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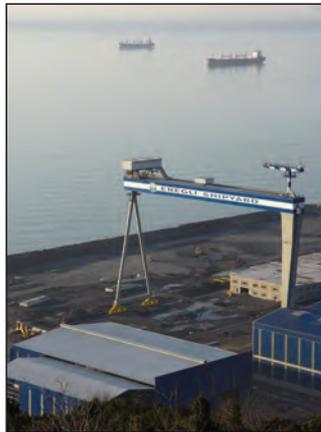
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# THE NAVAL ARCHITECT



Turkey's shipbuilding industry is currently enjoying a boom period. Smaller classes of ship predominate, particularly chemical tankers. At the same time, a number of important new shipyard projects for much larger vessels are in various stages. Seen here is part of the Eregli 'greenfield' yard, which is being developed by Medmarine on the Black Sea coast; this aims to build ships up to Panamax size. More details appear in our special feature, which begins on page 11.

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# NOBS: a practical hull form for the future?

**A** BRAND-NEW - and apparently wholly practical - hull form has emerged from that country which is an arch-creator of expansive and intriguing new ideas: Japan. The no-ballast ship (NOBS), with its heavy transverse rake, is the brainchild of the Shipbuilding Research Centre of Japan.

Too many times during the past 20 years or so, vast sums of Japanese government money have been expended on theories and experiments which, when it comes down to the harsh realities of everyday marine operations, prove unacceptable to the marine industry at large. Examples include the superconducting electro-magnetic motor (waterjet thrust type), the Techno Superliner, and the ADD diesel engine: all superb pieces of advanced naval architecture and marine engineering but totally impractical in the real world. The latest version of the Techno Superliner (*Superliner Ogasawara*, presented in *Significant Ships of 2005*) has foundered on the huge fuel cost of feeding its two gas turbines on a planned 1000km service to a group of remote islands.

The highly interesting ADD engine, featuring ceramics and other advanced wonders - and hence much more

the need to take on ballast water with potentially undesirable microorganisms - currently a topic of great interest to many and the subject of some new IMO legislation and new ship operational techniques. A practical new hull form for mainstream commercial vessels - a patent for the NOBS technique has been applied for in several major nations - will be of great interest to naval architects worldwide, not just for those involved in designing tankers and bulk carriers.

Although tankers (and possibly bulk carriers) are the most obvious beneficiaries, the SRCJ and the backers of this national project (which include the Ministry of Land, Infrastructure and Transport; the Japan Railway Construction, Transport and Technology Agency; the Nippon Foundation; and private enterprise - including Mitsubishi Heavy Industries, IHI Marine United, and Class NK) consider that modified versions of this exciting technique could be applied to other ships types.

Those involved in creating large container liners, where medium-size examples under post-Panamax dimensions are often compelled to sail with up to 10,000tonnes of water ballast for stability purposes, even when loaded, may examine the possibilities with particularly great interest, since this is an extraordinary volume that needs to be hauled around the world. Although container ships, bulk carriers, and medium-size and small tankers were not the prime target of the research, some studies have been made in association with the two Japanese shipbuilders involved.

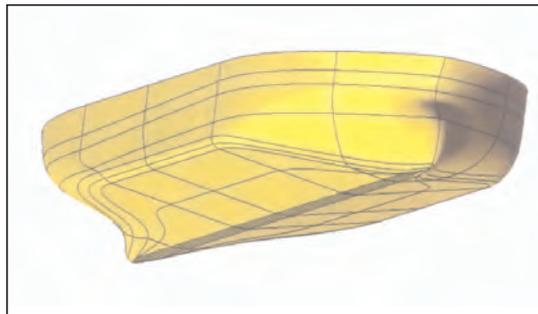
The first result of a transverse rake is loss of displacement; this has been recovered by expanding the breadth - something that may not immediately appeal to naval architects planning 25knot container liners. In addition, a NOBS vessel would have a fat bow and aft body, to distribute better the displacement; this feature would be combined with a small, efficient propeller.

A primary aim has been to ensure safe ship operation in normal seas with a 3m draught at the forward perpendicular, plus full propeller immersion at the stern. In rough conditions, a NOBS should operate safely with only one quarter of the ballast water that a conventional tanker would take on board. In parallel, the SRCJ aimed to achieve a saving in fuel of at least 5%, and to ensure that a NOBS tanker complied with IMO's Resolution A137(76) for manoeuvrability.

Steel reinforcement against a resulting increase in the longitudinal bending moment (caused by the extra breadth) is nominally expected to be around 10%; this must be a considered quite a high figure but the SRCJ believes some of this can be compensated for by superior propulsion efficiency. Most owners would clearly not be prepared to pay for this (unless perhaps they were planning to sail in Arctic waters), and the team acknowledges that further studies would probably have to be initiated to sharpen up the structural steel so as to attain a more attractive lightweight figure.

For once, this seems to really be a Japanese project that does have its feet on the ground. The NOBS could have far-reaching consequences for shipbuilding worldwide (and some changes for repair yards too, who would have to master some modified block arrangement techniques in their drydocks). The hull form will additionally please those concerned about the transport of undesirable foreign bodies around the world. 

**Hull form for the future?**  
Computer-generated impression of a no-ballast-water ship (NOBS), showing the transverse rake. Although primarily conceived as offering most benefit to larger types of oil tanker (and perhaps bulk carriers), possibilities exist to transfer to form to other ship classes.



expensive - is competing head-on in that most fiercely competed engine sector - small (and economical) four-stroke models for propulsion and auxiliary use; in Japan, several well entrenched manufacturers here vie for contracts in the Far East and worldwide.

Now at last, with the NOBS project, real prospects do exist of acceptance by shipbuilders and shipowners. A ship that carries virtually no ballast water must be seen as an attractive prospect, and the question might be asked, why has no one dreamed of it before? One answer might well be that a NOBS ship is seen as most attractive to larger classes of oil tankers, a sector in which the prime effort has been expended to prevent cargo spillage rather than deal with ballast problems.

Of course, that is not totally true: in the early 1970s, in pre-MARPOL days and prior to the arrival of double skins, a series of gigantic and spectacular explosions - featuring large quantities of twisted steelwork - took place in very large tankers sailing in ballast, due to gas build-up in the then dual cargo/ballast tanks. Luckily, the problem was quickly solved by the installation of nitrogen generators and the technique of supplying inert gas.

The impetus for the NOBS project is the prevention of bow slamming and propeller racing while in ballast, while a handy secondary result has been elimination of most of

Further details of the NOBS ship appear on page 30 of this issue.

## Balcony fire on *Star Princess* - safety bulletin issued by MAIB

THE UK Marine Accident Investigation Branch (MAIB) has issued a safety bulletin in connection with a fire that broke out on the Bermudan-registered cruise ship *Star Princess*, while it was on passage from Grand Cayman to Montego Bay, Jamaica on March 23 2006. There were 2690 passengers and 1123 crew onboard the four-year-old Fincantieri-built vessel.

The seat of the fire was on an external balcony located on Deck 10 of the vessel's port side. The fire spread rapidly along adjacent balconies and within 10 minutes had spread up to Decks 11 and 12 and onto cabin balconies in two adjacent fire zones. It also spread internally since the heat of the fire shattered glass in cabin balcony doors, but was contained by the fixed fire-smothering system fitted in each room.

As the fire progressed, large amounts of dense black smoke were generated by combustible materials on the balconies, and from burning polycarbonate balcony partitions. This smoke entered the adjacent cabins and alleyways, and hampered the evacuation of passengers. One passenger died as a result of smoke inhalation, and 13 others were treated for the effects of the smoke.

The fire was extinguished about one and a half hours after it had started. The crew fought the fire with water hoses from adjacent external areas, and from internal alleyways. Difficulty was experienced in reaching the fire due to the construction and partitioning of the balcony areas. A total of 79 cabins were condemned after the fire, and a further 204 were either water- or smoke-damaged. The damaged area covered three vertical fire zones on five decks.

Following the accident, the MAIB determined by practical tests that the materials at the seat of the fire were readily ignitable, and that the polycarbonate balcony divisions generated intense heat and copious amounts of dense black smoke as they burned.

SOLAS regulations, as included in Chapter II-2, *Construction - fire protection, fire detection and fire extinction*, do not, currently, prescribe the combustibility of materials used on external balcony areas, since these are not included within the vessel's fire zones. Similarly, the MAIB notes that balcony areas on cruise ships are not required to have fixed fire detection or suppression systems, as would be the case in internal areas. Additionally, balcony areas are frequently difficult to monitor due to their inaccessibility. This accident clearly demonstrates, continues MAIB, the risks of a serious fire starting and quickly spreading in areas not covered by regulation.

