. Sufficient generator capacity is available when the thrusters are needed
- diesel engines can be run at constant speed and closer to the optimum load to obtain lower specific fuel consumption. Low engine loads can usually be avoided
- freedom in location of generating sets.

The down sides normally associated with diesel-electric power plants are reduced, since a large portion of the propulsion power is mechanical. The high cost of electric systems is significantly reduced, as well as the transmission losses.

Hybrid propulsion with wing pods

One propulsion setup which can be used with CODED machinery is hybrid propulsion with wing pods. This set-up consists of two electrical pods, one on each side of a mechanical propeller on the centreline skeg, an arrangement that offers very high propulsion efficiency.

The possibility of splitting the load between three propellers, instead of two, yields better propeller open-water efficiency, especially in the case of high-power applications with limited draught. Furthermore, the single-skeg hull form without any open shaft lines offers significantly lower resistance than a twin-shaft line arrangement. This hybrid propulsion setup also offers excellent manoeuvring characteristics owing to the twin azimuthing pods, which makes the need for stern side thrusters unnecessary.

Machinery operation philosophy

The operational philosophy is an essential part of the wing pod concept. The centreline mechanically driven propeller is of the feathering type; it is used only at high speeds and feathered at low and medium speeds. The feathered mode

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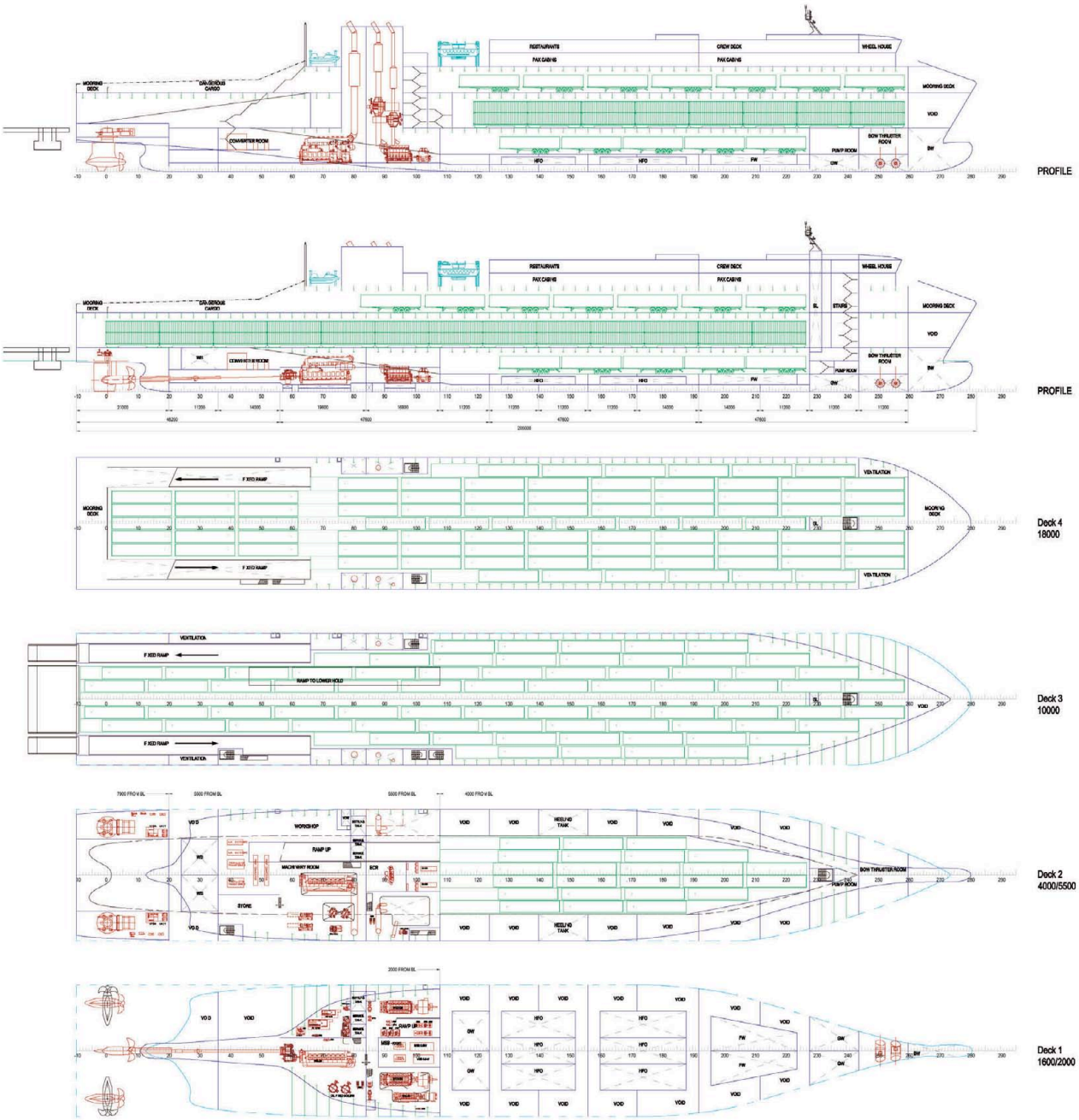
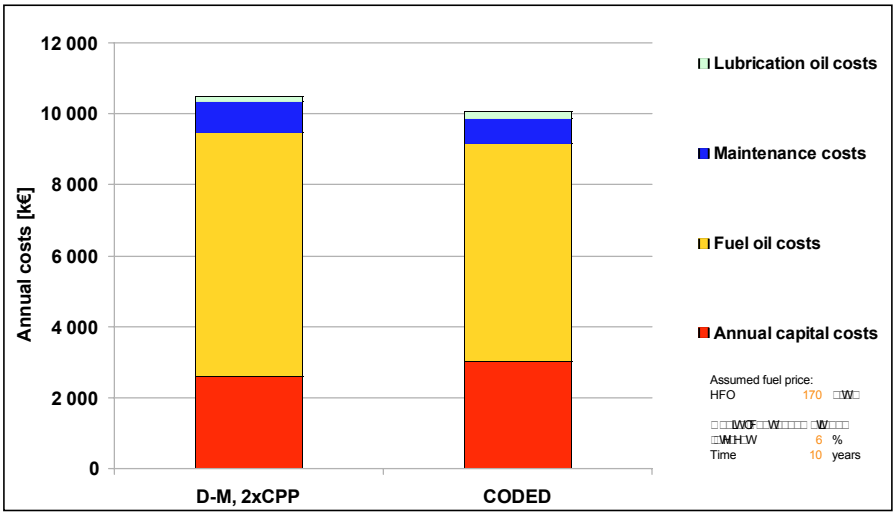
General arrangement plans of the proposed ro-pax ferry featuring a mechanically driven centre propeller with an efficiency rudder behind, plus two pod-type wing propellers.





Annual machinery-related costs for a CODED ro-pax ferry, calculated by Wärtsilä.

(pitch changed to align the blades with the water flow) results in significantly less resistance than for a windmilling propeller.

At low speeds, the vessel is driven by the pods alone. Low engine load on the mechanical diesel engines is thus never encountered and the possible negative effects associated with low load operation, such as increased fuel consumption, are avoided. Furthermore, the risk of pressure side cavitation is also reduced, since the CP propeller is never operated at low pitch and high revolutions.

These potential problems have been some of the drawbacks normally associated with conventional diesel-mechanical propulsion for ships operating at a wide range of speeds. Such features make the wing pod concept ideal for ferries with operating profiles requiring both high- and low-speed operation.

Benefits of efficiency rudder

It has been claimed that steering with pods in high seas reduces ship speed more than steering with conventional rudders (Trägårdh, 2002). In the new Wärtsilä concept, this has been remedied by applying a Wärtsilä efficiency rudder behind the centreline propeller (originally known as the PropacRudder and discussed in *The Naval Architect* November 1998, page 3). At high speeds, the ship is steered with this rudder and the pods are locked in their position. The speed loss in rough seas is therefore reduced as is fuel consumption.

The wing pod concept has also been suggested for some projects without any rudder in order to reduce the appendage resistance. However, some of the rotative losses in the slipstream from the propeller can be recovered with a rudder to compensate for the extra resistance of the latter. The rudder area can be smaller than for a normal vessel since it is only intended for use at high speeds; at low speeds, when a rudder is not as efficient, the pods are used for steering. The small area will help to keep the resistance low.

A Wärtsilä efficiency rudder offers additional benefits compared to a conventional rudder. For example, the torpedo shape improves the wake field, which results in lower pressure impulses. This is particularly beneficial in a passenger ferry, where low noise levels are important. The positive effect of the torpedo shape also improves propulsion efficiency.

To highlight the possibilities that this new propulsion machinery concept offers, Wärtsilä has created a new ro-pax concept with CODED machinery and wing pods. This is designed with an emphasis on efficient cargo transport and with only limited passenger facilities. There are two main cargo decks and one lower hold. A total of 3000lane metres is offered.

Cargo handling is designed for one main single-level stern ramp, in order to offer greater flexibility in selection of the itinerary. This five-lane-wide ramp leads to the main cargo deck. Separate ramps on each side are connected to fixed ramps leading to the upper cargo deck. These twin side ramps allow for two-way loading and discharge, ensuring efficient and flexible cargo handling. These two ramps are located on top of the pod rooms. This means that the lost space required by the pod machinery on the main deck has been turned into useful space which serves payload-related functions.

A fixed ramp with a watertight cover leads from the main deck down to the lower cargo hold. This passes through the machinery compartments to make as much space as possible available for cargo in the lower hold. Two passenger decks are located in the forward part of the hull, where there is room for 200 passengers in 100 cabins.

Machinery arrangement

The proposed ferry would have a CODED machinery layout with a single medium-speed diesel engine driving the mechanical propeller, and three diesel generators providing electrical power for ship's services and for the electrical propulsion system. All this machinery is located underneath the main deck aft of the lower cargo hold.

The mechanical engine is of the Wärtsilä 8L64 type with a power output of 16,080kW. This engine drives a Lips feathering CP propeller though a Wärtsilä horizontal offset reduction gear (SCH 142).

The rest of the propulsion power is supplied by two 7000kW pods. This gives a total installed propulsion power of 30MW. The available power in service condition with an engine margin of 85% is 27.3MW.

Electrical power is generated by one Wärtsilä 6L38B and two Wärtsilä 12V38B engines. This gives a total installed electrical power of 21,750kW. The smaller 6L38B engine makes it also possible to have an acceptable engine load in port - a larger engine would result in unnecessary low load for only the hotel consumers.

All gensets are located in a compartment forward of the main engine. The main switchboard and engine control rooms are also located in the centre of this compartment, with the engines on each side. As noted, the ramp to the lower hold also passes through the compartment, which affects the layout.

The Wärtsilä 64 engine is quite large and requires some special arrangements to fit below the main deck, which is 10m above the base line. Therefore, this engine is recessed into the tanktop and a special crane and lifting tools are needed. However, the large-bore design offers excellent fuel economy and low maintenance demand and comes with a wide range of built-on auxiliary equipment. This reduces space demand in the engineroom and should make installation easier.

Economics

Annual machinery-related costs have been calculated, based on an assumed operating profile for the cargo ro-pax with CODED machinery and a vessel with equivalent conventional diesel-mechanical machinery. The CODED machinery is slightly more expensive to purchase, with an estimated investment cost about €3 million higher than the conventional machinery. However, the much improved hydrodynamic performance results in significantly lower fuel consumption. This means that the CODED machinery should offer better total economy than the diesel-mechanical version, as the accompanying graph shows. The investment cost is turned into annual payments over a 10-year period and with assumed annual interest of 6%. The calculated annual saving is almost €0.5 million.

Conclusions

This proposed new CODED machinery concept with wing pods could clearly improve the performance of many ferries and ro-ro vessels. Compared with a conventional diesel-mechanical solution, the new solution offers better hydrodynamic performance, better manoeuvring, and better total economy. Investment costs are slightly higher but operating costs are reduced. The new concept can also yield advantages such as increased cargo capacity and shorter turnround in port.

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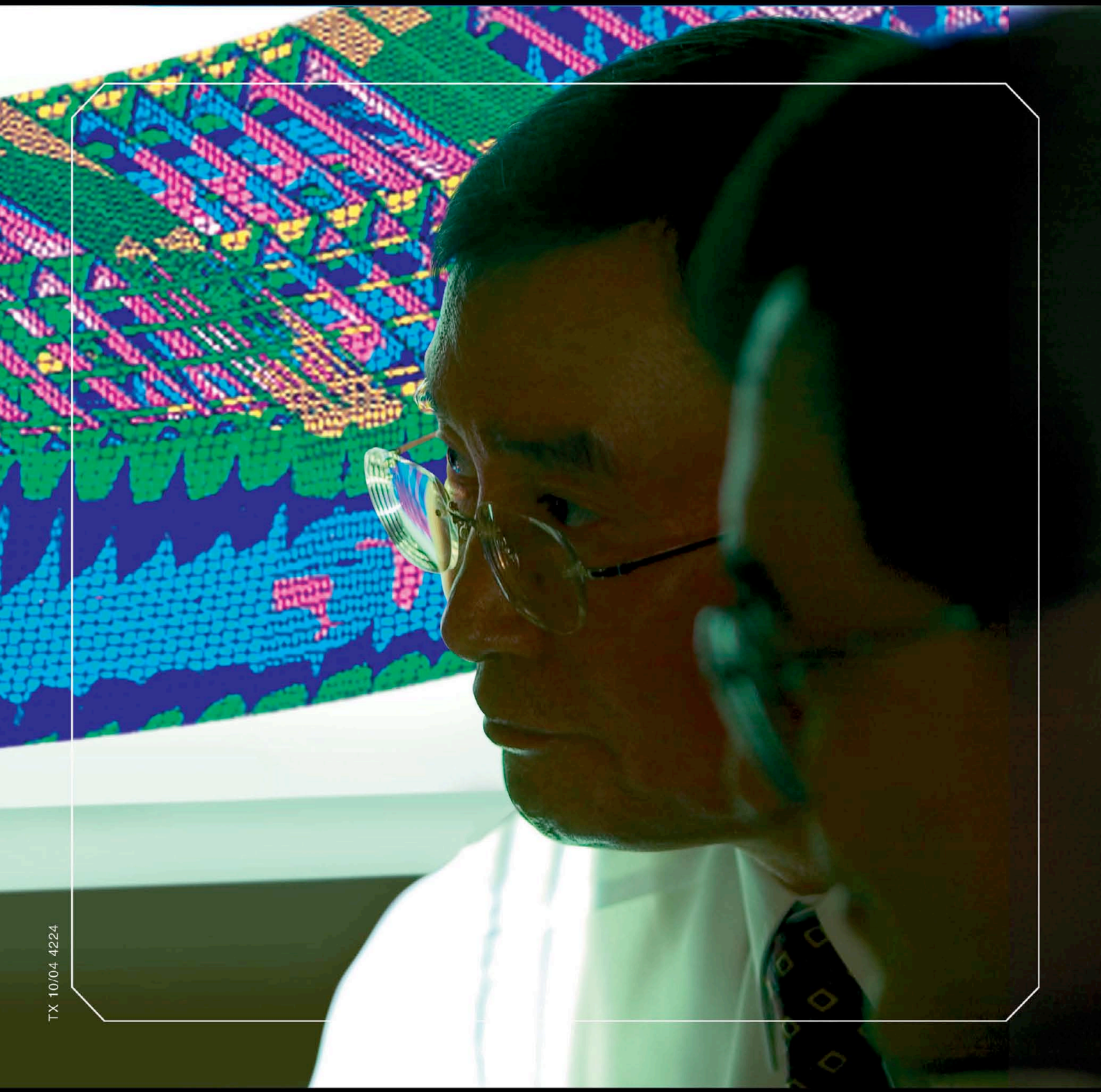

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New theatre ship for Rhine cruises

IN May this year, Shipyard De Hoop, based in The Netherlands, delivered the revolutionary day passenger ship *RheinEnergi* (yard number 404) to KD, which currently uses it as a theatre vessel.

This 90.24m vessel was designed by Shipyard De Hoop, with Groendijk Design responsible for the exterior and interior styling. Construction was carried out in accordance with Lloyd's Register Special Service Craft Code with a significant wave height of 1.2m.

In the centre of the ship, both in terms of design as well as construction, is a 9m x 5m stage. To create this space, as well as space for spectators, a catamaran hull concept was selected. Passengers are seated on two decks, both overlooking the stage, and the deck height of 6m ensures a very spacious feel.

The ship is fitted with two Deutz TBD620V8 main engines of 860kW at 1800rev/min and each drives a Schottel rudder propeller. *RheinEnergi* is also fitted with two Gerlien - Van Tiem bow propellers. Each is driven by a MAN B&W diesel engine of 250kW.

For power generation, the ship is fitted with two MAN B&W diesel engines of 443kW each, and two Leroy Somer alternators of 414kW each. One MAN B&W diesel generator of 95kW driving a Leroy Somer alternator of 80kW is also fitted as an emergency generator set. *RheinEnergi* has a trial speed of 22km/h.

In total 1000 passengers can be seated inside, but the ship may carry up to 1650 passengers. The galley is located under the stage in a bridge between the two hulls.

The 90.24m *RheinEnergi* is used as a theatre ship, and sails on the Rhine.

The interesting stage area of *RheinEnergi*, measuring 9m x 5m, meant that the vessel had to have a catamaran hull.

TECHNICAL PARTICULARS
RHEINENERGI

Length, oa	90.24m
Length, wl	85.30m
Breadth, moulded	18.50m
Breadth, oa	19.30m
Depth	3.55m
Draught	1.50m
Air draught (hull draught =1.50m)	10.30m
Main engines	2x Deutz TBD620V8, 2 x 860kW, 1800rev/min; 2 x Schottel rudder propellers
Trial speed	22km/h
Deck height	6m
Passengers	1650 max; 1000 seats inside

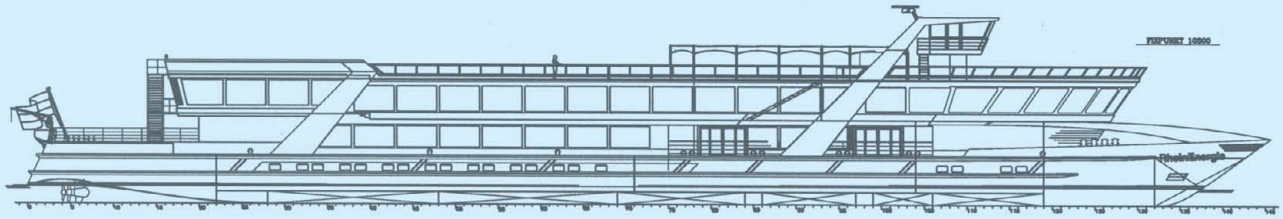
Project management solution launched

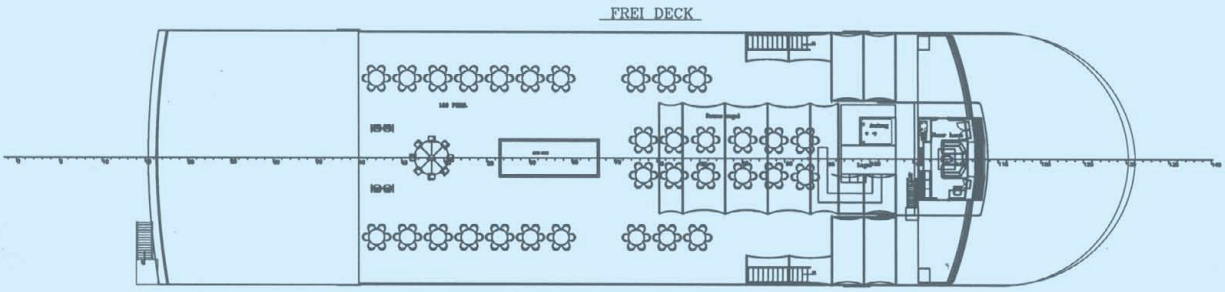
CLASSIFICATION society Bureau Veritas has launched VeriSTAR Newbuildings, a one-stop project management tool which allows BV clients, yards, owners, equipment manufacturers and BV surveyors and offices to manage the design review, product certification, and survey at site of all aspects of a newbuilding project, on line. The database created during the newbuilding then follows the life of the ship, allowing immediate access to product specifications for spare parts purchasing.

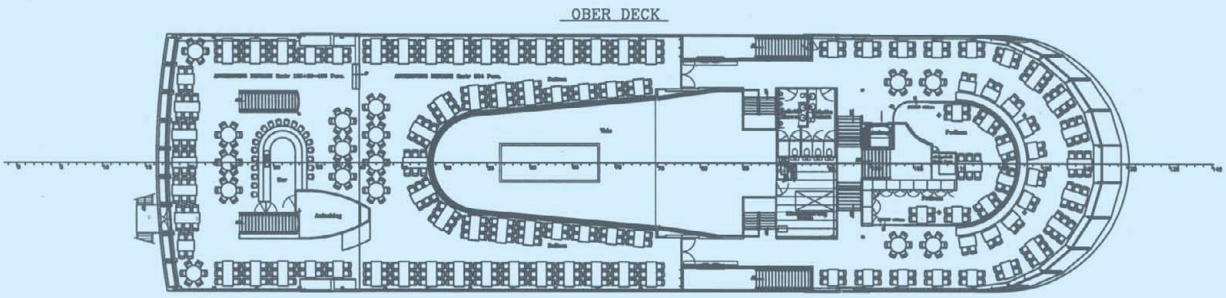
VeriSTAR Newbuildings was thoroughly tested across BV's global network during 2003 with training at Bureau Veritas' offices around the world. Now it is going to be open to ship owners, yards, and equipment manufacturers. Using the Internet, VeriSTAR Newbuildings allows everyone involved in a project, from design stage through the life of the ship, to see all actions required by BV in terms of surveyors, inspections and approvals, and all plans, certificates and documents at a glance. Certificates can be both checked and validated on line. The system allows equipment manufacturers to track certification of their products, and allows yards to coordinate plan submissions and approval, and the collation of all equipment and relevant certification.

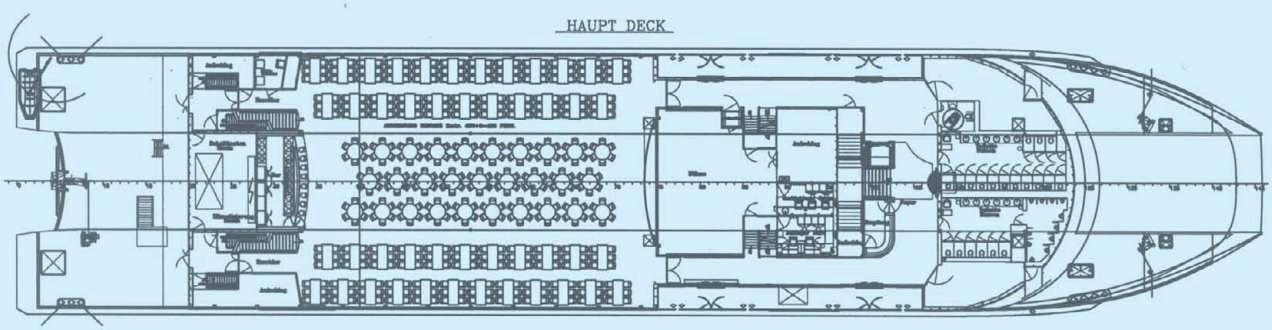
BV devised this system to help manage product certification internally, but in realising its potential usefulness, extended it to manage design and plan approval and on-site surveys. BV believes it will save time and money for yards, equipment manufacturers and owners, and improve efficiency right through the newbuilding chain and throughout a ship's life.

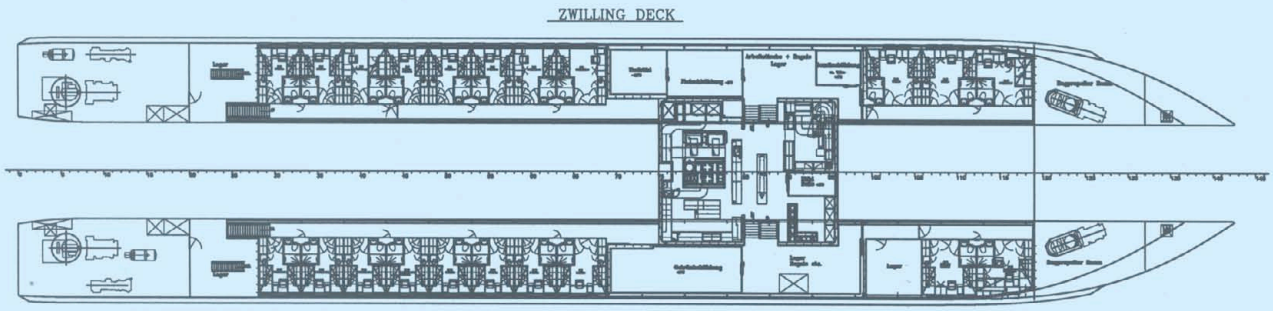
General arrangement of the 90.24m catamaran inland theatre ship *RheinEnergi*, built for KD.





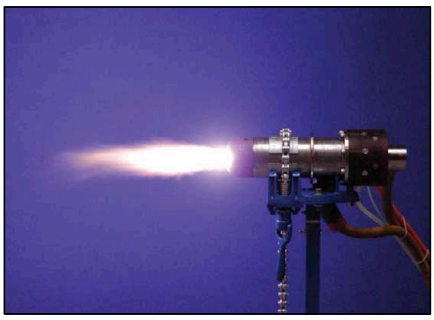






Plasma incineration - a revolution in shipboard waste disposal

A record number of overseas trade visitors from 116 countries attended the giant biennial Shipbuilding, Machinery, and Marine Technology (SMM) exhibition, held from September 28-October 1 in Hamburg, Germany, where 1450 exhibitors from 50 nations displayed their equipment and services. *The Naval Architect* was also there and here reports on some of the highlights of another successful event.



Generating 10,000°C: a PyroGenesis plasma torch, which lies at the heart of the new Deerberg marine incineration system.

A PIECE of equipment that looks set to revolutionise the disposal of rubbish onboard cruise liners, ferries, and naval vessels - ships that have large complements - was formally launched at SMM by the leading German waste-handling specialist Deerberg Systems (a short article appeared in *The Naval Architect* May 2004, page 62). While the prime focus is on ships with large numbers of people on board, a possible future use for burning sludge oil on merchant ships is also foreseen.

This Plasma King, as the new concept is known, was actually developed in Canada by PyroGenesis, a company headquartered in Montreal, but which is employing the expertise of Deerberg for marketing in a joint venture arrangement. The Plasma King will be a useful addition to the waste-handling packages that have already been promoted so successfully by Deerberg - 2004 marks the company's 25th anniversary. To date, this company has installed integrated waste management systems on 124 passenger liners and ferries, 64 naval vessels, and 600 other ships, and a healthy order book is currently held.

In 2000, Deerberg added the Hepburn Bio Ship Care range of biodegradable biological cleaning products to its portfolio; these products - seen by Hepburn as an essential component of any modern waste system - are worthy of examination by any responsible ship operator - particularly passenger-carrying ships using large volumes of cleaning chemicals annually, and remarkable results are shown to have been achieved in maintaining clean waste pipes, clean equipment (such as pulpers), and generally promoting a 'green' image, which is a key part of the Deerberg philosophy. In addition, special products are able to pre-treat galley grey water. Such cleaning products are likely to be more in demand from next year, when many current liquids will be disallowed.

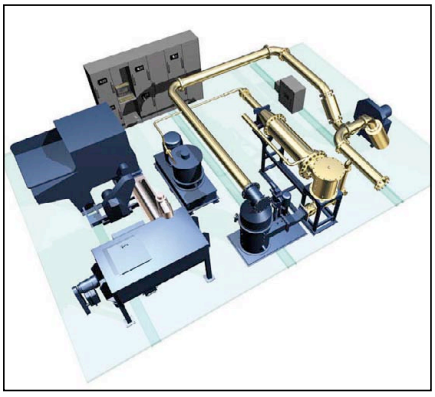
The technology employed in the Plasma King is somewhat similar to that used in a plasma cutting torch, ie, generating very high temperatures indeed - up to 10,000°C, which are employed to gasify all waste instantaneously. As we reported in May, a pilot plant is currently operating on the 1990-built Carnival liner *Fantasy* - this leading operator has taken a major role in development of the concept, although the technique was originally created by PyroGenesis for the US Navy, which was seeking a new-generation highly efficient waste treatment plant.

The plasma is created in a special torch using two electrodes (cathode and anode), an electric arc (between 60kW and 280kW are needed), and injected gas (helium and air). Because of the extreme and concentrated heat, plasma is said to be a safe, effective and reliable waste-destruction system, destroying toxic organic substances and producing NOx emissions that are well below regulations. A plant looks nothing like a conventional incinerator system, apart from a shredder (reducing wet and dry waste to 25mm x 25mm pieces), silo (with 'live bottom ribbon' mixer), and pulverising mill. A typical torch unit would probably be approximately 2.3m long and with a diameter of 0.5m.

The special patent horizontal plasma chamber uses an air and water-cooled liner, which eliminates the need for a refractory lining and allows for rapid start-up and shutdown of the plant (around 5 minutes compared with 15 hours for a conventional incinerator). Downstream of the chamber is a quenching unit which rapidly cools the flue gas from 1200°C to 85°C by using water spray nozzles. A venturi and cyclone then remove any ash through the pressure drop, which forces it into a water stream; the end solids are a very fine powder, and any carbon monoxide in the exhaust gas is converted to carbon dioxide.

Naval architects will be delighted to know that a PyroGenesis plant takes up significantly less space than a conventional plant and weighs significantly less. On a typical very large cruise liner with a complement of 4000 people, for example, and employing flue gas cleaning, the volume is only 230m^3, compared with 2200m^3, and the weight is 30tonnes instead of 75tonnes.

Layout of a typical Deerberg/PyroGenesis shipboard plasma waste incineration plant - the torch and incinerator are in the gold cylinder with venturi section and surrounded by large U-shaped piping. The shredder, silo, and pulverising mill are the blue items to the left. All equipment can be accommodated on one level, this saving considerable space compared with a conventional system.



Smart bilge alarm

A NEW smart-cell bilge alarm has been launched by UK company Rivertrace Engineering, based at Redhill, Surrey, a specialist in oil-in-water monitoring. The new unit meets the requirements of the latest IMO regulation MEPC 107 (49) for ship-borne bilge water separators and alarms; this legislation, which comes into force next January, specifies a much more accurate indication of bilge tank contents.

The smart-cell technology allows the alarm to analyse various oil types simultaneously, as required by the new legislation, without the need for re-calibration. A manual cell-cleaning device is also fitted as standard, since cell fouling is recognised as one of the major factors in monitor malfunction. The new unit also records all discharges over an 18-month period for interrogation if necessary by Port State Control inspectors.