The installation of balconies, similar to those onboard *Star Princess*, has become increasingly common in modern cruise liners. It is vital to ensure that fire protection arrangements within such ships, such as zoning, are not undermined by lack of appropriate measures externally, notes the MAIB. Immediate action is therefore required internationally, to address the risk of



The cruise liner *Star Princess* suffered serious damage after a balcony caught fire. A bulletin from the UK MAIB notes that balconies are generally not covered by current regulations.

fire in external areas such as balconies, and to stop the potentially catastrophic spread of any such fire.

This investigation, continues the authority, has already identified serious shortcomings in fire protection on balconies, which require urgent attention. MAIB and its partners, therefore, are working with the cruise industry worldwide to ensure that short-term measures are immediately put in place. These include: increased vigilance on vessels with balconies, with consideration given to dedicated lookouts and additional fire patrols; a review of crew onboard training and response; and advice to passengers and crew. The industry has already agreed to implement medium-term structural measures as soon as practical.

**GREEN FURNITURE FOR SHIPS** - In response to the UK Government's initiative to provide an industry-wide framework to stimulate sustainable consumption and production, the British furniture industry has recognised sustainable development as a strategic business issue by launching the Furniture Industry Sustainability Programme. This initiative is supported by Morgan Contract Furniture which has, for many years, taken a green approach to its products, including those for marine use.

The new initiative means minimising consumption of materials and natural resources, reducing and recycling waste as well as protecting the environment. All this can be achieved, says the company, while maintaining business growth and employment.

**INCAT ASSETS ACQUIRED** - A US technology solutions provider, Alion Science & Technology, has acquired assets related to vessels greater than 60m length from the

Australian company International Catamaran Designs (Sydney) Pty Ltd. The purchase includes design files and design tools for high-speed wave-piercing catamaran ferries and fast cargo ships, together with an extensive library of model test data. Mr Philip Hercus, developer of the wave-piercing concept, has been retained under a consulting agreement.

**FOUR NEW CONTAINER SHIPS ORDERED AT HHI** - Hyundai Heavy Industries (HHI) recently secured an order for four 8600TEU container liners worth US\$540 million, from principals of Zodiac, based in the UK. The ships will have a length of 339.6m, a width of 45.6m, a depth of 24.6m, and a service speed of 27knots. Each will be fitted with a 80,080kW engine, which, it is claimed, will be one of the world's largest ever. The vessels are all scheduled to be delivered by 2009.

Including this order, HHI (including Samho Heavy Industries) will have 50 super-large container ships of 8000TEU and over on its order book, capturing 40% of the global containership market share. 

### PEOPLE

**HENRIK MADSEN** has taken over as chief executive officer of Det Norske Veritas (DNV) and has introduced a new business area, ICT Risk Management, which will be operative from January 1 2007. He also presented five new members of the executive board. **Tor E Svensen**, chief operating officer DNV Maritime, will, in addition to his current position, take up the responsibility as Mr Madsen's deputy. 

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# First of Finnlines' Italian-built ferries set for delivery

A NEW fast ro-pax ferry, built by Fincantieri for Finnlines and launched towards the end of last year, is expected to be delivered imminently. The 217.60m long *Finnstar* is the first of five sisters - believed to be the largest and fastest of their type - ordered from the Italian group's Ancona and Castellammare di Stabia shipyards. She has been designed for the Finnish operator's long international services (thought to be mainly between Scandinavia and Germany), carrying passengers and road vehicles, and features a bulbous bow, transom stern, and an engineroom arranged amidship/aft of the superstructure.

Propulsion is provided by four Wärtsilä L46D medium-speed four-stroke diesel engines, each with nine cylinders in line and burning heavy fuel, and transmission is through twin-input/single-output reduction gears and flexible couplings to CP propellers. The total MCR is approximately 41,580kW. *Finnstar's* trial speed was recorded at 25.00knots.

The new ferry is equipped with four auxiliary generators (driven by Wärtsilä 6L20 engines), each with an output of 1140kW each at 1000rev/min; unusually, these are arranged to run on marine diesel oil only. Additional electrical power will be provided by two shaft generators, each driven through a primary-type PTO and each of which runs at 1500rev/min and supplies 2200kW.

Good manoeuvrability should be ensured by two flap-type rudders turned by rotary-vane steering gear, also two 2000kW electric CP bow thrusters. For mooring, two self-tensioning electrically driven combined anchor windlasses/winchs, each with two drums and one warping end, are arranged on the forecastle, along with four electric self-tensioning winches aft.

A total capacity of 573 berths, in 201 cabins, has been provided for passengers, including two disabled-access cabins. Public spaces include a



The 217.60m long heavily ice-strengthened *Finnstar* was launched at the Ancona shipyard towards the end of last year.

## TECHNICAL PARTICULARS *FINNSTAR*

Length, oa.....	217.60m
Length, bp.....	199.00m
Breadth, moulded max.....	30.50m
Depth, to main deck.....	9.90m
Draught, scantling.....	7.10m
Draught, design.....	7.00m
Deadweight, design draught....	9260dwt
Trailers.....	300 (4200 lane metres)
Cars.....	62
Passengers.....	500
Main engines.....	4 x Wärtsilä 9L46D
Output total, MCR.....	41,580kW
Speed, trial at design draught, 85% MCR and 15% sea margin.....	25.00knots
Flag.....	Swedish/Finnish
Classification.....	Det Norske Veritas +1A1, Car Ferry A, Ice Class 1A*, EO, NAUT-OC, RP, TMON; SOLAS 1974 with amendments in force; MARPOL 1973/1978

number of shops, bars, saunas, a children's play room, a gymnasium, a meeting room, and a games room.

Two lifts, each with a capacity for 10 people, are provided for passengers, whose comfort should be ensured by a pair of active fin-type stabilisers. An extra two lifts are installed for stores handling. Firefighting in the public rooms and accommodation is provided by sprinklers, and by a drencher system in the enclosed cargo spaces and in the engineroom.

*Finnstar* has four ro-ro cargo decks (one of which is partially open and which includes hoistable car platforms), with a very large vehicle

capacity. Cargo access from shore is provided at two levels: by a stern ramp arranged on the main deck; a stern ramp on the upper deck; a bow door and bow ramp on the main deck; and a bow bulkhead door and visor on the upper deck.

Access from the main deck to the lower garage is provided by a fixed ramp towards the stern, with a hoistable ramp provided towards the bow. Access from the upper deck to the weather deck is over a hoistable tilting ramp. The complete access package was designed by the MacGregor group. *Finnstar* has a ro-ro capacity of 4200m trailer lane metres (3.0m and 2.8m width), with space for 62 additional cars (2.3m lane width). 