This new smart-cell bilge alarm from Rivertrace Engineering meets the requirement of IMO's new MEPC 107 (49) legislation, which comes into force on January 1 2005.

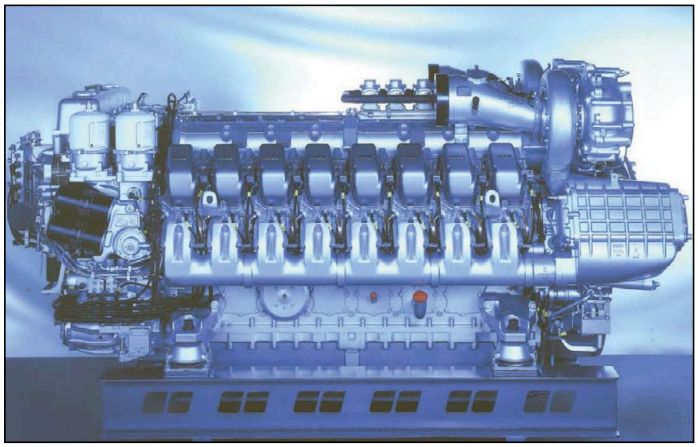
Engines uprated for commercial use

THE Series 4000 engines from MTU have recently been uprated with 6%-10% more power that their predecessors. These new units will be suitable for commercial vessels and ferries over 50m in length. The aim of this uprating by MTU is to set a new standard in the power output class between 1500kW and 2500kW. The first M61 and M71 engines are already in use.

Four engines have been uprated, and two 16-cylinder engines with power outputs of 1520kW and 2000kW respectively, M61R and M61, have been added to the MTU product range. These engines deliver 120kW and 240kW more power than their predecessors, M60R and M60. The existing M71 12- and 16-cylinder engine has been uprated to 1850kW and 2465kW. These now deliver 110kW and 145kW more than their M70 predecessors. The older engines will however, stay in the MTU portfolio.

The new 12- and 16-cylinder versions keep a long period between overhaul (TBO) at 30,000 hours (M61R model), 24,000 hours (M61 model), and 15,000 hours (M71 model). The engines also have low fuel and oilconsumption, high torque, and low exhaust and noise emissions.

The new marine designs benefit from improvements to cylinder heads, intercoolers, and common rail fuel injection. For example, the material used in the intercoolers is now made from nonferrous metal instead of aluminium, which makes the engines more reliable under difficult operating conditions. The increase in power output was achieved by optimising engine settings.



The new MTU Series 4000 propulsion engine.

The Series 4000 engines are controlled by the electronic MDEC engine management system (MTU diesel engine control) which allows engines and other components such as cooling, transmission, generators, and pumps, to be integrated into a common management system.

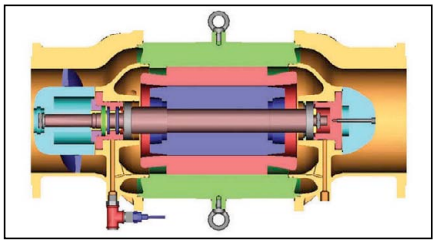
This series also features two high-efficiency MTU exhaust turbochargers. Charge air is cooled by an intercooler which is positioned above the power take-off. The sequential turbocharging system results in a higher charge air pressure with a corresponding optimisation of engine operating values across the entire engine performance map.

These units also feature a state-of-the-art common rail injection system which makes it possible for all key combustion-influencing parameters to be freely determined. This includes timing and duration of injection, as well as injection pressure and rate. This reduces fuel consumption and helps helps to meet current and future exhaust emission limits.

New in-line anti-heeling pump

A COMPLETELY new anti-heeling pump was launched at the SMM exhibition by the German pump manufacturer Allweiler. This is the Alltrimm design with reversible hydraulics for installing in line, as part of a heel control piping system, and using a drive integrated into the pump lobe. A standard electric motor from a leading German manufacturer is used, and the integrated arrangement avoids the need to fit valve controllers.

An Alltrimm pump requires little space and is said to be easy to install; it has few wearing parts because no coupling or gearbox is required. Other benefits include electrical actuation, low-load flow reversal, and low mass moment of inertia for very short start-up times.



A cutaway view of Allweiler's new Alltrimm in-line anti-heel pump, seen here in its single-stage version.

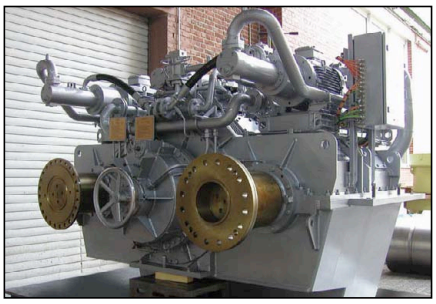
Single- and twin-stage versions are built with flow ranges from 300m³/h to 1000m³/h and pump heads of 10m (single stage) and 20m (twin stage). Although two motor sizes cover this performance range, installation dimensions are identical. Allweiler plans to extend the pumping range in the future but an intelligent modular system is aimed at ensuring that the most important components in the single and twin-stage versions will be completely identical. These features, plus many standard components, should make it possible for owners to maintain an economical stock of spare parts.

Two Renk gearbox designs for Fred Olsen trimaran

THE German gearing specialist Renk AG has built two types of gearbox for Fred Olsen's pioneering new 127m long trimaran ferry *Benchijigua Express*, which is nearing completion at Austal's yard in Henderson, Australia. Each of the port and starboard shaft lines for the steerable water jets is fitted with a ASL65 single-stage gearbox for reducing the speed of the 9100kW diesel engines; this is a well-proven design similar to some 50 units already delivered for many fast ferries.

More innovative however is the specially designed gearbox for the centre waterjet. This is an ASL2x80 model combining the output of two 9100kW MTU diesel engines running at 1150rev/min, with transmission to one large booster waterjet. For operational flexibility, this waterjet can be driven at partial load by one engine only. To optimise operations, a second gear stage is introduced in the form of a planetary gear on the output shaft; this can handle the input from either or both engines and avoids separate gear stages and thus reduces weight.

In addition to this unique project, Renk has recently secured a number of other interesting gearbox orders. These include two gears for Color Line's new cruise-ferry *Color Fantasy*, which is almost complete at Masa-Yards' Turku site; these NDSQL-3800 units will each combine the output of two 7800kW Wärtsilä 8L46B medium-speed engines.



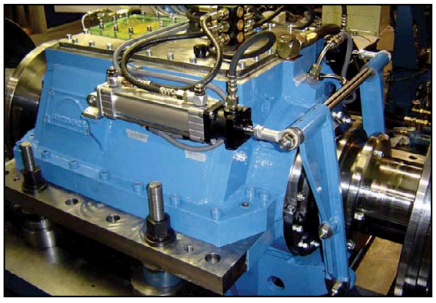
This Renk ASL2x80 twin-input/single-output gearbox will combine the output of two 9100kW diesel engines to drive the central booster waterjet on Fred Olsen's new trimaran ferry.

Further twin-input/single-output gears are being supplied to Fincantieri for Moby Line's new ferries, for the new Finnlines ro-pax ferries recently ordered from the same shipbuilder, and for the new ro-pax ferries being constructed in Korea at Samsung Heavy Industries for Norfolk Line.

Another speciality of Renk, at its Hannover works, is shaft bearings, and a notable recent order is for four thrust bearings of the Axilus LAKRZ20-200 type, ordered by Schottel's propeller works at Wismar, as part of shaft lines being supplied to the Uljanik Shipyard in Croatia for a number of railway ferries being built for trans-Caspian Sea routes. This type of bearing is able to absorb large axial forces and is therefore specially suitable for dealing with propeller thrust. It includes a gear-type coupling which can be pneumatically actuated when the shaft is stationary to improve efficiency and safety.

Also for shipping to a Croatian yard is a novel patent propeller shaft clutch-coupling of the KAZ45-450 type. A total of 12 of these are being shipped to the Brodosplit yard for installation on Stena's new twin-screw P-MAX 49,900dwt products tankers, with wide beams and shallow draughts, on order there. KAZ couplings can be disengaged in 10 minutes and re-engaged in 20 minutes.

Four of these LAKRZ20-200 thrust bearings with pneumatic gear-type couplings are being supplied to Schottel for fitting to propeller shaft lines on new Russian train ferries building at the Uljanik Shipyard for the Caspian Sea.



Herus - closing the gap between semi- and full-spade rudders

A RELATIVELY new high-efficiency rudder design from Becker Marine Systems - the Herus has already been installed on at least 25 ships - is aimed at closing the gap between a conventional semi-spade rudder and a full spade rudder, although it possesses similar characteristics to a semi-spade design, offering hydrodynamic efficiency and bending moment absorption, as well as improved course-keeping. The Herus, which is generally designed for fitting to large and slow ships, can actually be supplied as a complete component, ready for installation at the shipyard - it can include the completed block section or only the leading head and rudder components.

The number of bearings on a Herus rudder is reduced to one, with one neck bearing, and the stock diameter and thickness of the rudder blade are less. Since the leading head is a welded design and the trunk is already integrated, the installation time, effort, and risk of mis-alignment are all reduced to a minimum. Maintenance is also said to be limited.

A Becker Herus rudder installation, showing the extra leading head fabrication above the horizontal plate. This offers hydrodynamic efficiency and bending moment absorption, as well as improved course-keeping.

Contracts on the horizon for Russian yard

ADMIRALTY Shipyards, of St Petersburg, Russia, celebrated its 300th anniversary at the SMM exhibition. This is the oldest yard in Russia.

Admiralty is currently working on a contract for Sovcomflot, also of Russia, for six 47,000dwt product tankers. At the beginning of September the keel of *Torgovy Bridge* was laid. This vessel will be delivered in November, 2005, and is the fourth of six. Shipbuilding contracts for the construction of the fifth and the sixth tankers of the series came into force at the beginning of September. These vessels will be delivered in 2006.

Sevmash, a northern Russian shipyard, is currently building an FPSO for an oil field, and Admiralty is in discussions with this yard to build a 70,000dwt shuttle tanker - which will transport oil from the FPSO to other areas in Europe. Admiralty is optimistic it will win this tender as it has much experience in building this type of tanker, such as the 20,000dwt *Astrakhan* class (*Significant Ships of 2000*). An indication of what these new tankers might look like appeared in *The Naval Architect* September 2002, page 31.

Leak-free pumps using magnetic couplings

A SPECIAL feature of Kral marine screw pumps manufactured by the Austrian company Kräutler GmbH & Co is the use of magnetic couplings in place of mechanical seals. Despite the cost premium, excellent sealing is obtained, and the cost will probably be amortised over three years, says the company. Such couplings should ensure that a pump is hermetically sealed, thus leaks are almost non-existent. These couplings also have a much extended maintenance interval of 40,000hours, compared with 10,000hours for a mechanical seal.

Kral pumps - typically used for fuel transfer - are available with flow rates up to 660litres/min and can easily handle heated fuel oils up to 180°C and beyond (up to 250°C). The rotation of the electric drive motor is transferred through the magnetic coupling to the pump without contact. Since there is no friction, Kräutler says there should be no wear. If an overload situation occurs, the motor will decouple from the pump to prevent damage; once the motor is stopped, the magnetic coupling will synchronise and the pump can be restarted. The company says that mechanically sealed versions of its pumps can easily be converted to magnetic couplings using a special kit.

Successful trials for new ballast water technology

A NEW technology for treating unwanted organisms in ballast water will be commercially available from Alfa Laval in 2006, as part of the company's 'Pure thinking' environmental campaign. EcoStream, for cleaning bilge water, is already available, and the company is currently working on other solutions, such as for cleaning the gases released during ventilation of an engine crankcase.

IMO regulations regarding ballast water come into effect in 2009, and to ensure its systems are up and running by this date, a complete water treatment system has been installed on a Wallenius Maritime car carrier, as a full-scale trial. The unit was fitted in 2003, and since then ongoing tests have been conducted. The test system was retrofitted while the ship was in full operation and is integrated with the vessel's ordinary ballast system, and can be operated during ballasting and de-ballasting.

Alfa Laval has been working closely with Swedish company Benrad AB to find a way to remove invasive species, based on the patented Benrad AOT (advanced oxidation technology). The system consists of two distinct stages.

The first is a pre-treatment stage, and the second is the aforementioned Benrad AOT. The AOT differs greatly from traditional ultra-violet (UV) technology, even though UV light is one of its components. In traditional UV technology, micro-organisms are exposed to the rays, which destroy their DNA.

However, Benrad AOT uses a lower amount of a special DNA light wavelength in combination with catalysts to generate hydroxyl radicals, which destroy the micro-organisms by breaking down the cell membrane.

This solution can be fully integrated with a vessel's ballast water system and no interference with ballast operation procedure is caused. The system is also well equipped to handle marine conditions, and varying flow.

During ballasting, water passes through a pre-filter to remove large particles and organisms. The water continues to the Benrad AOT unit which produces free radicals that break down any organisms that have passed through the filter. Sediment build-up in the ballasting tanks is avoided due to the pre-filter stage, and any backflushing water is returned to the ocean directly at the ballasting site.

During deballasting, water passes through the Benrad AOT unit to kill any organisms that may have re-grown in the tanks during the voyage. The filter is bypassed, leaving no unwanted residues onboard so as not to produce any discharge or backflushing water. This way there is no risk of contamination at the deballasting site.

Onshore studies of system efficiency have found that this system can remove over 99% of natural plankton after a storage period. The Benrad AOT is also environmentally friendly in that it does not produce any lasting toxicity, and uses only a small amount of energy.

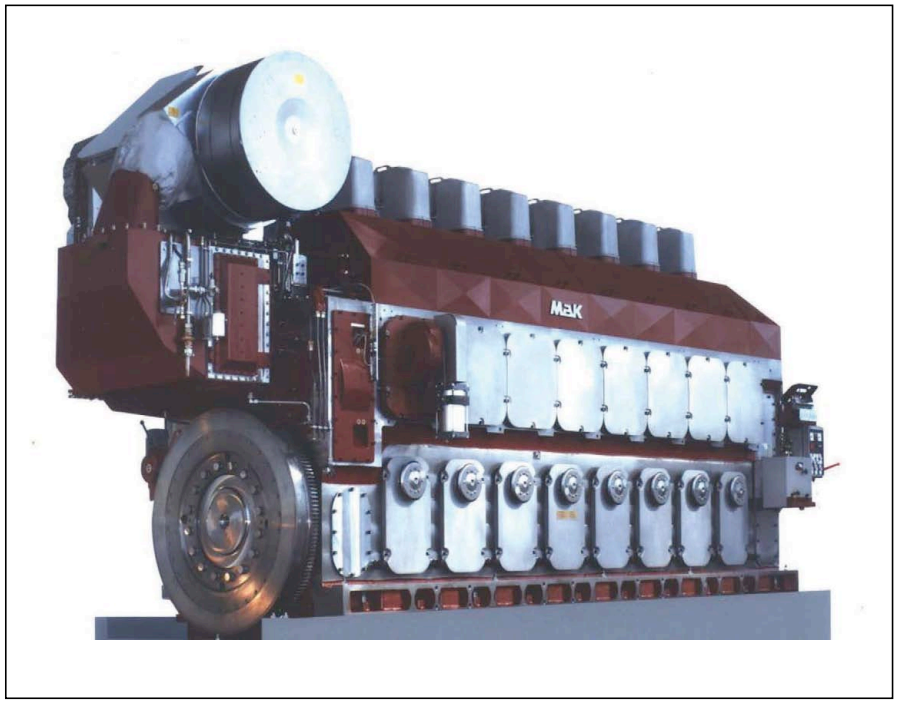
Power boost and refinements for M43 C-version

AS forecast in our May 2002 issue, Caterpillar MaK has boosted the output of its successful M43 long-stroke medium-speed diesel engine by 10% from the initial 900kW/cylinder to 1000kW; this move is made in conjunction with the release of an improved design, now known as the M43C. Thus, the largest engine in the range, the 16-cylinder vee-form version, can today offer an output up to 16,000kW at 514rev/min, with a more modest 6000kW from the six-cylinder in-line model.