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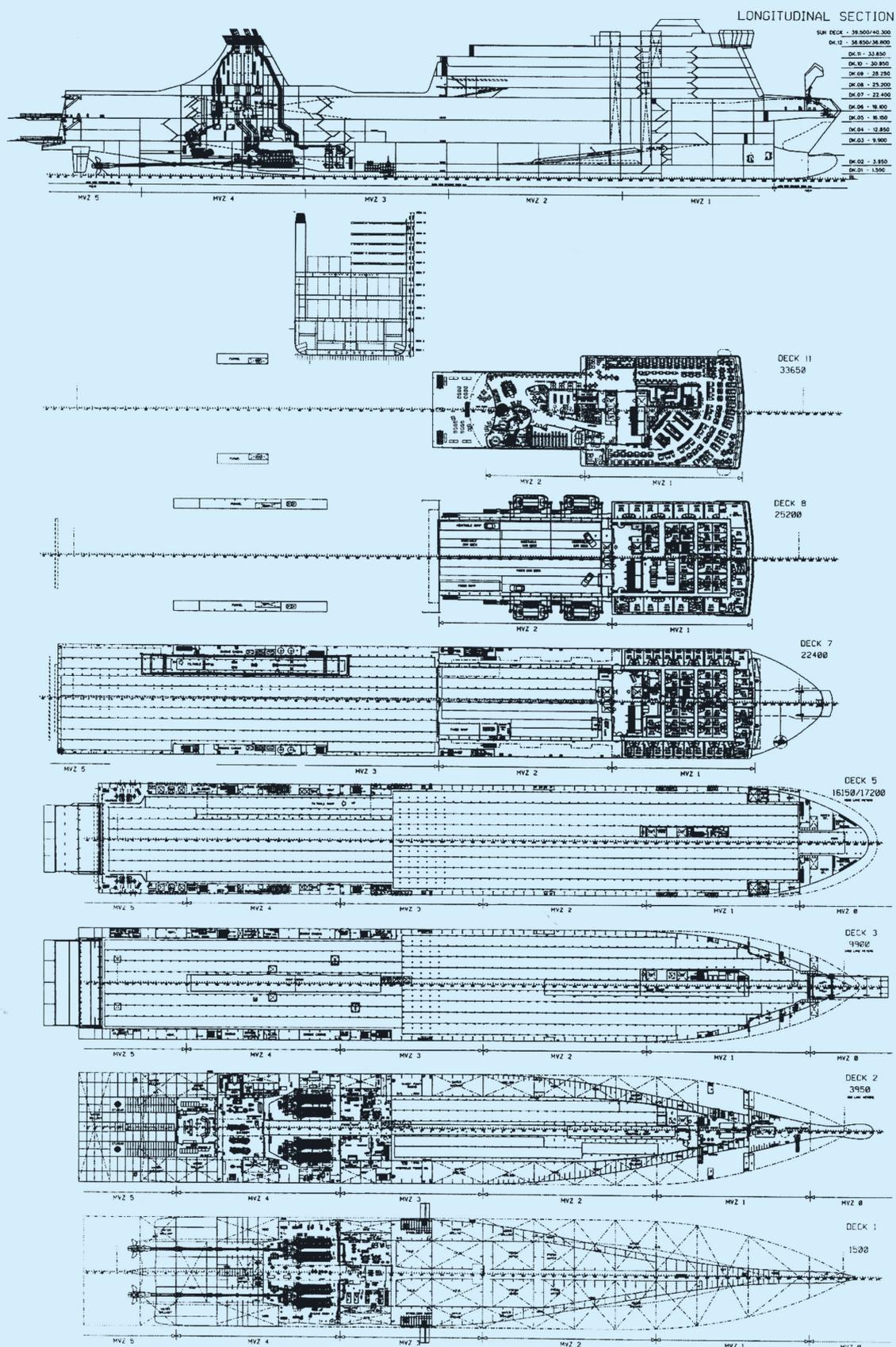
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General arrangement plans of the new Fincantieri-built ro-pax ferry *Finnstar*, built for Finlines. Four sisters are to follow.



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## Boom times continue for Turkish yards

Turkish shipbuilding is experiencing a genuine boom period at the present time. Yards there are building not only more ships, but increasingly large and complex designs as well. Shipyards in Turkey, most of which are concentrated in the Tuzla Bay area just outside of Istanbul, are benefiting from the general buoyancy of the global shipping business. Almost all the country's yards are full through to the end of 2007 at least, and in reality there are few slots available in 2008. Some yards have significant contracts that extend through to 2010. At the same time, several important investment programmes in new and upgraded yards are under way. Clive Woodbridge made a special visit to Turkey for *The Naval Architect* and reports here on a reasonably happy industry although some challenges lie ahead.

ACCORDING to the French shipbroker, Barry Rogliano Salles, last year the size of the Turkish shipbuilding orderbook doubled from 600,000gt at the end of 2004 to 1.25 million gt in December 2005. This was the result of around 860,000gt of new orders being placed over the 12-month period.

Another consultant, Fred Doll, of Doll Associates, estimates that there was an orderbook of around 1.5 million dwt in Turkey at the end of last year - enough to put the country in the top 10 of the world's shipbuilding nations, and give the country around 1% of the global order book.

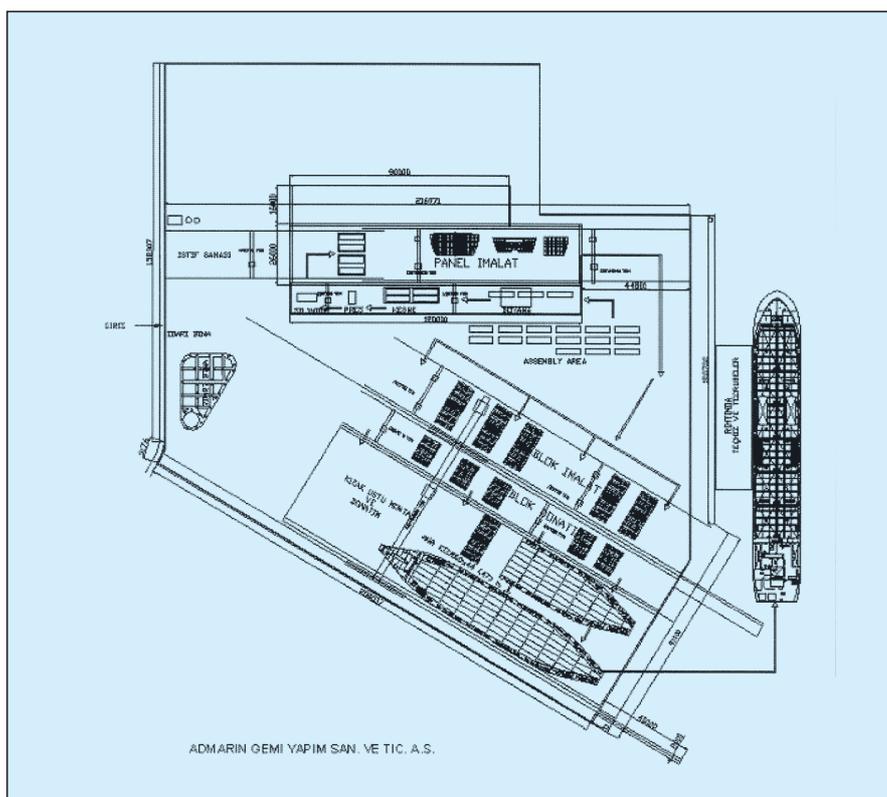
However, Turkey's position is particularly strong in certain niche market segments, especially small chemical and product tankers, which make up by far the biggest single type of vessel currently on order there. Figures from the Turkish Shipbuilders Association suggest that around 49% of all vessels currently on order at its member yards are IMO Type II chemical/product tankers, while a further 18% are relatively small crude/product tankers.

According to Fred Doll, Turkey has a market share of the world tanker market under 10,000dwt of around 23%, and also controls around 11% of the container ship market for vessels under 2000TEU. The country is, furthermore, relatively strong in bulk cement carriers, with around 36% of the tonnage on order in this very specialised sector.

### Ship size and complexity increasing

At the same time as the Turkish shipbuilding order book is expanding, the average size of the vessels being built there is steadily increasing as well. A few years ago, relatively few vessels over 10,000dwt were contracted at the country's yards, but these are now becoming more commonplace.

According to the Turkish Shipbuilders Association, 27 of the 100 vessels of over 1000dwt that were confirmed as being on order at its member yards at the end of 2005 were more than 10,000dwt in size. In October



A typical example of the new investment under way today in Turkey is the 'greenfield' shipyard at Kosbas/Kocaeli for Admarin Denizcilik. It was expected to become operational in April this year. A plan of the yard is seen here.

last year, the largest to date, the 27,000dwt chemical tanker, *Ottomana*, was delivered by the Celik Tekne yard in Tuzla to Mediterranean di Navigazione (presented in *Significant Ships of 2005*).

Yards are also building vessels of growing complexity and sophistication. A prime example is *FS Charlotte*, a combined molten sulphur/bitumen carrier which was recently delivered by the Yardimci yard to Fouquet Sacop, of France. Celik Tekne is also now working on *Saracena*, an 18,000dwt ice-class chemical tanker for Mediterranean, which will be able to handle cargoes at temperatures as low as -35°C. The Madenci shipyard on the Black Sea coast, meanwhile, has secured orders to build four 3300m<sup>3</sup> LPG carriers, for G & H Shipping, and this is the first time this type of vessel has been built in Turkey. These particular vessels were the subject of an article in *The Naval Architect* March 2006, page 41.

### New investment for larger ships

Considerable investment has been made by yards in the Tuzla area in the past two years to allow them to handle vessels of greater size. Nevertheless, the maximum size that can be built in the Tuzla area is around 30,000dwt, and there is generally a lack of room for significant

yard expansion. (The state-owned Pendik shipyard, which has a dock that can build ships up to 170,000dwt, is now being used by the Turkish Navy and is unlikely to be returned to commercial shipbuilding duties in the foreseeable future.)

To address this issue, several new shipbuilding facilities are being built in Turkey, in the Izmit Bay, Black Sea, and Marmara Sea areas especially, and most of these have a capacity to construct vessels of a larger size than those in Tuzla. In addition, the Um Deniz yard at Izmit, which was originally designed to build VLCCs, is now back in production, thanks to a deal with the Volharding group, of The Netherlands. As reported in *The Naval Architect's* May issue, a series of 917TEU container ships is being constructed here to a Volharding design.

In reality however, Turkish yards are only likely to be competitive compared with China and other Asian yards with respect to vessel sizes up to around 30,000dwt. As a result, this is where the focus of the country's yards will continue to be.

Another notable trend in evidence is that many of the vessels now rolling off the Turkish shipbuilding production lines are being designed in Turkey, primarily through three leading design houses, Delta Marine, Admarin,

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Turkish shipbuilding is experiencing a genuine boom period at the present time. Yards there are building not only more ships, but increasingly large and complex designs as well. Shipyards in Turkey, most of which are concentrated in the Tuzla Bay area just outside of Istanbul, are benefiting from the general buoyancy of the global shipping business. Almost all the country's yards are full through to the end of 2007 at least, and in reality there are few slots available in 2008. Some yards have significant contracts that extend through to 2010. At the same time, several important investment programmes in new and upgraded yards are under way. Clive Woodbridge made a special visit to Turkey for *The Naval Architect* and reports here on a reasonably happy industry although some challenges lie ahead.

ACCORDING to the French shipbroker, Barry Rogliano Salles, last year the size of the Turkish shipbuilding orderbook doubled from 600,000gt at the end of 2004 to 1.25 million gt in December 2005. This was the result of around 860,000gt of new orders being placed over the 12-month period.

Another consultant, Fred Doll, of Doll Associates, estimates that there was an orderbook of around 1.5 million dwt in Turkey at the end of last year - enough to put the country in the top 10 of the world's shipbuilding nations, and give the country around 1% of the global order book.

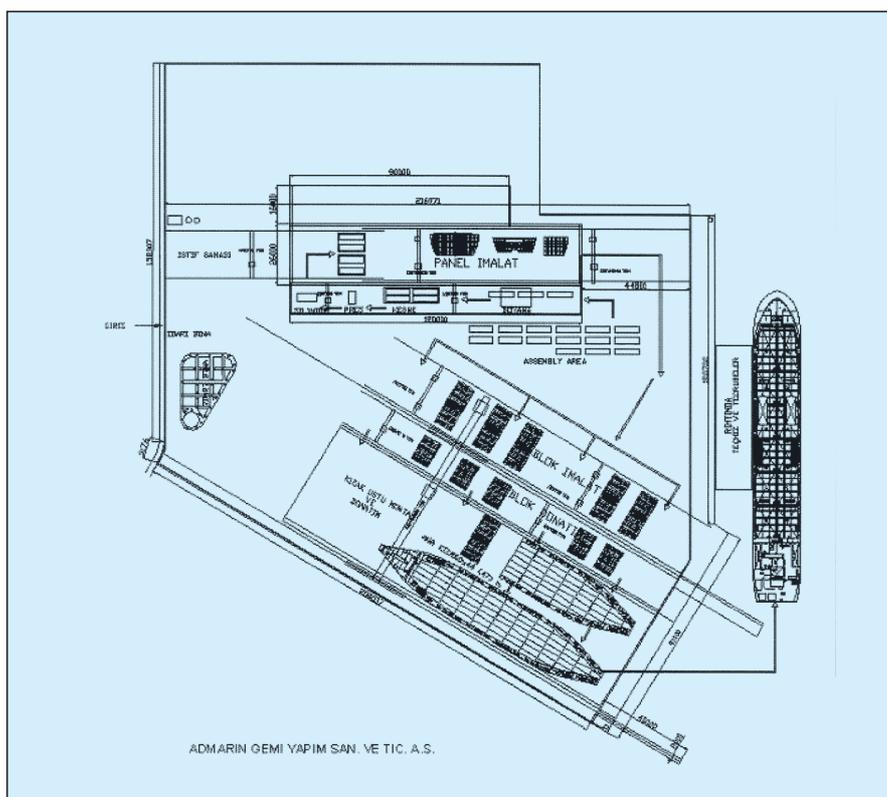
However, Turkey's position is particularly strong in certain niche market segments, especially small chemical and product tankers, which make up by far the biggest single type of vessel currently on order there. Figures from the Turkish Shipbuilders Association suggest that around 49% of all vessels currently on order at its member yards are IMO Type II chemical/product tankers, while a further 18% are relatively small crude/product tankers.

According to Fred Doll, Turkey has a market share of the world tanker market under 10,000dwt of around 23%, and also controls around 11% of the container ship market for vessels under 2000TEU. The country is, furthermore, relatively strong in bulk cement carriers, with around 36% of the tonnage on order in this very specialised sector.

### Ship size and complexity increasing

At the same time as the Turkish shipbuilding order book is expanding, the average size of the vessels being built there is steadily increasing as well. A few years ago, relatively few vessels over 10,000dwt were contracted at the country's yards, but these are now becoming more commonplace.

According to the Turkish Shipbuilders Association, 27 of the 100 vessels of over 1000dwt that were confirmed as being on order at its member yards at the end of 2005 were more than 10,000dwt in size. In October



A typical example of the new investment under way today in Turkey is the 'greenfield' shipyard at Kosbas/Kocaeli for Admarin Denizcilik. It was expected to become operational in April this year. A plan of the yard is seen here.

last year, the largest to date, the 27,000dwt chemical tanker, *Ottomana*, was delivered by the Celik Tekne yard in Tuzla to Mediterranean di Navigazione (presented in *Significant Ships of 2005*).

Yards are also building vessels of growing complexity and sophistication. A prime example is *FS Charlotte*, a combined molten sulphur/bitumen carrier which was recently delivered by the Yardimci yard to Fouquet Sacop, of France. Celik Tekne is also now working on *Saracena*, an 18,000dwt ice-class chemical tanker for Mediterranean, which will be able to handle cargoes at temperatures as low as -35°C. The Madenci shipyard on the Black Sea coast, meanwhile, has secured orders to build four 3300m<sup>3</sup> LPG carriers, for G & H Shipping, and this is the first time this type of vessel has been built in Turkey. These particular vessels were the subject of an article in *The Naval Architect* March 2006, page 41.

### New investment for larger ships

Considerable investment has been made by yards in the Tuzla area in the past two years to allow them to handle vessels of greater size. Nevertheless, the maximum size that can be built in the Tuzla area is around 30,000dwt, and there is generally a lack of room for significant

yard expansion. (The state-owned Pendik shipyard, which has a dock that can build ships up to 170,000dwt, is now being used by the Turkish Navy and is unlikely to be returned to commercial shipbuilding duties in the foreseeable future.)

To address this issue, several new shipbuilding facilities are being built in Turkey, in the Izmit Bay, Black Sea, and Marmara Sea areas especially, and most of these have a capacity to construct vessels of a larger size than those in Tuzla. In addition, the Um Deniz yard at Izmit, which was originally designed to build VLCCs, is now back in production, thanks to a deal with the Volharding group, of The Netherlands. As reported in *The Naval Architect's* May issue, a series of 917TEU container ships is being constructed here to a Volharding design.

In reality however, Turkish yards are only likely to be competitive compared with China and other Asian yards with respect to vessel sizes up to around 30,000dwt. As a result, this is where the focus of the country's yards will continue to be.

Another notable trend in evidence is that many of the vessels now rolling off the Turkish shipbuilding production lines are being designed in Turkey, primarily through three leading design houses, Delta Marine, Admarin,

and Navtek. This is in stark contrast to the situation at the end of the 1990s, when there was relatively limited local design capacity.

While their order books are full, Turkish yards do face a number of problems at the present time. Costs are certainly rising, both as a result of increases by their traditional European suppliers, and as a result of increased labour costs in Turkey. Yards have also been hit by an appreciation of the Turkish Lira against the Dollar.

#### Some price rises outside shipyard control

Cost reduction, through switching to cheaper Far East component suppliers, and by raising productivity, will have to be a priority for Turkish yards over the coming years if they are to retain a competitive edge. However, as one

shipyard executive says, 'Shipowners are blaming us for the higher prices. But the reality is that many of the increases are outside of our control'.

Notably, Turkish yards are finding it increasingly difficult to source main engines within a reasonable time frame (as a result of the huge boom in all shipbuilding sectors), and this has led to significant delays in delivering some vessels. According to one yard, 'The situation is now so serious that we are having to see what main engines are available and then tailor our newbuilding programme to build vessels suitable for the type and power rating that engine manufacturers can deliver, rather than the other way around'. This is an extraordinary situation.