At the same time, significant improvements have been made to service operations and ease of maintenance. When the M43 was introduced, the number of parts was reduced by 35%, and a further 8% has been achieved with the new C version.

MaK's Flex-Cam concept, planned to reduce NOx emissions as well as offering invisible smoke conditions, is continued as part of the company's ACERT technology for emission reduction. NOx emissions on the M43 amount to 8g/kWh and below, down to 25% load (equivalent to 30% below the current IMO standard), and smoke levels are below the 0.5FSN threshold over the whole operating range. An annual sum of US$200 million is being spent to improve these figures even more and to ensure thoroughly 'green' credentials for all engines in the Caterpillar and MaK ranges, without the need for any external exhaust treatment.

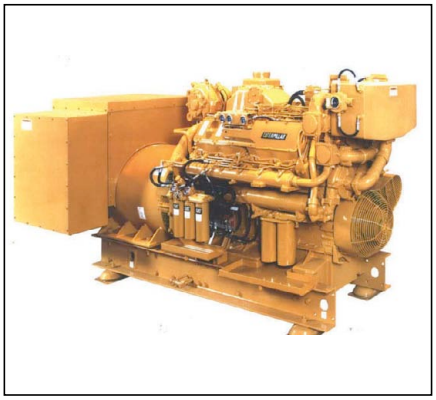
Meanwhile, existing M43 engines have been chosen for a number of notable vessels recently, including most of the successful ro-ro ships ordered from Flensburger Schiffbau by UND and others, and Brittany Ferries' new *Pont-Aven*, from Meyer Werft.



The redesigned MaK M43C medium-speed engines offer a 10% power increase - up to 16,000kW for a 16-cylinder machine - and include Flex-Cam and ACERT technology for minimal exhaust emissions and smoke levels.

Factory-built gensets - a new move

Like competitor Wärtsilä (as reported in another article in this feature), Caterpillar MaK has also adopted a new policy of supplying factory-built, tested and type-approved gensets, with warranties. This move, which has involved all major classification societies, is aimed at avoiding problems over installation quality that sometimes arise and which can cause lengthy and costly arguments, when engines and alternators are packaged by a third party. This new policy will apply across the whole range of Caterpillar and MaK engines.



A new move for both Caterpillar and MaK is the supply of factory-built and type-approved diesel-alternator sets, with warranties. This is designed to avoid problems with third-party assembly. Seen here is a certified Caterpillar 3412C DI-TA set with a 625kVA alternator.

Maritime IP (Internet protocol) solution

ONE of the industry's first fully-integrated IP-enabled communications tools is set to be launched next summer by Zenitel Marine, a provider of integrated marine communication systems. The VINGTOR AlphaCom (ACM) Evolution is based on the company's ACM communication system.

In addition to including a range of exciting new IP features, the ACM Evolution allows users to mix new and existing user terminals and services in the same exchange. Current communications exchange product users can upgrade their systems to take advantage of IP solutions with ACM Evolution.

Zenitel's IP solution has been designed to improve efficiencies, enable significant cost reductions, and provide a range of new services. The key applications of the system, according to Zenitel, include integration of system management with a common administration network onboard for all electronic equipment.

Marine equipment, such as CCTV cameras, ballast water monitors, general automation systems, paging systems, and fire alarm equipment can now communicate seamlessly over an Ethernet LAN or other IP network. This enables crew members to monitor systems from a common administration network. Shore-based personnel can also monitor and interact with the system remotely.

The ACM Evolution also enables so-called VoIP to be employed, a technology that allows users to make calls using the Ethernet LAN or a broadband Internet connection. This offers a significant decrease in cabling and weight onboard. Additionally, for shipping companies forced to rely on expensive wireless communications, VoIP represents a significant cost-saving opportunity.

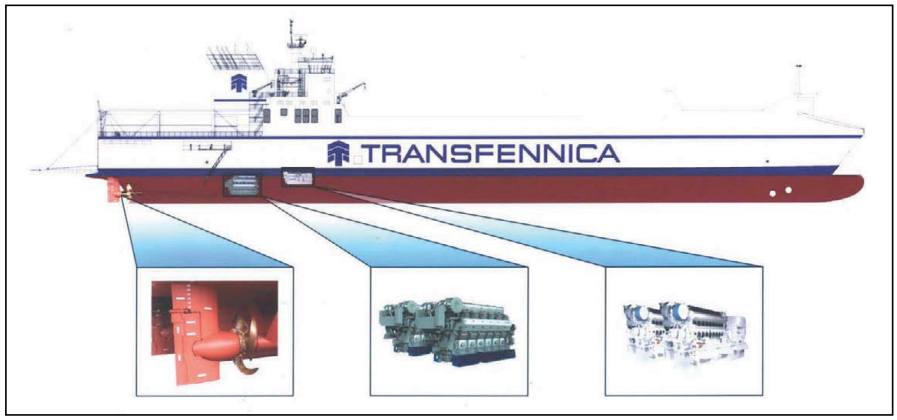
Shipping companies operating in different maritime sectors will use the ACM Evolution in different ways. For example, there is a demand for VoIP among cruise ship operators, who can use the technology to provide passengers with a full range of in-cabin services, while tanker operators may see more value in the systems management.

Propulsion package for new Spliethoff sto-ro ships

A CONTRACT to supply a power plant package for a quartet of new sto-ro cargo ships for the Dutch owner Spliethoff has been won by Wärtsilä Corp. These interesting 12,800dwt multipurpose designs will be built in Poland by Stocznia Szczecinska Nowa for delivery in 2006, when they will sail on charter with Transfennica, of Helsinki.

For each vessel, Wärtsilä will supply two 12V46 medium-speed propulsion engines of 12,600kW and two Lips CP propellers - which will operate in association with efficiency rudders and bulbs, to offer useful savings in power; a Unnet aft seal protection system will be fitted to each shaftline. In addition, two Wärtsilä 8L20 engines will drive 1360kW alternators.

Although designed primarily for loading forest products and paper, the new designs are planned for flexible operations and will also be able to carry containers of various sizes (up to 660TEU), road trailers, vehicles, MAFI trailers, and cassettes. Cargo access will be over a wide stern door/ramp, with fixed ramps leading to the upper decks and lower hold; there will be four levels in all, offering a total capacity of 2800lane metres. Service speed will be 22.00knots, and the hulls will be ice-strengthened to meet Finnish ice class 1A Super.



An impression of Spliethoff's new 12,800dwt multipurpose sto-ro cargo ships, to be built by Stocznia Szczecinska Nowa for a Transfennica charter.

Hull-building success for Maritim

A SMALL Polish shipyard, Maritim, based in Gdansk, has been enjoying fruitful times recently by building hulls and sections under subcontract, as well as an occasional completely outfitted vessel. Hulls have been constructed for a wide variety of customers, including some in The Netherlands, Norway, and Finland, while sections have regularly been shipped to Germany. Sections for Finland have included double-bottom units for the new Ultra-Voyager cruise liner at Masa-Yards, while the bulbous bow for *Queen Mary 2* was delivered to Chantiers de l'Atlantique.

To smooth production, Maritim is currently seeking its own second-hand floating dock for launching hulls, rather than having to charter one for individual launches. Up to 30,000tonnes of steel can be processed annually, using three independent sites, including one in Gdynia.

New captain's chair for commercial use

A NEW version of Rolls-Royce's captain chair was showcased at this year's SMM exhibition. The chair features an updated touch-screen system, and feedback from customers means that placement of controls on the armrests have been adjusted. The captain's chair was originally developed for offshore service vessels, but this latest version is suitable for all commercial ships.

The screens are used to display information and can be linked to the entire Rolls-Royce range of power, propulsion, integrated bridge, automation, and dynamic positioning systems, for example. The link to an integrated bridge system allows users to customise the operator's view, radar, electronic charts, and conning displays. This has been made possible with a cooperation agreement with Furuno.

The touch-screen controls are integrated with others fitted into the armrest, allowing the operator to manoeuvre the ship without getting up, alleviating operator fatigue over long watch periods. A new ergonomically-designed Poscon II joystick can be also incorporated as an option.

Electronics business booming

In 2003 Rolls-Royce formed a Marine Electrical Systems business to put all its propulsion packages into one integrated system solution. Key to this business was the acquisition of VT Controls.

Rolls-Royce Marine Electrical Systems has completed a number of contracts this past year, has won new orders, and continues to develop new products. For example, for a contract with Ferguson Shipbuilders in Scotland for four new chain-operated ferries that will operate between Devon and Cornwall, Rolls-Royce will provide the main and harbour switchboards, two main propulsion drive systems, and an integrated platform management system (IPMS).

A Scottish Fisheries protection vessel will feature a Rolls-Royce 660V propulsion switchboard, 415V ship's services and emergency switchboards, two group starter boards, two main propulsion drive systems, two electronic soft starters, and an IPMS. In addition to these contracts, the company has also supplied a great deal of equipment to navy vessels all over the world.

This very large six-bladed FP propeller, in position outside the main entrance to the SMM exhibition, was cast by Mecklenburger Metallguss (MMG) for one of a series of 8100TEU container liners ordered by C P Offen from Hanjin Heavy Industries in Korea. It has a diameter of 8.80m, weighs 103tonnes, and will absorb the output from a 68,640kW Sulzer propulsion engine running at a maximum of 102rev/min. The liner will have a service speed of 26.50knots.

New two-part flexible coupling

CENTA, the Germany-based couplings manufacturer, has recently released the SEC 200, a coupling system with two parts. This system includes components which allow optimal elasticity in all directions, a change from the more traditional ring-form type.

The SEC 200 has an economic life time of 50,000 hours, as well as normal maintenance periods, as its construction allows uncomplicated installation and access. It has the same shape as the SEC 100, making upgrades easy.

Its segmented form allows uncomplicated assembly and dismantling, as well as easy replacement of single parts. Due to its modular construction, better cooling of the coupling is possible. High bending forces, a problem in standard couplings, are prevented due to Centa's 'tilting protection' which balances leverage forces that are generated by the segmentation.

Factory-commissioned gensets

A NEW range of pre-commissioned standard diesel-generator sets, ready for installation, has been launched by Wärtsilä. Known as the Auxpac series, they feature both medium-speed and high-speed diesel engines and cover either 50Hz or 60Hz operation. Medium-speed sets are offered in electrical outputs from 520kW to 2850kW and the high-speed sets electrical outputs from 60kW to 1630kW. Heavy-fuel-burning medium-speed sets are based on Wärtsilä 20 or 26-series engines, while those in the high-speed range will use Volvo Penta engines running on gas oil.

Easy-to-use documentation will be supplied for each set, covering all technical and commercial aspects and available in digital or printed form, while Wärtsilä will provide all project management and marine engineering skills to support design and installation, as well as service and spare parts.

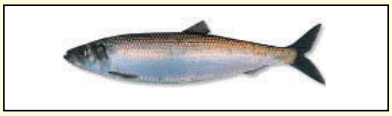
The Royal Institution of Naval Architects

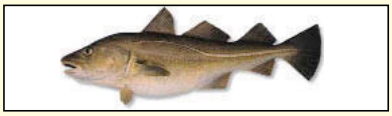
in association with Newcastle School of Marine Science and Technology

Fishing Vessels, Fishing Technology and Fisheries

13 - 14 April 2005, University of Newcastle upon Tyne, UK

Call for Papers & First Notice





The safety of fishermen, the sustainability of fish stocks, and the economic viability of fishing dependent communities are issues that have to be addressed simultaneously in order to ensure a sustainable future for fishing industries. Fishing is a difficult and hazardous occupation, presenting major challenges to all involved. The safety of the fishermen is heavily dependant on the quality of the design and construction of their vessels, while the success of their operations is dependant on the ingenuity of their equipment, fishing gear, and procedures. In recent years the sustainability of many fisheries has become an area of concern, and is the subject of international debate. As a result successful fishing in future will operate in a framework of controls on the amount of fishing effort and in the face of restrictions on the nature of the fishing gear aimed at promoting 'environmentally friendly' fishing techniques.

Participants in the many disciplines that have a mutual interest in these important overlapping areas are invited by RINA to submit abstracts for papers to be presented at the International Conference on Fishing Vessels, Fishing Technology and Fisheries. Papers can address any of the topics listed below, or related areas of interest:

- Fishing vessels: design, construction, safety, stability, propulsion
- Equipment: fishing gear, deck equipment, personal safety
- Electronics: fish finding, alarms, integrated bridge systems
- Operations: fishing techniques, vessel management, maintenance
- Policy: frameworks for sustainability, implementation strategies, examples of success and failure
- Policing: fisheries patrol boats, remote observation, operational practice

Selected papers from the conference will also be published in the International Journal of Small Craft Technology.

☐ I would like to offer a paper and attach a synopsis of no more than 250 words by the 1 Nov 2004

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Squat formula for ships in rivers

Following on from his June 2004 article concerning squat and *Queen Mary 2*, Dr C B Barrass proposes a suitable formula for all naval architects and ship masters to predict the necessary under-keel clearance when navigating in a river or canal.

WHEN a ship is in shallow waters and at forward speed, there is the danger that she will go aground due to the phenomenon known as 'squat'. The danger is greater when the ship is in a river or canal; this is because of interaction effects with the adjacent riverbanks and the sides of a moving vessel. The narrower the channel, the greater will be the ship squats.

By definition, ship squat is the loss in under-keel clearance as a ship moves at forward speed, compared to when she is stationary. At high speeds, a ship may squat until the static under-keel clearance has been equalled. The ship has then grounded.

Because of erosion to river banks and interaction with moored ships in a river, the forward speeds of ships are a lot less than when 'at sea' or open-water conditions. Some port authorities 'request' maximum speeds of only 4knots in their rivers; others may allow slightly higher transit speeds, commensurate with ship size.

Another restriction often put on incoming ships is a minimum static under-keel clearance. Some port authorities require at least 10% of the mean draught; others demand at least 1.0m. Others again can request a static under-keel clearance of at least 1.25m.

The author, in the interests of safety, favours the minimum requirement to be irrespective of a ship's static draught and to be in units of metres. After all, 10% of a ballast draught is less then 10% of a fully-loaded ship.

To predict maximum ship squat in river conditions, the author has produced a diagram that involves 'K' coefficients (Fig 1). For this study, the value of 'K' will range only from 1.0 to 2.0. If 'K' < 1 on the diagram, then use 'K' = 1. If 'K' > 2 on the diagram, then use 'K' = 2. The parameters associated with this diagram are H/T and B/b.

- H = depth of water in a rectangular cross sectional-shaped river (m)
- T = ship's static even keel draught (m)
- B = breadth of water in a rectangular cross sectional-shaped river (m)
- b = breadth moulded of ship in transit (m).

In this article, concentration is on shallow waters where the static H/T ranges from 1.10 to 1.30. It is in this range of 10% to 30% under-keel clearance that there is greater chance of a ship going aground. At greater than 30% static under-keel clearance, likelihood of touchdown is greatly decreased.

Procedure for using Fig 1

The following procedure should be followed:

1. determine and record the values of H, T, B and b
2. calculate the values H/T and B/b
3. enter Fig 1, and plot the intersection point of H/T with B/b. See the results for the three worked examples below
4. using this intersection point and the 'K' contour lines, determine the value of 'K' appropriate to the river condition under consideration.

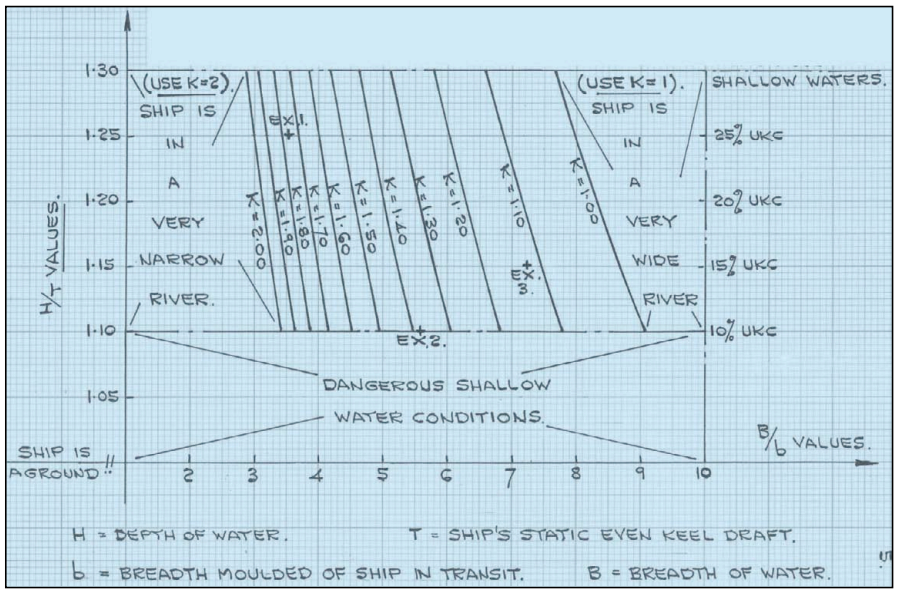


Fig 1. 'K' co-efficients for rectangular-section rivers.

Having now obtained a value for 'K', the next step is to link it with two more variables. They are the block coefficient Cb and the ship speed V, measured in knots. The Cb will depend on the ship type being considered.

For each ship type, Cb will depend on the condition of loading, being less at lower draughts.

The speed V is the ship speed relative to the water. Tidal speed and direction of current must always be taken into account by a ship's pilot.

Cb = volume of displacement / (LBP x b x d)
LBP = length between perpendiculars
b = breadth moulded of the considered ship
d = even keel draught, ranging from light ballast to fully-loaded departure condition.

Table 1 illustrates typical Cb values for several merchant ships, but a note of caution should be added: whilst Table 1 shows Cb values at fully-loaded conditions, it must be remembered that ships do go aground at draughts less than their moulded draught. In recent years, 16 ships have done so.

Calculation of maximum squat

To obtain the maximum squat for these ships in a river, the squat predicted for open-water conditions must be multiplied by the previously determined value for 'K'. Hence, maximum squat in a river or canal = 'K' x $\{Cb \times V^2/100\}$ metres.

Whereabouts does the maximum ship squat occur? Assume first of all that each ship when stationary, is on even keel. This appears to be a sensible pre-requisite prior to entering shallow waters. If this is so, then: If Cb > 0.700, then maximum squat occurs at the bow. If Cb < 0.700, then maximum squat occurs at the stern. If Cb is approximately 0.700, then maximum squat extends from stern to amidships to bow.

However, if a ship when static has an aft draught greater than its forward draught, then the maximum squat will occur at the stern. Squat will also occur at the bow, but will be of less magnitude.

Furthermore, if a ship when static has a forward draught greater than the aft draught, then the maximum squat will occur at the bow. Squat will also occur at the stern, but will be of less magnitude.

Worked example 1

A container ship has a Cb of 0.575. She is proceeding upriver at a speed (V) of 6knots. This river, of rectangular cross-section, has an H/T of 1.25 and a B/b of 3.55. When static, the ship was on even keel. Calculate her maximum squat at this speed and whereabouts it will occur.

Using Fig 1, at the point of intersection of 1.25 and 3.55, the 'K' value lifted off is 1.752, so maximum squat

= 'K' x $\{Cb \times V^2/100\}$ metres.
= 1.752 x $\{0.575 \times 6 \times 6\}/100$
= 0.36m

This squat will be located at the stern, because her Cb < 0.700 and the ship when static was on even keel.

Worked example 2

A general cargo ship has a Cb of 0.700. She is proceeding upriver at a speed (V) of 5knots. This river, of rectangular cross-section, has an H/T of 1.10 and a B/b of 5.60. When static, she was on even keel. Calculate her maximum squat at this speed and whereabouts it will occur.

Using Fig 1, at the point of intersection of 1.10 and 5.60, the 'K' value lifted off is 1.374, so maximum squat

= 'K' x {Cb x V^2/100} metres
= 1.374 x {0.700 x 5 x 5}/100
= 0.24m

This squat will be located from stern to amidships to bow, because her Cb is 0.700, and the ship when static was on even keel.

Worked example 3

A VLCC has a Cb of 0.825. She is proceeding upriver at a speed (V) of 7knots. This river, of rectangular cross-section, has an H/T of 1.15 and a B/b of 7.25. When static, she had trim by the stern. Calculate her maximum squat at this speed and whereabouts it will occur.

Using Fig 1, at the point of intersection of 1.15 and 7.25, the 'K' value lifted off is 1.120, so maximum squat

= 'K' x {Cb x V^2/100} metres
= 1.120 x {0.825 x 7 x 7}/100
= 0.45m

This maximum squat will be located at the stern, because when static, this ship had trim by the stern.

Ship type	Typical Cb, fully-loaded
ULCC	0.850
VLCC	0.825
Oil tanker	0.800
Small bulk carrier	0.750 to 0.800
Large bulk carrier	0.800 to 0.825
General cargo	0.700
Passenger liner	0.600 to 0.625
Container ship	0.565 to 0.585
Ro-ro vessel	0.575
Coastal tug	0.500

Table 1. Typical Cb values for merchant ships when fully-loaded.

Conclusions

By using this procedure, it becomes possible to predict quickly and accurately the maximum ship squat and its whereabouts for all types of merchant ships operating in confined channel conditions, such as in a river or a canal. It will be suitable for typical speeds of transit of ships in narrow rivers to wide rivers.

Chemical carriers: market prospects to 2015

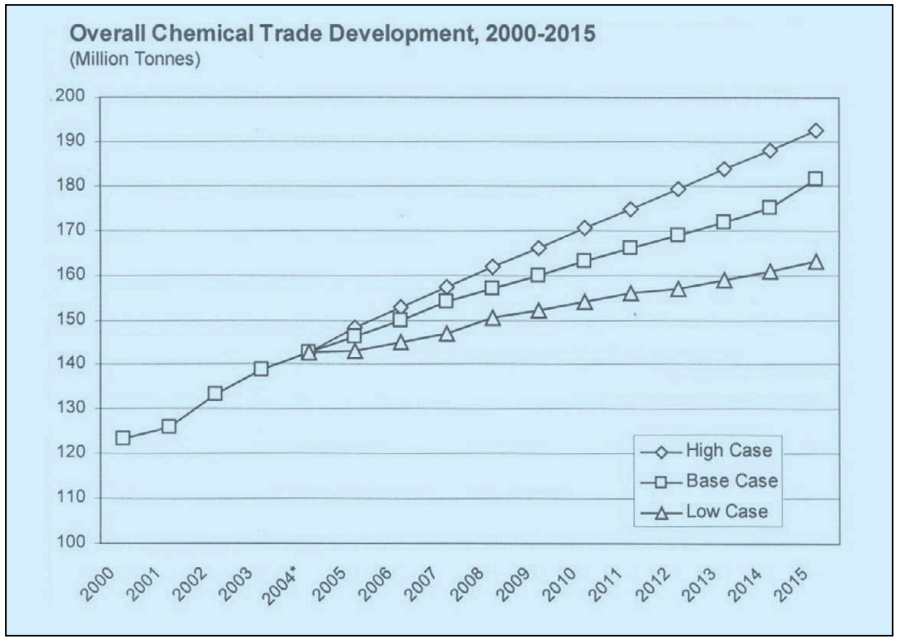
THE chemical carrier sector has been suffering over recent years from limited growth in demand, and stagnant freight rates. However, the past year has seen a turnaround in the industry, with increased economic activity and a rise in demand for chemicals funding trade and shipping demand expansion. A new report, entitled *Chemical Carriers: Market Prospects to 2015*, highlights the present market and predicts future trends.

The rapidly expanding Chinese market has dominated the recent growth for chemical carrier demand, as import volumes continue to increase, with Indian demand also rising significantly. This has brought about a change in market dynamics, with an increased focus on intra-regional imports/exports. Future developments will continue to centre on the build-up of petrochemical capacity in Asia as well as Latin America, with some additional limited growth in the established industrialised markets of the US and Western Europe.

Long-haul shipping demand over the forecast period to 2015, according to this report, is expected to depend heavily on Middle East petrochemical expansion, based on low-cost feedstock, primarily targeting expanding import markets in Asia.

The significance of traditional back-haul trades such as vegetable oils and inorganic chemicals is set to rise over the forward period, supporting the development of niche markets alongside fully integrated services.

This report, compiled by Ocean Shipping Consultants, also examines the implications of recent fleet developments on the forward market, in conjunction with a background of expanding demand in Asia as well as structural change among the major chemical trades. It not only analyses the changes in supply and demand during the recent past, but also examines likely developments through to 2015.



Overall chemical trade development 2000-2015, according to Ocean Shipping Consultants in its new report *Chemical Carriers: Market Prospects to 2015.*

Included in the report are detailed analyses and forecasts in the areas of: trade volumes and patterns for major individual products, import/export details for individual chemicals, fleet development, vessel operating costs, vessel freight rates, aggregate demand and supply, and vessel profitability.

Chapters include the organic chemical trade to 2015, which examines supply and demand developments for each of the major products, examining production, consumption, imports, and exports. Development of recent trade patterns are also examined. Another section of this publication includes vegetable oils and animal fats to 2015, which examines recent developments in this field. Other chapters include inorganic chemicals to 2015, chemical carrier shipping demand to 2015, chemical carrier fleet development to 2015, and chemical carrier freight rates and costs to 2015.

Next-generation TCR turbocharger

FOLLOWING the successful introduction of the TCA axial turbocharger two years ago, MAN B&W Diesel Group has expanded this range to include a completely new radial model. The TCR design will replace the current NR series which has been in production for nearly 50 years, culminating in the current NR/S design.

The new TCR series has a compressor pressure ratio of 4.7 and is capable of up to 5.2 when built as a special version. Aimed specifically at the medium- and high-speed diesel and gas markets, six different models are able to cover a wide range of outputs from 400kW to almost 6000kW.

When the axial TCA turbocharger was launched, and since delivery of the first unit in May 2002, over 350 have now been ordered. MAN B&W Diesel is quite confident that it will be able to repeat this success with the TCR series.

The TCA and TCR are the first MAN B&W Diesel turbochargers to be completely designed using a 3D CAD system. This simplifies and reduces development work by integrating innovative software tools during CFD (flow) and FEA (strength) analysis. These findings allow optimisation of the material used for the turbocharger so as to combine maximum strength with the lowest possible weight and a compact design.

The flow and strength analyses resulted in a completely new design of compressor wheel, which permits higher efficiency, quicker response behaviour during acceleration and, therefore, minimal emissions from the complete system. The compressor wheel is screwed onto the shaft via a special retainer, which ensures precise centring. This design permits, among other things, a smaller hub and, therefore, an increase in the airflow rate.

With regard to the rotor support, the axial bearing was located between the two radial bearings which permitted minimisation of the bearing space requirements. The sealing system was also designed to be as compact as possible and without any additional sealing air requirement. The piston ring gasket, combined with a labyrinth seal, was thoroughly tested and proved to provide optimum sealing capacity both in operation and at stand still.

Once again, flow calculations played a major part in development of the new turbine in order to create a shape with high efficiency on the one hand and a wide application range on the other. Consequently, the new turbine provides optimum values in part load and full load operation and is equally suitable for constant- and pulse-pressure turbocharging. Optimisation is not restricted to the turbine rotor but covers the complete system from the gas inlet casing, via the nozzle ring to the turbine outlet casing, which can be obtained in various mounting variants. An optional variable nozzle ring permits turbocharger adaptation to most load conditions.

Development work also concentrated on the noise level by the introduction of a completely new intake silencer, which not only reduces the turbocharger noise but is very easy to install. With regard to weight, the one piece casing in cast aluminium benefits once again from FEA optimisation, while an integrated washing system permits compressor wheel cleaning during operation.

The TCR turbocharger is an expansion of the TCA axial range, and is a completely new radial design.

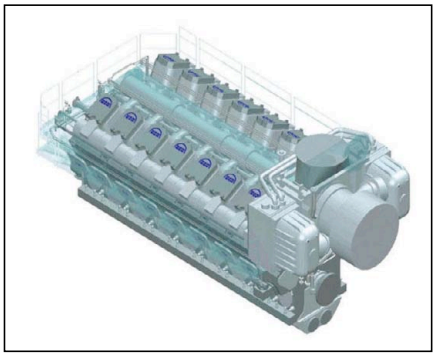
During TCR turbocharger development, great importance was attached to an extended service life of the wear parts, which is to the operator's benefit with extended service work intervals and the possibility to carry out maintenance work with other services to be done on the engine. Many design details contribute to simplifying and reducing maintenance. For example, an opening in the turbine outlet casing permits inspection of the turbine wheel without having to remove the casing.

New software for 3D engine viewing

In other news, a new software tool to support reliable engineroom planning, the 3D Engine Viewer, was recently launched by MAN B&W. This tool provides CAD models of four-stroke engines - in individual configurations.

Enginerooms are becoming more compact, making every centimetre matter, while ship owners are asking for detailed drafts and accurate calculations of these rooms. To combat this problem, CAD engine models can help to precisely plan an engineroom.

The 3D modelling tool has an easy to use interface for choosing and configuring a suitable engine, where the required power range leads to a virtual engine model. Engines can be shown in various views, namely, isometric, installation, dismantling areas, and pipe connections.


Screen shot from the new 3D modelling software that helps engineroom design.

With additional drop-down lists, the engine can be further configured according to specific needs; isometric views and data is adjusted automatically. The end result is that the user gets realistic models that can be downloaded in the most common file formats, in 2D pdf and dxf, in 3D as dgn, sat, and igs.

Second new Algerian ferry launched

EL Djazair, a car ferry for the Algerian company ENTMV (Entreprise Nationale de Transport Maritime de Voyageurs) was launched recently by IZAR Sevilla. This vessel is the second of a series of two for the same owner. The first one, *Tassili II*, is currently in Cadiz Shipyard where it is going through outfitting works before sea trials.

Each of these 145.00m vessels has the capacity to transport 1300 passengers and 135 crew. They have cargo capacity for 300 cars (1350 car lane metres) or 42 trailers (550 trailer lane metres) on two garage decks.

The yard used its new production facilities while constructing this vessel, which include an increase of lifting capacity, and at present the yard can handle blocks of up to 240tonnes. Now a 20-month delivery time is possible for specific types of such as ferries, ro-paxes and asphalt carriers. In addition to this, Sevilla´s port authority has approved a new floodgate construction in the Guadalquivir River that will allow the IZAR yard there to build vessels of up to 32.3m in breadth.