Overall, there has been a tremendous improvement in quality and efficiency within

the Turkish shipbuilding industry over the past few years. This has helped attract more business from overseas owners, who can benefit from Turkey's closer proximity to Europe as well as the country's relatively low labour costs. It is, one yard points out, much cheaper for a European owner to position a new construction team in Turkey, than in China.

Today, Turkey is without doubt now a real force in world shipbuilding, albeit one heavily focussed on certain niche markets; it has certainly risen in stature since our last visit to that country in 1998. As time goes on, the country's yards seem likely to diversify their production still further, and there are those who believe that Turkey could be an attractive location to build LPG, reefer, ro-ro, and PCTC vessels, as well as chemical and product tankers, in the foreseeable future. 

## Kalkavan upgrades Sedef for container-ship building programme

ONE of the biggest shipyard investment programmes in Turkey is being undertaken at the Kalkavan Sedef shipyard in Tuzla. This yard is being extensively upgraded in order to increase production capacity, boost productivity, and allow the yard to build larger container ships, up to around 4500TEU in size.

The project is being undertaken in two phases and, in the first stage, an area to the north of the yard is being redeveloped. A new berth, measuring 250m x 42m, is under construction, and new gates are being installed to allow it to function as a 'semi-wet' facility. The new berth will be served by an overhead gantry crane with a 400tonne lift and carry, and a 500tonne lift capacity, which is currently being built at the yard.

A highly automated painting facility covering around 3300m<sup>2</sup> and incorporating four halls, with heights to 18m, is now operational near to this berth, and this new facility allows all blocks to be painted and finished in enclosed, environment-controlled conditions. Furthermore, a new pipe shop is nearing completion, and an enlarged prefabrication area is being built that will allow all operations to be brought under cover.

Sedef is furthermore buying a multi-wheel Scheuerle block transporter which will have a total capacity of 256tonnes. This will allow the yard to fabricate larger and heavier blocks and move them internally within the yard. At present the maximum size of block that can be constructed is 80tonnes. The upgraded yard will also have the capacity to manufacture up to 40 blocks simultaneously, reducing berth production time quite considerably.

The second phase, due to commence later this year, will include the extension and redevelopment of an existing berth, to the south of the yard, so that it will measure 250m in length and 42m width. Thus Sedef will soon have two new berths, each of 250m length. This area will also be equipped with a 400tonne capacity overhead crane. Phase two will further include the building of additional production line facilities, and the enlargement of an outfitting



An array of gantry cranes at the Kalkavan Sedef yard, which is fully booked through to 2010 with a series of container ships. An additional gantry crane, of 500tonne lift capacity, is under construction.

berth, 8m in width and 60m in length, so that it will measure 200m x 18m. An area of land adjacent to the slipway will also be reclaimed and probably used for hatch cover production.

The Kalkavan Sedef shipyard is fully booked until 2010, building a long series of container ships for its parent Turkon Holdings group. To date, Turkon has contracted Sedef to build a total of 26 container vessels. Of these, 16 will be 1150TEU size - up to the end of May 2006 five of these had already been delivered - while 10 will be of a new 1900TEU design, developed in-house by Turkon in conjunction with Delta Marine. Some of the newbuildings will be used to strengthen the fleet operated by sister company, Turkon Line, while the majority will probably be sold to third parties on completion.

Steel cutting for the first of the 1900TEU vessels, believed to be the largest container ships so far built in Turkey, is scheduled to start around February 2007, and deliveries will begin in the second quarter of 2008. According to Cumhur Kuter, general manager, 'We want to establish Sedef as a leading brand in the container-ship market. We want to be known as a container shipyard, and eventually our aim is to construct vessels up to 4500TEU here'.

Sedef has a long track record building container vessels, as was noted in our 1998 report, and has in the past built ships of around 1000TEU size for Turkon. The first four geared vessels were delivered in 1995 and a subsequent series of similar gearless ships was completed in 2001-2002. 

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## Cement carrier pair from Selah

AS is the case for most Turkish shipbuilders, the Selah Shipyard's core business, at present, is chemical tanker production. However, the yard is also building two 12,500dwt cement carriers for the Greek operator, Nafto Trade. One of these was launched in April this year, and will be delivered in June, while a second is on schedule for completion early in 2007. These cement carriers, designed by Cosnav, of Italy, feature a tailor-made automated screw compressor-based loading and discharge system.

This is the first time Selah has built cement carriers, and the yard reports that it has received further enquiries for this type of vessel. As a result, it is optimistic that more orders will follow.

Meanwhile, chemical tanker production continues. A 4200dwt chemical design for Turkish owners was launched in May this year, and should be handed over before the end of June. Beyond that, Selah has in the past year received contracts to build two 10,200dwt chemical tankers, for delivery to Turkish owners in 2007, as well as a 7500dwt chemical tanker for other domestic interests. These contracts will keep the yard fully occupied until the first quarter of 2008.

During 2005, Selah completed two chemical tankers. *Brovig Wind*, a 4200dwt vessel, was delivered to her Norwegian owner in August, while *Acacia*, a 7200dwt design, was completed for a Turkish owner last November.



One of the two new 12,500dwt cement carriers designed by Italian consultancy Cosnav for Greek owner Nafto Trade, seen on the berth at the Selah Shipyard.

While Selah's main operational focus is in Tuzla, the company is part of a consortium that is planning to develop a second yard, on the Mediterranean sea coast, near Mersin. However, this Akter Shipyard project has been held up by local bureaucracy and environmental protest groups, which have launched a legal battle against the plans. The Selah-led consortium has bought a 47-year

lease on a site within Mersin harbour from the Turkish Government, and the company is confident that the court will eventually rule in favour of the Akter yard project.

To begin with, this 120,000m<sup>2</sup> yard will probably focus on shiprepair activity, for vessels up to 250,000dwt. However, in the longer term the planned floating dock could be used for shipbuilding work as well. ⚓

## Torgem builds to the max

IN 2005, Tuzla's Torgem shipyard secured orders for two 20,000dwt bulk carriers for the Kaptanoglu group, of Turkey. These are of Delta Marine's new NG-BULK20 type (discussed elsewhere in this feature) and the biggest vessels that the yard can build, following the recent widening and lengthening of the company's berth. They are also amongst the biggest commercial vessels ever built in Turkey by the private sector. In recent months, Kaptanoglu has also ordered a 20,000dwt chemical tanker at Torgem, further demonstrating its confidence in the yard's ability to deliver vessels of this size.

Over the past year, Torgem has completed a number of chemical tankers, including two 5850dwt vessels for the Turkish owners, Soli and TVK, a 3300dwt tanker, also for TVK, and a 4850dwt tanker for Admarin. The yard was furthermore used to carry out the conversion and outfitting of a 68,000dwt tanker, *TK New York*, which was brought to Turkey as an uncompleted hull.

As a result of orders secured in the past year, Torgem currently has contracts through to the end of 2007. In addition to the 20,000dwt vessels for

Kaptanoglu, the yard is finishing off a 5850dwt chemical tanker for Marina Shipping, of Turkey, and is currently working on a 5700dwt

multipurpose ship, for another Turkish owner, Atako Shipping, and a further 4850dwt chemical tanker for Admarin. ⚓



Steelwork modules being assembled at the berth head of the Torgem shipyard. Interesting current work at this yard includes construction of the first examples of Delta Marine's new NG-BULK20 double-skin bulk carriers. Two ships are being built for the Kaptanoglu group.

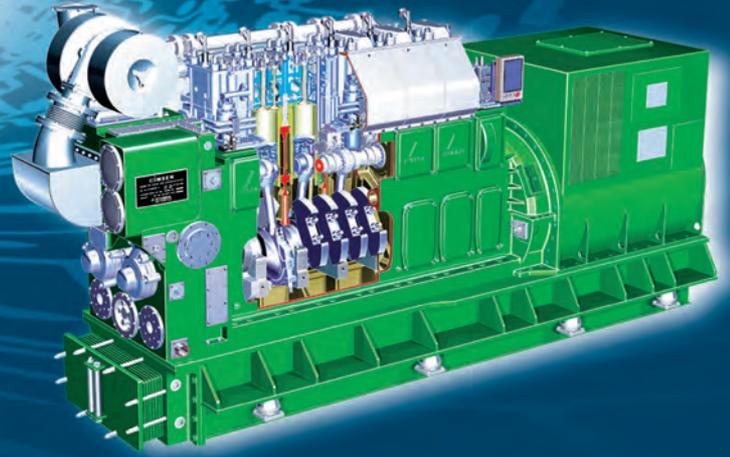
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## Diversification for Delta Marine

**T**HIS year, the Istanbul-based ship design company, Delta Marine, celebrates its 10th anniversary, having been formed by Bulent Sener, chairman, in 1996. Since then, the company has established itself as one of the country's foremost naval architects, developing a wide range of vessel design types.