TECHNICAL PARTICULARS
EL DJAZAIR

Length, oa	145.00m
Length, bp	130.00m
Breadth moulded, main deck	24.00m
Depth to upper deck	14.65m
Depth to main deck	8.55m
Maximum deadweight	2900tonnes
Speed, service at 85 % MCR	22knots

Earlier this year *El Djazair,* a car ferry for ENTMV, was launched from IZAR's Sevilla yard.

Nearly 500 vessels designed by Defcar

A LEADING marine engineering and consulting company Cintranaval-Defcar SL offers a wide range of solutions to shipyards and ship owners. Main activities include the design of ships, development and marketing of CAD/CAM/CAO software for ship design and shipbuilding - the Defcar system - as well as several consultancy services.

The company has designed nearly 500 ships of all types including merchant ships, offshore vessels, tugs, fishing vessels, patrol vessels, and yachts. Furthermore, the Defcar CAD/CAM system has been installed in 90 companies from 25 different countries, and more than 100 vessels a year are designed and built with the aid of this system.

Ship design covers preliminary and basic design to class and detailed design, including production drawings and information for workshops. In addition, the Defcar CAD/CAM system covers hullform design and naval architecture calculations, also hull structure and piping production.

In 2003 the company designed 37 ships. At present, 14 ships designed last year are still under construction. These include a 73m offshore DSV/ROV vessel which was built by Astilleros Balenciaga for Khalifa A Algosaibi Diving & Marine Services, a 3000m^3 oil tanker built by Astilleros Zamakona for Suardiaz, as well as a number of tugs and fishing vessels.

***Aquanaut* is a new 73m DSV/ROV vessel designed by Cintranaval-Defcar SL and built by Astilleros Balenciaga.**

Defcar has also recently penetrated into the Asian market. Installations have been made in PT IKI (Indonesia), Italthai Marine (Thailand) shipyards, and Saigon Shipbuilding Industry Co in Vietnam, also in the ship design company Navnautik Pte Ltd, located in Singapore and India.

The Royal Institution of Naval Architects

HUMAN FACTORS IN SHIP DESIGN, SAFETY AND OPERATION

23-24 February 2005, RINA Headquarters, London, UK

Second Notice

Naval architects and marine engineers have a direct influence over designs and as such have an influence over how their designs are used by seafarers. In recent years, they have made increasing efforts to gain an awareness of human element issues and to improve their understanding of how and why their designs influence human behaviour.

The traditional view that human error is the major cause of all accidents is being challenged by some who consider human error to be a symptom of deeper problems with the system. Errors can be induced through bad design, poor training or poor/inadequate management systems. Indeed, some argue that modern technology has reached a point where improved safety can only be achieved through a better understanding of human element within the system.

This conference aims to bring together international specialists and professionals including designers, ship operators, mariners, equipment manufactures and regulators to highlight how the sensible application of ergonomics and human factors can provides an opportunity to both reduce costs and improve safety.

The Institution invites papers in such areas as:

- Integration of human factors into the design process
- Practical applications of human factors engineering
- Survivability, escape and evacuation systems
- Design of navigation & control systems
- Onboard working environment
- Feedback from the users into the design loop
- Safety performance and management
- Maritime operating organisations and teamwork

Supporting Organisation

The Nautical Institute

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Users' meeting for CAD/CAM advancement

A FORAN Users Meeting took place in Granada, on October 27, 28, and 29. The main objectives of this forum was to encourage the interchange of impressions among Foran users, to present the latest improvements of the system, and to discuss Foran of the future. In total, 16 themes were discussed. Forum 2004 also focussed on the new technical features of the CAD/CAM software.

At the time of writing, 37 companies and 60 individuals had confirmed their attendance. Only 25% of the attendees were from Spain. The latest releases of the software incorporate many of the suggestions raised by the participants in the previous forum, held in Valencia, and in the most recent Foran reference group meeting.

Topics discussed by employees from the company included 'Foran Development Strategy: Looking to the Future' and 'New Features in Hull Structure'. In addition a representative from Severnaya Shipyard gave a paper entitled 'Experience in the Application of Foran'; the talk 'Practical Application of Welding Robots for Aluminium Structures' was given by a representative of Fjellstrand. Others that gave papers included representatives from IZAR, Rolls-Royce Marine, and Kvaerner Masa-Yards.

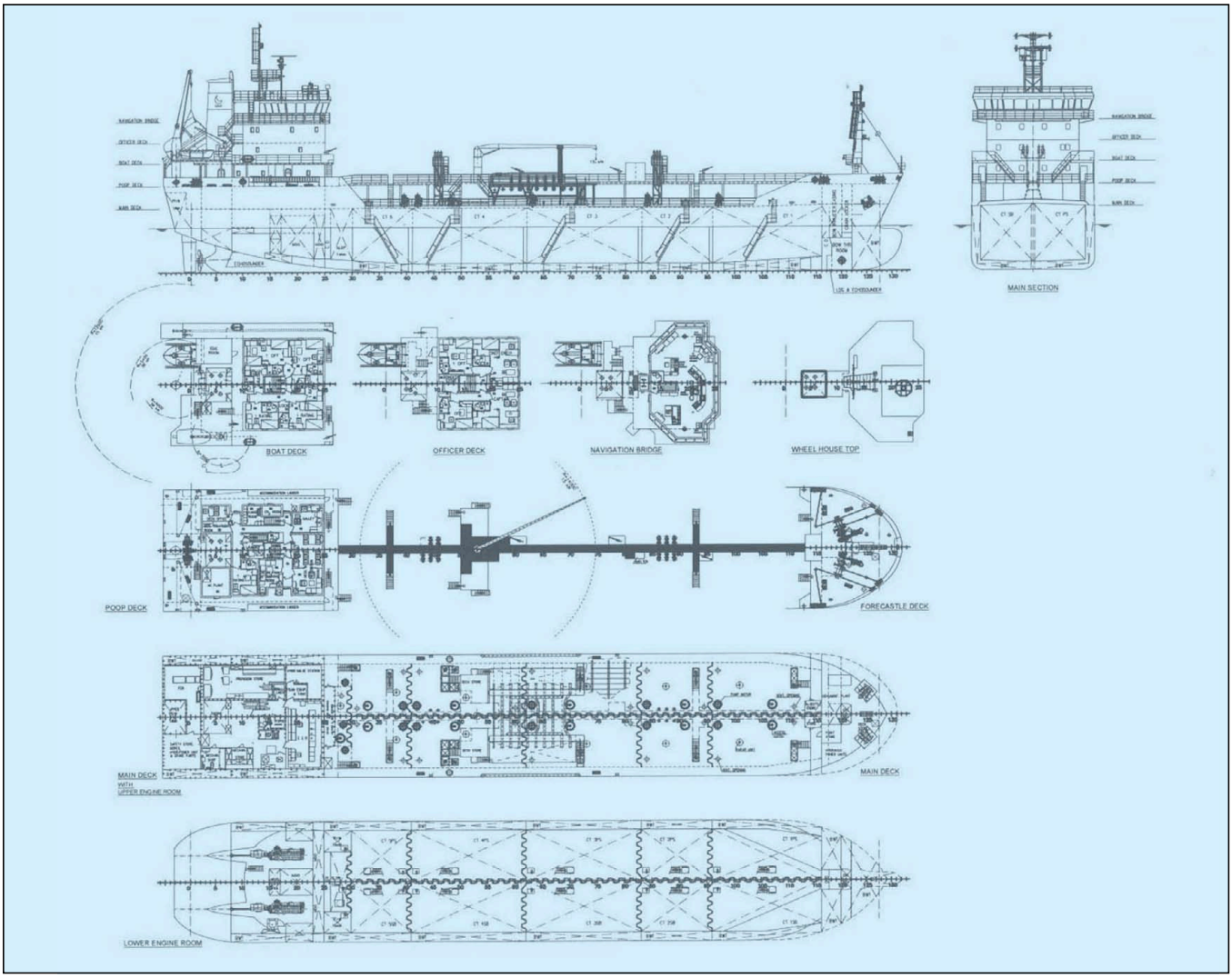
Sener, the creator of Foran, also used this forum to make a final decision on the date of release of a new version of the software, V60. At the time of writing, this was thought to be in June 2005. In addition to this, it was also planned to launch an Internet-based learning concept, which would allow users to receive training online. *The Naval Architect* hopes to report on this event in more detail in our January issue.

First European-built Mitsubishi engine delivered

IN JULY this year IZAR-Manises Propulsion Energy, IZAR's two-stroke diesel engine factory, delivered a 6UEC50LSII type, 8670kW Mitsubishi engine delivering 127rev/min. This will be installed in a 25,000dwt chemical tanker, which is being built in the Turkish shipyard Celik Tekne for the Italian shipowner Mediterranea di Navigazione. IZAR-Manises Propulsion & Energy is the only licensee of Mitsubishi in Europe and this is the first Mitsubishi engine to be built there.

General arrangement plans of the two new 3491dwt IMO Type II product/chemical tankers now being delivered to Crescent Shipping by Rousse Shipyard, based on the River Danube in Bulgaria. They are designed to load cargoes up to 1.54tonne/m³ specific gravity (partial loading) in five pairs of tanks, each served by individual deepwell pumps of 150m³/h; an extra tank is available for slops. Ballast water and tank washing are also handled by deepwell pumps - two of 250m³/h and two of 25m³/h respectively.

These tankers have twin CP screws and twin rudders, with the propulsion plant on each line comprising a MAN B&W 6L23/30A engine burning gas oil and developing 960kW. Each engine also drives a 813kVA alternator off the gearbox, and service speed is 11.60knots. The ships are classed with Lloyd's Register to the following standards: +100A1, Double Hull, IMO II - Chemical Tanker, ESP, SBT, EP, + LMC, UMS, SCM.



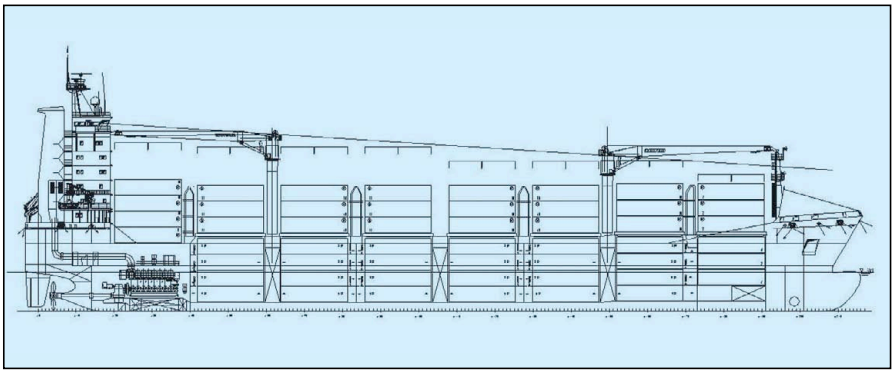
Schiffko reefer designs to meet new capacity demands

CURRENT demand for refrigerated container capacity has led the German naval architectural and engineering consultancy Schiffko to launch some new container ship designs where the accent is on large numbers of reefer boxes. These follow those mainly non-reefer designs reported in our September issue (at various Chinese yards) and October edition (at a Brazilian yard).

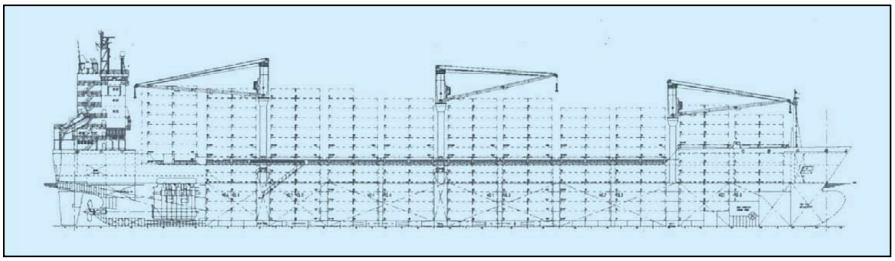
One of these new concepts is the CV350XT vessel, which is a stretched version of the CV1100 PLUS design, having a length overall of 153.60m, compared with 148.00m of the smaller ship; all holds are planned for air-cooled boxes, up to a total of 155 40ft x 9ft 5in units (high-cube type), plus 208 plugs for deck containers. At the same time, the tanktop is strengthened for heavy cargo up to 12tonnes/m^2. Classification is planned to be to Germanischer Lloyd standards.

Although the cell guides are arranged for 40ft containers, fittings are included on the hatches and on deck to load 20ft and some 45ft containers, as well as those of the 40ft type. The standard crane arrangement is two 45tonne jib units. Maximum deadweight is 14,200dwt at 8.50m freeboard draught, and the service speed, provided by a four-stroke engine of 9730kW at 428rev/min, is anticipated at approximately 20.00knots. A larger version of this ship is also offered as the CV400XT.

Schiffko has already designed a much larger container vessel, the CV2900 PLUS, which is able to load up to 2833TEU, including 352FEU water-cooled boxes in the holds and 248FEU air-cooled units on deck. Three of these 35,250dwt (scantling draught of 12.00m) vessels, including *Olga Maersk*, have already been delivered to Maersk Sealand by Volkswerft Stralsund. These Lloyd's Register-classed vessels have a service speed of 23.00knots.



Profile of the new CV350XT container ship, which is mainly geared to carrying large numbers of refrigerated boxes; all holds are engineered to load up to 155FEU air-cooled containers.



Another container-ship design from Schiffko is the CHC2500 model of 33,900dwt, which is able to load up to 2452TEU, including 328 refrigerated boxes on deck and a further 72 in the holds, all served by electrical sockets. At the standard 14tonnes homogeneous load, the container total is 1867TEU. Service speed is planned to be 21.25knots on a design draught of 10.10m.

BOOK REVIEW

Basic Ship Propulsion

By J P Ghose and R P Gokarn. Published by Allied Publishers Private Ltd, 1/13-14, Asaf Ali Road, New Delhi 110 002, India. E-Mail: aplnd@del2.vsnl.net.in 557 pp. ISBN: 81 7764 606 0. Hard back. US$22.00 plus postage.

Both authors are professors who graduated from and have since been associated with the Department of Naval Architecture, Indian Institute of Technology, Kharagpur, within varied careers. Originally written by Professor Ghose, the book was completely rewritten by Professor Gokarn, taking into account comments by experts including Professor Chengi Kuo, of Strathclyde University. It was written in response to a perceived need of students for a basic text in this important topic. It includes an extensive bibliography to aid further study.

The book concentrates on the propulsion device, touching briefly on propulsion machinery in the introduction and, later, on the need to match the propulsion device with the machinery. It is mainly concerned with screw propellers, including their geometry, basic theory, open-water performance, interaction between the propeller and the ship, cavitation, strength, model experiments, and ship trials.

The design of propellers is dealt with for both free-running and towing situations. The uses of methodical-series data and of circulation theory in design are covered; the former is mainly illustrated by use of the MARIN B-Series and, for high-speed twin-screw ships, the Gawn series. These topics are covered in some depth with a later chapter dealing more briefly with unsteady propeller loading, vibration, propulsion in a seaway, propeller roughness, propeller manufacture, and acceleration and deceleration. The book uses SI units throughout except where using historical data which is in Imperial units.

Having dealt comprehensively, and in some detail, with the screw propeller, some 80 pages are devoted to unconventional propulsion devices including CP, ducted, super-cavitating, and surface-piercing propellers, together with means of improving water flow into the propeller.

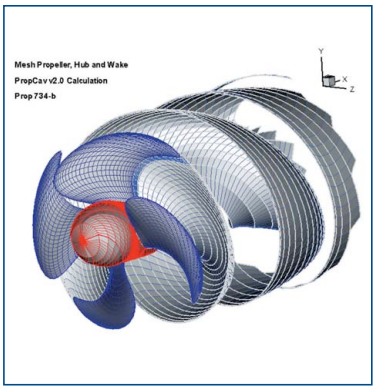
The great strength of this book is the way in which the text is laced with illustrative examples, of which each chapter has about five. The student will find these invaluable in showing how to carry out typical calculations. Then there are approximately 10 set examples at the end of each chapter (about 100 in total) for student practice, the answers being provided at the end of the book.

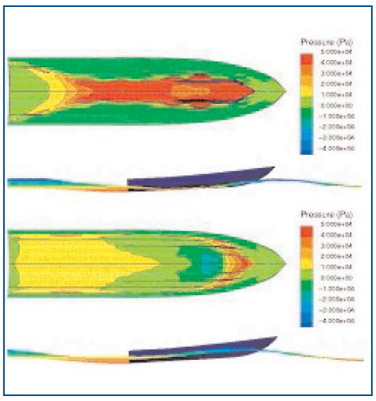
Finally, at the end of the publication, there are some 80 review questions to test the reader's understanding of the subject and 50 miscellaneous problems with answers. Thus the book should prove popular with lecturers in propeller design.

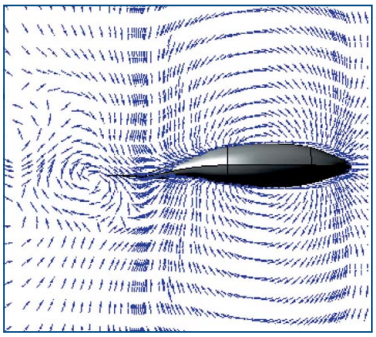
The title of the book shows that the authors were concerned to get across the basic concepts of propeller design and performance, and these they have covered with great thoroughness. Apart from the student and lecturer, the book should also prove useful to the practising naval architect who wishes to revise his or her knowledge of the basics of propulsion devices.

E C Tupper

The Royal Institution of Naval Architects







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Marine CFD 2005

The Fourth International Conference on Marine Computational Fluid Dynamics

30 - 31 March 2005, Southampton, UK

Second Notice

The International Conference on Marine Computational Fluid Dynamics and associated workshops offer delegates the opportunity to meet and hear from the leading industry and research experts in this field from around the world.

Computational fluid dynamics is a powerful tool for solving complex hydrodynamic problems. CFD offers the designer cost and flexibility advantages compared with model testing. However, many still see their use as more of an 'art' than a science, and the province of specialists. A lot of work is going into making CFD a universal design tool.

Marine CFD 2005 will focus on the application of CFD techniques to hull hydrodynamics, marine propulsors (propellers, pods, waterjets, etc), hull/propulsor interaction, and ship aerodynamics for conventional and unconventional ship design. The programme includes software workshops which will give the delegates a chance to participate in and discuss demonstrations of the latest CFD software. The Institution invites papers on:

- Practical applications of CFD techniques to marine design
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- Developments in adaptation grid generation
- Coupling of CAD and CFD software
- Development of quality standards and best practise

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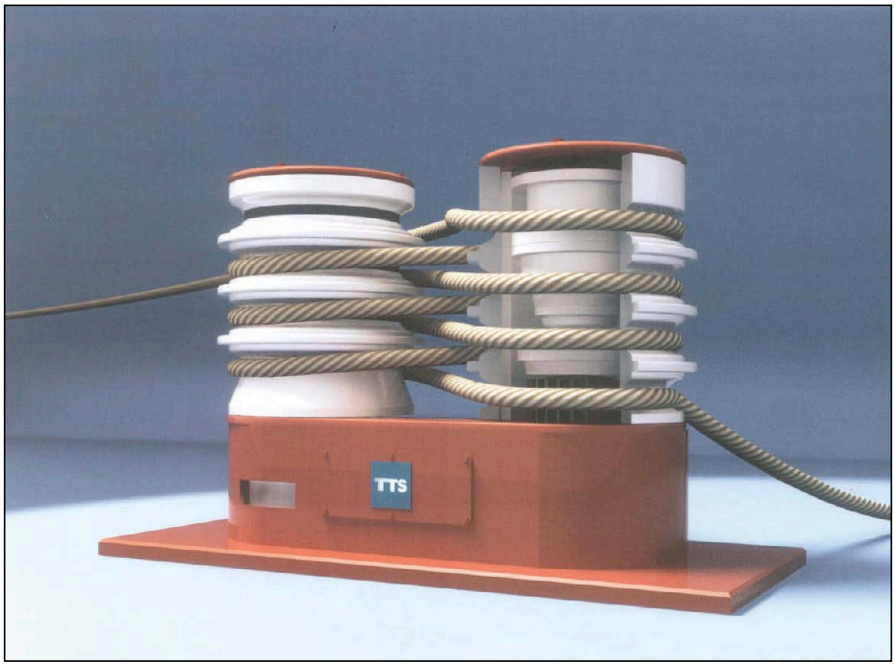
Winch bollard: a new aid to safer mooring

APART from the radical Iron Sailor vacuum mooring concept discussed in our July/August issue (page 36), there have been relatively few innovations over recent years to ease the lot of a mooring team on board a ship. That situation might now change with the introduction by the Norwegian company TTS Marine of another really novel piece of equipment.

This is the patent 'winch bollard' mooring system, which is expected to make mooring operations both easier and safer, and which does not involve stoppers. A unit consists of two special vertical bollards (not quite identical, as can be seen from the illustration) mounted on a single base, and which can be driven by either electric or hydraulic motors installed inside the winch itself. Less space is occupied than with a conventional mooring winch.

Normally, when using a conventional capstan or warping drum on a winch, the rope must be moved from the capstan or drum to a bollard, since the former are not designed to retain a rope. To maintain line tightness, a thinner 'helper' rope is normally fixed to the mooring rope and to a fixed point by a second person, before moving the mooring rope to the bollard. With this new TTS arrangement, the complete operation is carried out on one system.



A number of benefits are claimed by TTS for its innovative winch bollard concept, including one-man mooring.

The two bollards - each with four grooves - hold mooring rope just like a normal bollard or capstan but they can also tighten or release the line in a controlled and safe manner. Only one man is needed to work the system and he will control operations using a foot pedal. Winch bollard controls will reduce line speed when a line load increases, and the operator does not stand in direct line with the rope. An integrated emergency stop is included together with a failsafe brake, and the bollard grooves are fitted with vulcanised rubber to prevent rope slipping. All bearings are self-lubricated and water-resistant.

For electrical systems, a frequency converter with control unit is supplied, and for the hydraulic version the system is prepared for connection to an existing ring main; alternatively, TTS will supply a hydraulic power unit.

Three sizes are currently available, with rated pulls of 40kN, 80kN, and 150kN, and corresponding holding loads of 104kN, 247kN, and 366kN. A winch bollard can also be used for towing purposes if necessary. The prototype unit was installed last year on the foredeck of a Norwegian coastal cargo ship *With Junior*; the design is expected to be most useful on offshore support vessels and smaller types of cargo vessels where deck space at the stern is limited.

Acquisition of LMG cargo cranes

TTS Marine has signed a letter of intent to purchase the crane division of Lübecker Maschinenbau Gesellschaft (LMG), the German cargo crane manufacturer, with the objective of strengthening its presence in this sector. Up till now, TTS has mainly been strong in the hose-handling and provision crane market and has not had any wire-luffing cargo models. The German company is expected to operate under a new name, TTS LMG, and will remain at its site in Lübeck. LMG's crane division has a history stretching back 150 years and formerly included the Orenstein & Koppel designs.

Seen here during her recent launching process at Austal's yard in Henderson, Australia, is the pioneering 127m long trimaran *Benchujigua Express*, which is now nearing completion for Fred Olsen services in the Canary Islands. The distinctive stabilised monohull, fabricated in aluminium, can be clearly seen. Projected service speed is expected to be above 40knots. Details of the gearboxes for this ferry are given on page 18 of this issue.

Maritime and Coastguard Agency
An Executive Agency of
the Department for Transport.

Department for Transport
Southampton

Marine Surveyor (Ship discipline)

MCA East of England Region - Hull Marine Office (Beverley)

The Maritime and Coastguard Agency (MCA) is internationally acknowledged by governments and maritime organisations as a world authority on marine safety. The responsibilities of its surveyors embrace all aspects of maritime safety, including the setting, monitoring and enforcing of standards of safety and pollution prevention on all UK vessels, working for the raising of standards internationally and enforcing international standards on foreign ships visiting UK ports.

We are looking to fill a full time Marine Surveyor vacancy (Ship Surveyor discipline) at our Hull Marine Office (Beverley). Applicants should preferably be graduates in naval architecture and have at least 5 years' relevant or marine surveying experience, those with other qualifications coupled with longer, relevant experience in a senior position within the maritime field will also be considered.

Travel on official duty around the United Kingdom is a requirement, so a current driving licence is required. Short-term visits on official duty abroad will also be necessary.
You must also be prepared to work as a team and be part of an on-call roster, for which an allowance will be paid.

The roster will include weekend working and unsociable hours.

The current pay scale for this post starts at £32,177 per annum. The successful candidate may be offered a higher salary depending on relevant experience and qualifications.
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For an application form please telephone Danny Light on 02380 329 308, fax 02380 329 465, e-mail danny_light@mcga.gov.uk or write to The Maritime and Coastguard Agency, Human Resources (Recruitment Team), Bay 3/19, Spring Place, 105 Commercial Road, Southampton SO15 1EG.

The closing date for completed applications is 4th January 2005.

Interviews will be held week commencing 18th January 2005 at the MCA Marine Office, Crosskill House, Mill Lane, Beverley, East Riding of Yorkshire, HU17 9JB.

www.mcga.gov.uk

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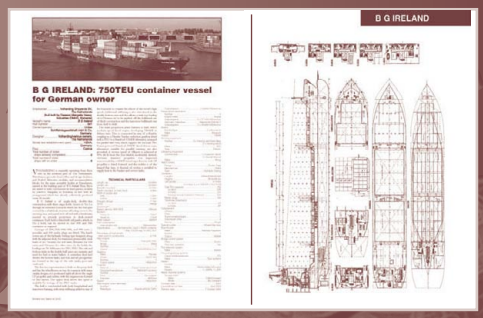

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Wärtsilä 46F: a new state-of-the-art propulsion engine

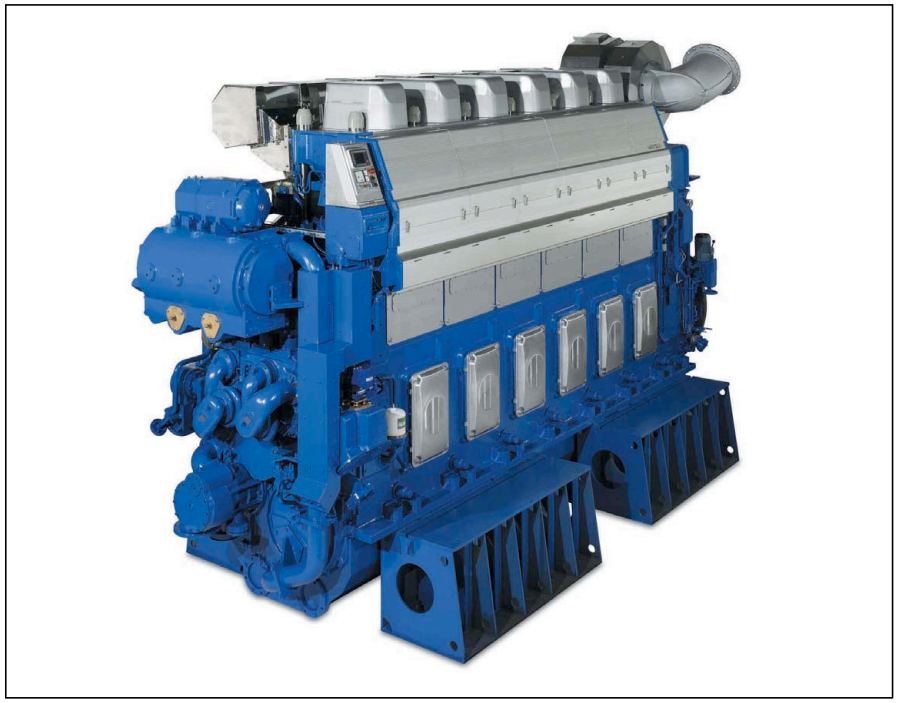
AN almost identical model number, together with a similar bore and stroke and exterior appearance to the existing 46-type design belie the fact that the Wärtsilä 46F is a totally new medium-speed diesel engine from the mighty Finnish stable. F stands for 'future', and thus all the latest technology is applied to all key components to ensure that all the traditional requirements of owners, operators, and shipyard engineering teams - reliability, economic purchase and operating costs, environment-friendly, and easy installation - are met.

A large cylinder output of 1250kW offers high power-to-weight and power-to-space ratios, and although the bore and stroke are similar at 460mm and 580mm, the running speed has been increased over the existing 46 model to 600rev/min in order to achieve the extra output - rather than raising mean effective pressure. The new engine will be offered initially in in-line versions with six, seven, eight, and nine cylinders, and the principal target market is medium-size container ships, smaller tankers, and cargo ships. Such vessels could potentially benefit from the new model's higher output through the fitting of engines with one or two fewer cylinders, thus gaining more cargo space.

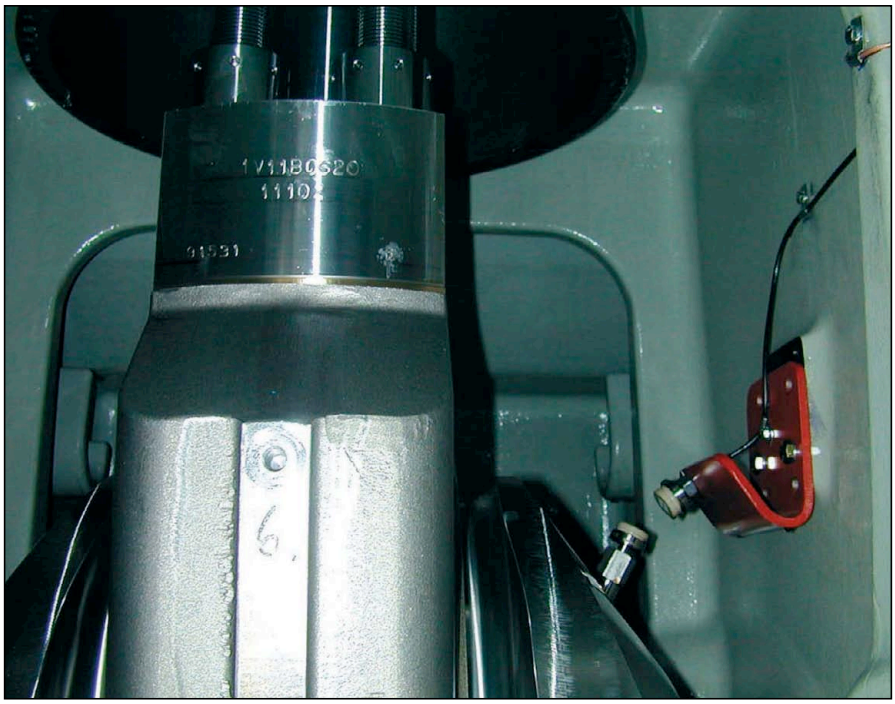
Common-rail fuel injection will be standard for maximum fuel efficiency, although conventional injection with twin-plunger pumps is an option. When operating at full load, early closing of the inlet valves makes it possible to use a low effective compression ratio; this results in a work-cycle characterised by low combustion air temperatures (Wärtsilä's CASS concept - combustion air saturation system - is an option for the new engine; this can help to reduce NOx formation by up to 50%).