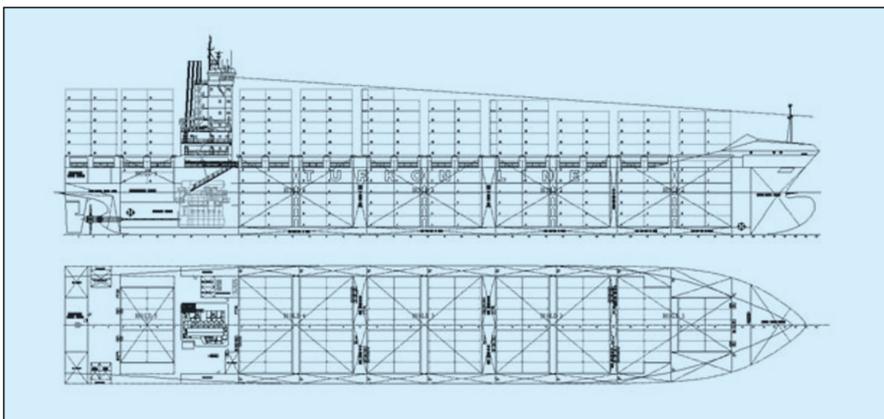
At present, Delta Marine is working on a large number of newbuilding contracts at Turkish shipyards. One of the most notable is a 20,000dwt double-skin bulk carrier design - the NG-BULK20, first presented in *The Naval Architect* November 2005, page 36 - which Delta has developed for the Kaptanoglu group. Currently under construction at the Torgem yard, the first of two vessels is due for delivery in late 2006 and the second should follow in 2007.

As yet unnamed, the bulk carrier is a single-deck, single-screw vessel with a double bottom and double skin. One of the known features of such a double-hull design is that there are no steel structures facing into the cargo holds, nor on the decks, other than brackets and bulwark stiffeners. This approach is aimed at facilitating loading and unloading operations, and also to reduce maintenance requirements.

The newbuilding has four equal-size cargo holds, measuring 28.20m x 21.00m, while the hatch coamings are relatively large at 24.50m x 18.20m. The vessel complies with Bureau Veritas' Heavy Cargo and Grab Loading notations, and the maximum tanktop load for each cargo hold is 18tonne/m<sup>2</sup>. The NG-BULK20 is also equipped with three electric deck cranes, capable of lifting 30tonnes at 28m outreach.

The propulsion system for this new bulk carrier is based on a MAN B&W 8S35MC two-stroke engine which provides for a design speed of 14.50knots. Daily fuel consumption at this speed is said by Delta Marine to be highly economical - around 21tonnes at 85% MCR.

The hull form has been optimised by utilising software developed in-house as well as third-party CFD software. Tank tests carried out at the Bulgarian Ship Hydrodynamics Centre also proved highly successful, Delta Marine points out, with resistance results amongst the best when compared with similar forms in the archive of the Bulgarian laboratory.



Profile and deck plan of the new 1900TEU container ships designed by Delta Marine, which have been ordered by Turkon Lines at Sedef Kalkavan.

### New container ship design

Delta Marine is also developing a 1900TEU container vessel design for Turkon, and a series of these ships will be delivered from the Sedef Kalkavan shipyard commencing in 2007. This design combines a high intake capacity within the vessel's overall length of 182.85m, and a relatively fast service speed of 19.50knots. The vessel, which has 10 container bays, two of which are aft of the superstructure, has capacity for 270 reefer containers, while hold one is dedicated to dangerous goods.

These two projects are particularly significant for Delta Marine since they represent diversification away from the company's traditional focus on tanker design work. According to Mr Sener, 'It is important that we have expanded our portfolio into bulk carrier and container ship design. Until 12 months ago, we did not have these types in our reference list, as the market had pushed us more towards tankers. But now, thanks to Turkon and Kaptanoglu, we have the opportunity to work on these alternative types'.

Notwithstanding this situation, Delta Marine still has a number of significant tanker projects in hand. These include a 20,000dwt ice strengthened chemical/products tanker building at the Soli

Shipyard. Pipes on deck are protected from rough weather conditions by an enclosed catwalk, while full segregation is provided by hydraulically driven submerged cargo pumps installed in every cargo/slop tank.

Other notable current or recently completed projects designed by Delta Marine include the 5850dwt asphalt carrier, *Mar Victoria*, built by the Selah shipyard for Mar Petrol; the 15,500dwt oil/chemical tanker, *Puli*, delivered by Cicek Shipyard to Kaptanoglu, and since renamed *Fionia Swan*; and *FS Charlotte*, a molten sulphur and bitumen carrier recently delivered by Yardimci to Fouquet Sacop, of France (discussed elsewhere in this feature).

One of Delta Marine's strengths is its capability for in-house software development. The company has developed DeltaLoad loading computer software; B\_Surf, for form design, manufacturing and fairing; Delta Hydro, for capacity calculations, hydrostatic, longitudinal strength and launching calculations; and MarineCAD for ship structure modelling and production planning. Further new systems to ease hull design tasks are currently being developed by the company's software engineers and should be available for use in the near future. ⚓

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## Class society enhances capabilities

LEADING class society, The American Bureau of Shipping (ABS), is strengthening its presence in the Turkish market in response to growing demand levels. The society is now providing classification services to a total of 76 new vessels, which are on order for delivery from Turkish yards in 2006-2009. This gives the society around 46% of the current Turkish order book, and makes it the second largest class society in that market, behind Bureau Veritas.

In line with the market overall, chemical/product tankers make up the biggest single category of the ABS workload in Turkey; however, the society has also received a contract to class a total of 24 container vessels ordered at the Kalkavan Sedef shipyard by the Turkon group. Four of these ships have been delivered already and the others will follow over the next three to four years.

ABS also has more than 20 vessels contracted for building by the Yardimci group. This includes 11 oil/chemical carriers, three cement carriers, and a series of eight container vessels



ABS country manager Muzaffer Artun (left) signs a contract to class a long series of container ships at the Kalkavan Sedef shipyard, represented by general manager Cumhuri Kuter (right).

of around 1000TEU capacity. Other notable contracts signed in recent months include the series of four LPG carriers which will be built to joint RINA and ABS class at the Madenci Shipyard on the Black Sea for G & H Shipping (*The Naval Architect* March 2006, page 41).

The society also classed jointly, again with Registro Italiano Navale, *Ottomana*, which at 27,000dwt is the largest vessel yet built by a commercial yard in Turkey. ABS is also dual-classing an 18,000dwt chemical tanker for the same Italian owner, again at Celik Tekne.

In response to the positive market conditions in Turkey, ABS is enhancing its role within the country. Until two years ago, the society did not have a technical office for plan reviews in Istanbul, despite having had a presence there since the 1950s. This work was instead carried out by the ABS regional head office in Piraeus.

Since early 2005, ABS engineers have been transferred to Istanbul to set up an engineering office, while local surveyors have received training in London and Piraeus for equipment reviews and other tasks. There are at present four engineers in the ABS Istanbul office and these can carry out vessel plan reviews, as well

as material and equipment certification. In addition, there are 14 active surveyors based in the city.

Country manager, Muzaffer Artun, says, 'This initiative has been very beneficial. Having the technical engineering office makes it easier for us to provide assistance to vessel designers, as we can discuss issues with them and help to resolve any problems much more quickly than before. We also now have better liaison with owners ordering in Turkey as well.'