A special feature on the Wärtsilä 46F will be continuous monitoring of big-end bearing temperatures - the engine is claimed to be the first-ever to have this ability fitted as standard, as well as existing features of main bearing and exhaust-gas temperature monitoring; information will be supplied in real time as a pre-requisite for a condition-based maintenance programme. Today, the latter is becoming a standard for ship maintenance, and Wärtsilä can provide a free trial period with its own system during the warranty period of a new 46F engine. For those owners wanting a simple arrangement, an alternative 'traffic-light' system can be fitted. Temperature at the big-end bearings will be monitored by sensors.

Wärtsilä anticipates that the first production engine will be delivered in approximately one year' time, although, at the time of writing, no orders had been placed for an F model. The current 46-series engines will be continue to be built, at least for the time being.



Although outwardly similar to its predecessor, the new Wärtsilä 46F has an increased output of 1250kW/cylinder and runs at a higher speed of 600rev/min.



Big-end bearing temperature monitoring is standard on the new engine and information can be hooked to a real-time condition-based maintenance system.

TECHNICAL PARTICULARS
WÄRTSILÄ 46F

Bore	460mm
Stroke	580mm
Speed	600rev/min
Mean effective pressure	25.90bar
Piston speed	11.60m/sec
Cylinder output	1250kW
Weight	97tonnes-140tonnes
Cylinders	6, 7, 8, 9

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The Royal Institution of Naval Architects

Recycling of Ships and other Marine Structures

4-5 May 2005, London

First Notice & Call for Papers

The disposal of ships and other marine structures raises a wide variety of issues. Recent high-profile cases in the developed world such as the US Navy's so-called "Ghost Ships" and the Brent Spar oil platform have highlighted some potential issues associated with disposal, mostly identified by persons or organisations raising environmental concerns.

However, at present, the vast majority of ships are broken up on beaches in Asia where concerns have been raised either with regard to the lack of environmental or safety legislation or the degree with which it is enforced by the recycling states. As a result of this, the activity, in the way it is carried out by some recycling facilities in those countries, is now regarded by the International Labour Organisation (ILO) as one of the most dangerous in the world. There are calls to ensure that more facilities become capable of breaking up and recycling ships both cleanly and safely, in both Europe and Asia. The need for yards of this type in Asia exists as the vast majority of the scrap steel extracted from ships finds a ready market in the construction industry and the various components of the ships (auxiliary engines, batteries, hydrocarbons, brass fittings, copper, household fittings such as wash basins, taps, toilets and showers etc) are re-sold for further use.

There is a requirement for all single hulled oil tankers to be replaced by 2010. This is expected to lead to a massive increase in the number of ships requiring disposal, magnifying the problems faced today. There are also approximately 200 decommissioned ships, the so-called "Ghost Ships", owned by the US government awaiting disposal in James River, Virginia.

The 1972 London Convention and the OSPAR Convention of 1998 have effectively ruled out the disposal respectively of ships and oil and gas platforms by dumping at sea. This means that methods must be found to dismantle them safely and cleanly on shore.

CONTENTS:

Papers are invited on the following topics:

- Assessments of the future demand for recycling
- The economic and environmental case for recycling. Can the developed world compete?
- Design for recycling: Use of easily recyclable materials, creating and keeping an inventory of potentially hazardous materials and taking measures to facilitate the removal and disposal of these materials.
- Regulatory matters: International and National regulations and their enforcement, industry guidelines and voluntary codes of practice.
- Controlling the environmental impact of recycling.
- Working conditions in recycling facilities
- New technologies and methods of recycling.

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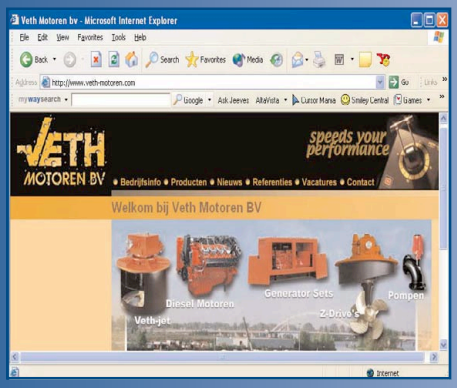

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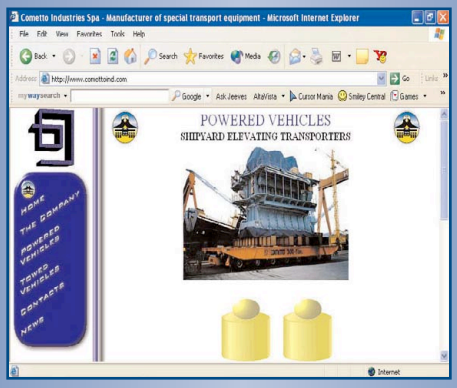

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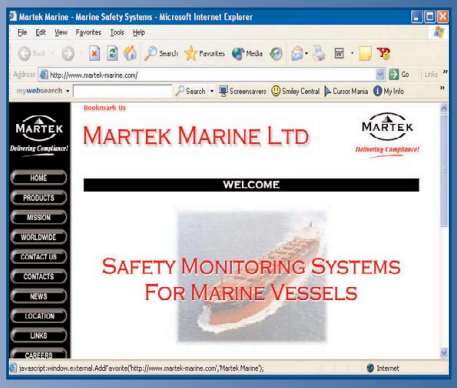

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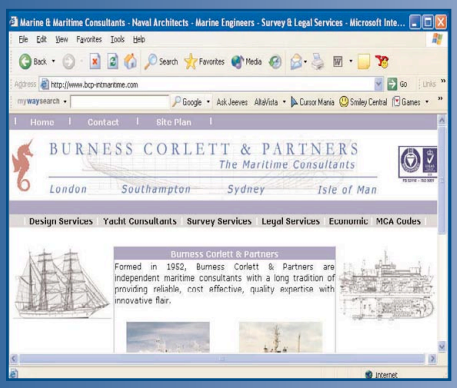

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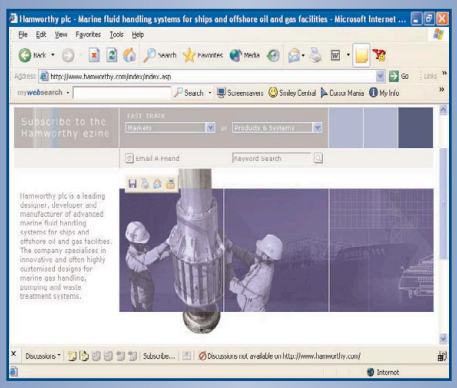

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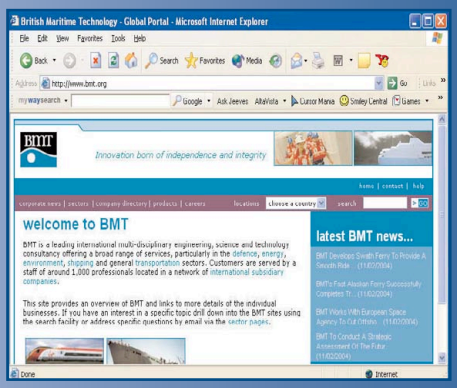

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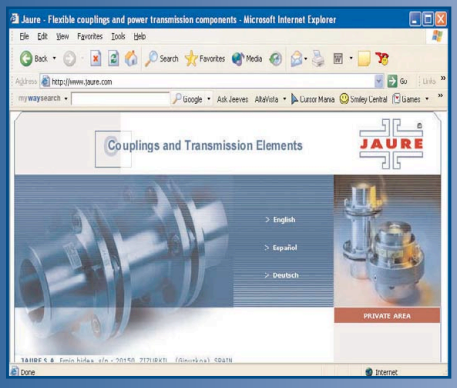

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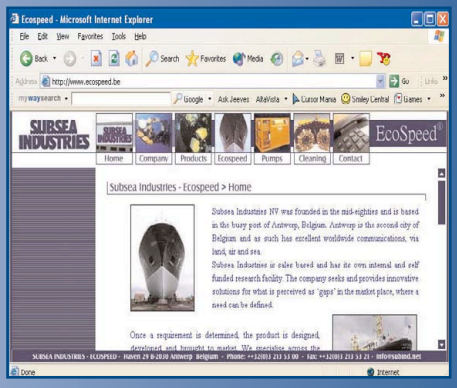

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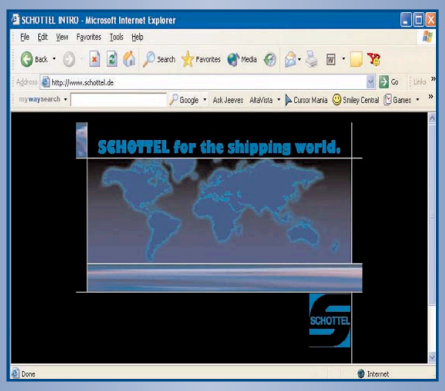

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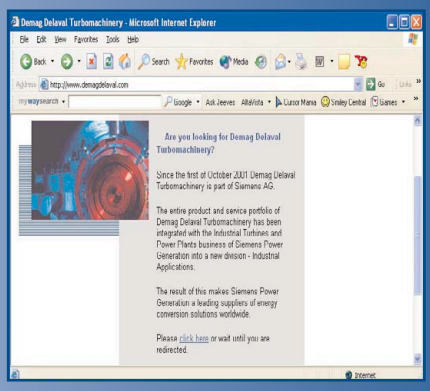

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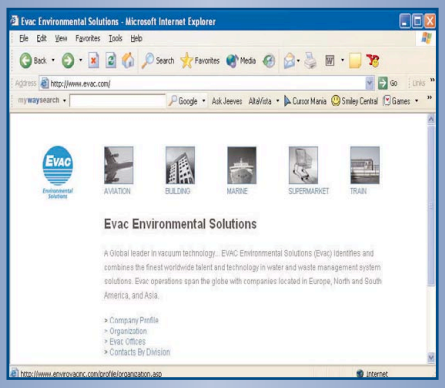

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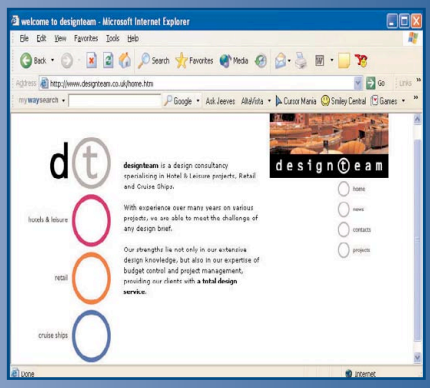

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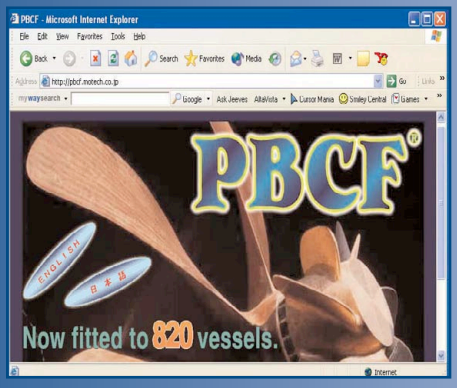

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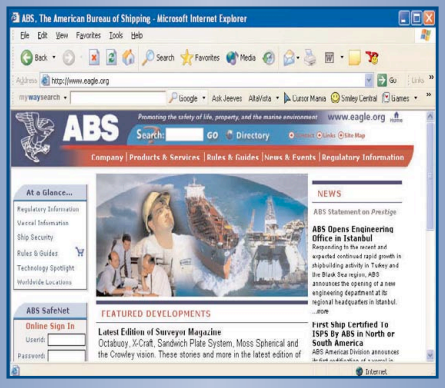

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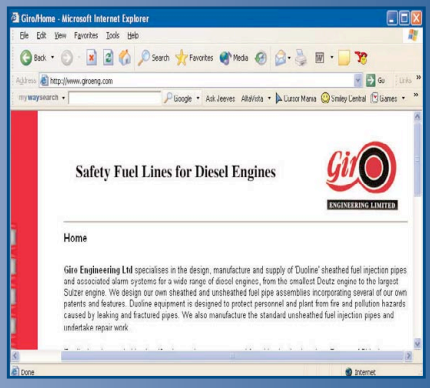

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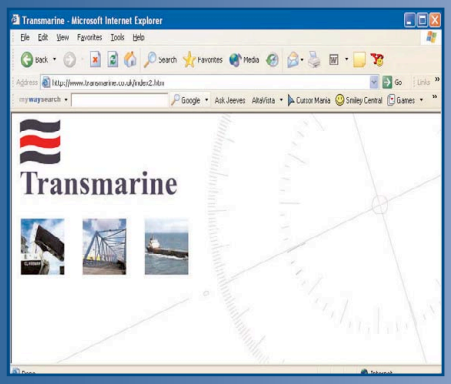

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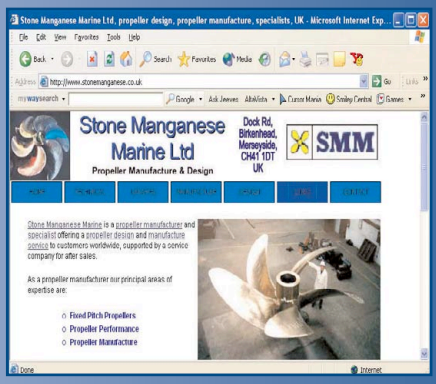

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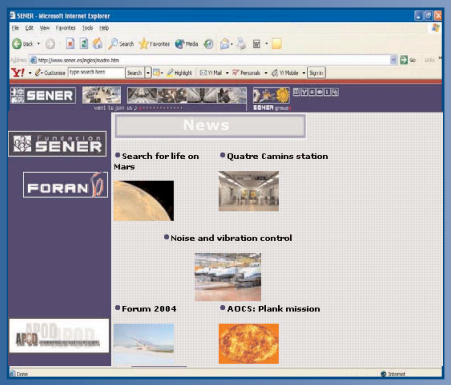

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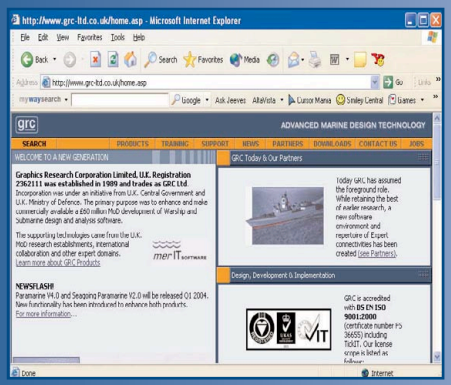

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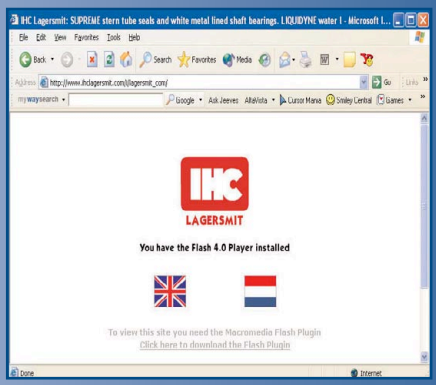

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