This is particularly the case for Turkish owners who, because of the particular *modus operandi* in domestic yards, often have to take a direct

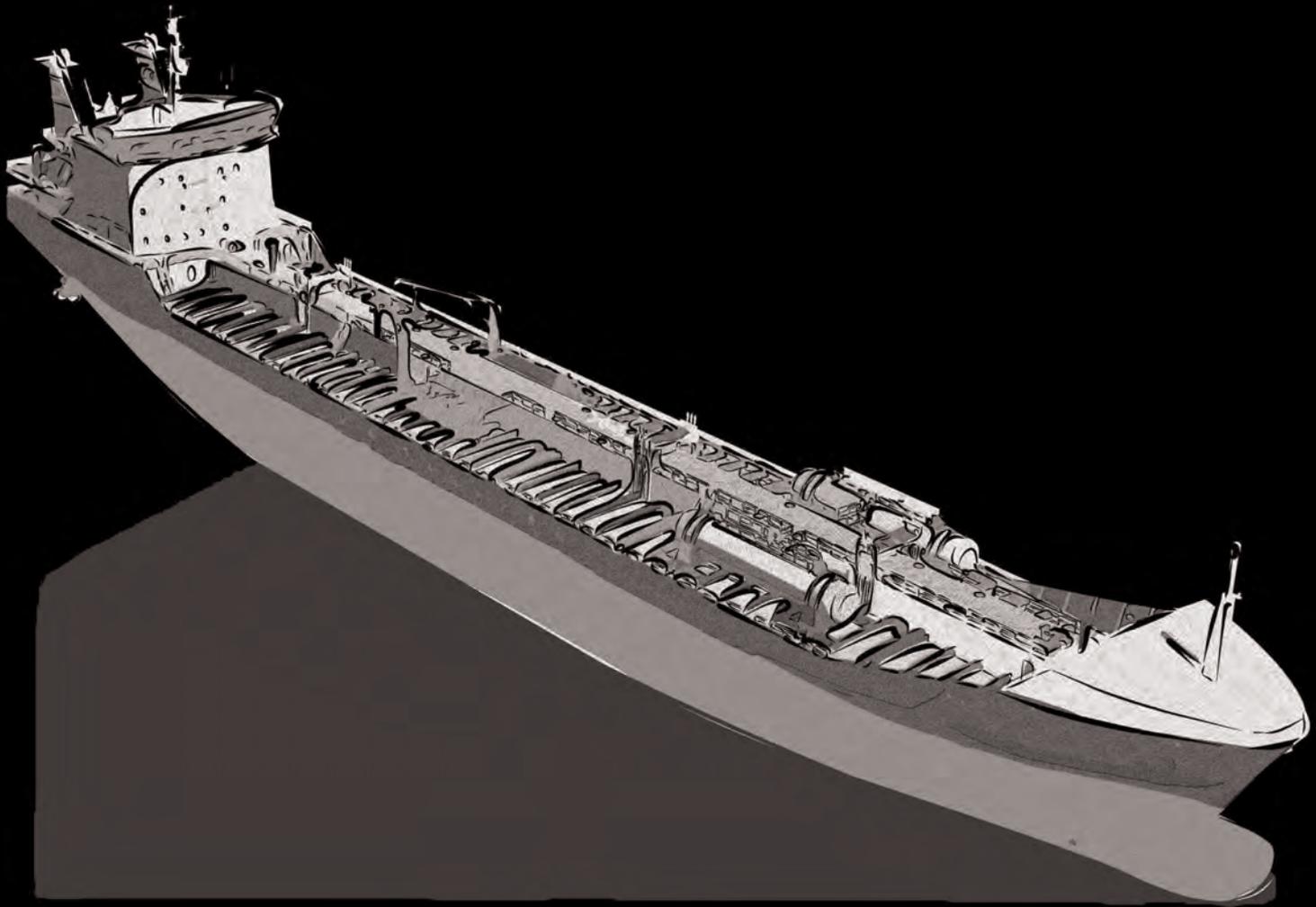
responsibility for importing materials and equipment for their vessels. As a result, they often need greater technical advice and assistance than overseas owners, and ABS is now in a much better position to provide that service.

Mr Artun says, 'Without doubt, having the technical office has helped us to gain market share in Turkey, step by step. We aim to increase the number of projects where the technical review is undertaken in Turkey to at least 50% of the total, and to do this we will continue to increase the capacity of our technical office here in Istanbul.'

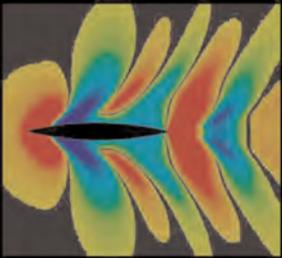


Located in the Dardanelles, near Gallipoli, the Gelibolu shipyard is currently building two 8100dwt shallow-draught dry cargo vessels. Seen here (top) on the berth is *Azov Concept*, recently launched and expected to be delivered shortly; her sister, *Azov Confidence*, should follow by October 2006. The yard is also working on a self-propelled offshore accommodation barge (bottom), which is expected to be completed later this year.

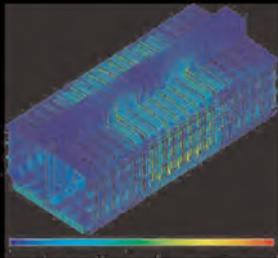
Gelibolu covers an area of 50,000m<sup>2</sup>, and has three berths, each measuring 130m x 30m. In addition, the yard has 8000m<sup>2</sup> of covered workshops available.



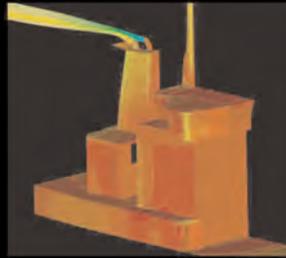
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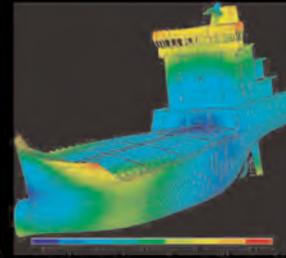
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## FS Charlotte delivered by Yardimci

ONE of the most significant ships delivered from Turkey this year is *FS Charlotte*, an 11,000dwt molten sulphur and bitumen tanker. Designed by Delta Marine, of Istanbul, she was handed over to her owner, Fouquet Sacop, of France, in March 2006, by the Yardimci shipyard group. One of only very few vessels of this type in service worldwide, *FS Charlotte* is now on long-term charter with Total.

She is a single-decked, single-screw tanker, with a double bottom and double skin and has a total 11 cargo tanks and two slop tanks. Six of the cargo tanks are designed to carry molten sulphur (1.80tonne/m<sup>3</sup>) at 180°C and five to carry bitumen (1.30tonne/m<sup>3</sup>) at 250°C. The cargo tanks are fully independent of the hull structure, and mounted on special supports, to allow for expansion of the cargo at high temperatures, and so *FS Charlotte* is, effectively, a triple-hull ship.

Each of the cargo tanks, which can expand up to 80mm, weighs around 400tonnes, and this presented a significant challenge to the designers. The Ulepsi tank support system from the Dutch company Beele Engineering was selected for the vessel, and was able to demonstrate that it could meet this very specific requirement, after extensive strength, thermal and CFD analysis.

The cargo discharge system is based around four Bornemann hydraulic pumps in two separate pumprooms. Two of the pumps have a capacity of 400m<sup>3</sup>/h, for bitumen; and two are rated at 337m<sup>3</sup>/h for molten sulphur.

Considerable attention also had to be paid to the effectiveness of the tank insulation system, so that in the event of any technical problems, the temperature can be maintained sufficiently to keep the cargoes liquid, allowing them to be pumped out ashore. The daily cargo heat loss, in the event of a failure of the heating system, is said to be only 1°C.

Delta Marine points out that the hull form of *FS Charlotte* has been designed to minimise resistance and there are no steel structures facing into the cargo tanks. The company further says that the overall design provides an 'environment-friendly, cost-effective, reliable, and flexible unit'.

At present, Yardimci has some 23 other vessels confirmed on order for delivery in 2006 and 2007. These are primarily being built at the



The 11,000dwt molten sulphur/bitumen tanker *FS Charlotte* is one of the most interesting ships delivered from a Turkish yard this year. She was completed in March by the Yardimci Shipyard for the French owner, Fouquet Sacop. Six cargo tanks are designed for transporting molten sulphur at 180°C, with five further spaces for bitumen at 250°C.

Yardimci and Turkter yards, the latter having been acquired by Yardimci in 2004. However, a number of vessels are being at least partly fabricated at the Torlak and Dearsan yards in Tuzla, through subcontract agreements.

The majority of ships on order are chemical tankers, including a series of eight ships for the Clipper group, which range in size from 3500dwt to 10,000dwt, plus two more vessels for Fouquet Sacop. The French owner has placed orders for a 3900dwt bunker tanker, due for delivery in May 2006, and a 7500dwt chemical tanker that will be handed over next year.

Herning Shipping is another significant overseas customer for Yardimci, and this company has three 3500dwt chemical tankers on order with the group for delivery in 2006-2007. Also on the Yardimci orderbook are three cement carriers, one of 9000dwt and two of 6000dwt size, for Greek interests, for a charter to Lafarge. The largest ships being built by Yardimci, however, are two 17,000dwt chemical tankers for the Turkish owner Dunya Denizcilik.

Yardimci is also shifting back into container-ship construction. So far, one 970TEU vessel has been booked for 2007 delivery, to the group's own account, and this is expected to be followed by further vessels of this type in 2008 and 2009.

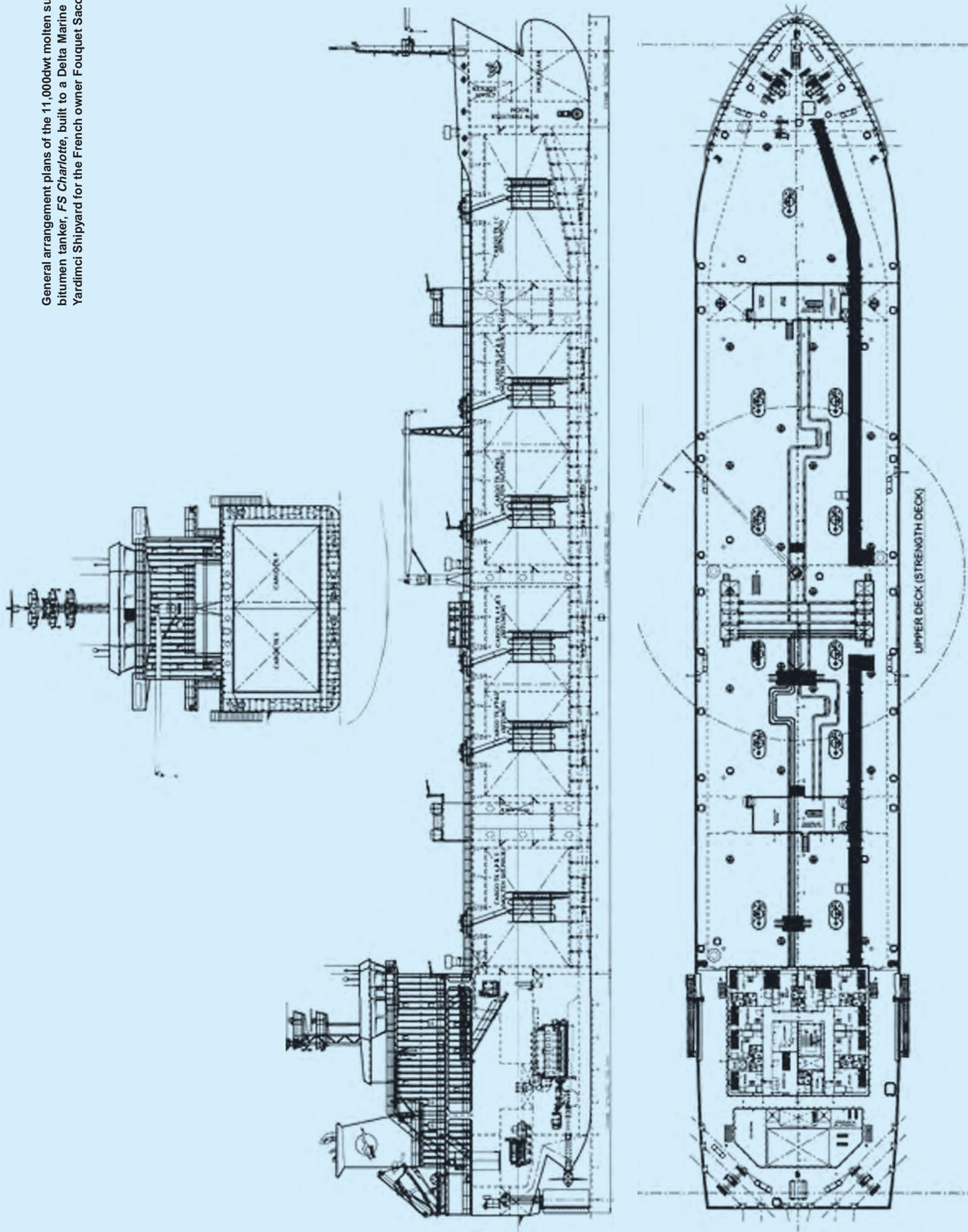
Managing director, Servet Yardimci, reports that 'Our focus will remain on chemical carriers since we have great expertise in this sector and can benefit from economy of scale. However, we were a significant container-ship builder in the 1990s and would also like to return to this market'.

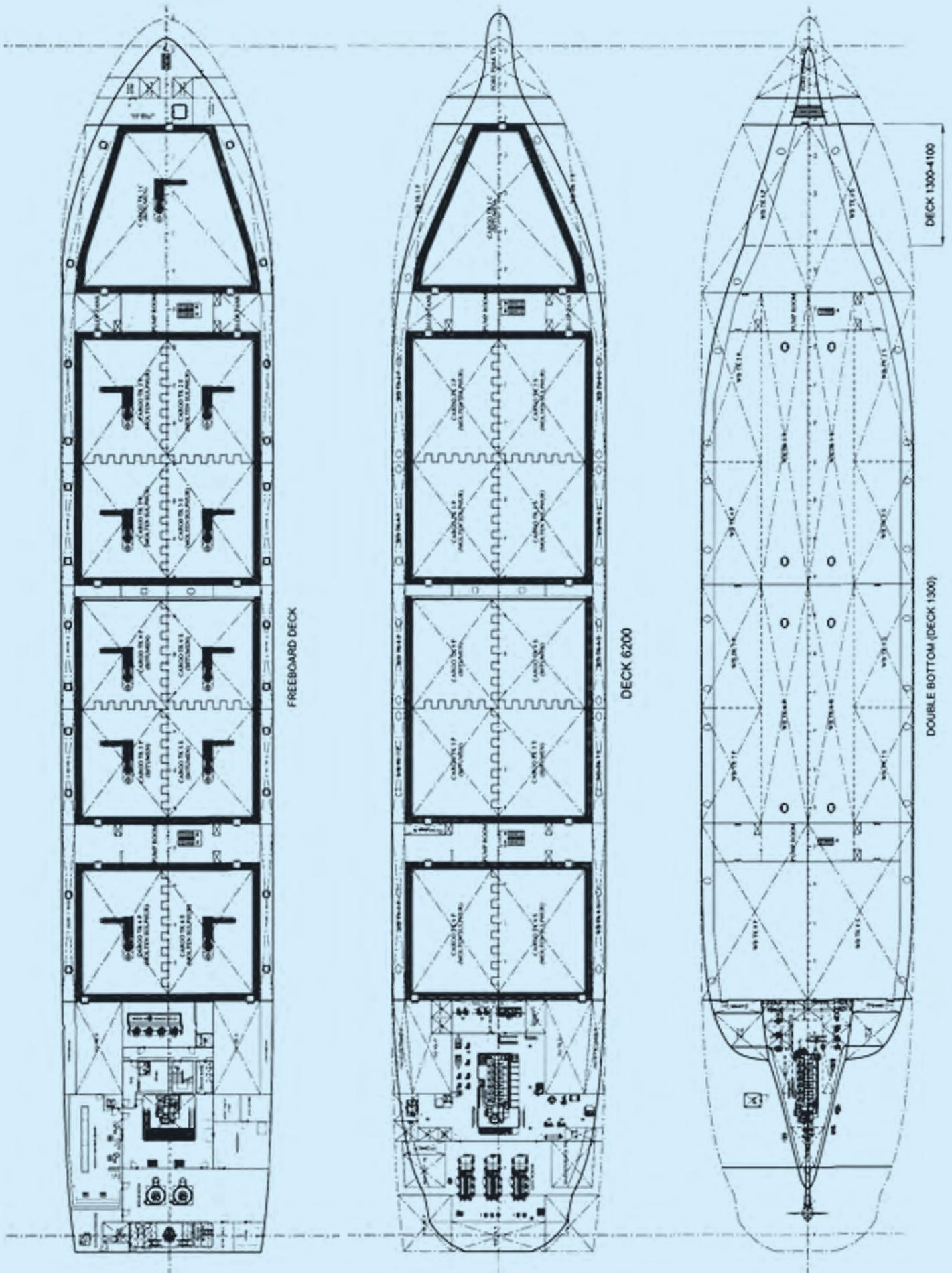
In terms of investment, Yardimci is concentrating largely on modernising the Turkter site. A 400tonne gantry crane has been installed here, for example, while the berth has been increased in length and new CNC cutting tools have been acquired. Yardimci has also bought an area of land close to its Tuzla shipyards and is using this for block construction and prefabrication activity, to overcome space limitations at Tuzla. ⚓

### TECHNICAL PARTICULARS FS CHARLOTTE

Length, oa.....	129.00m
Length, bp.....	123.90m
Breadth, moulded.....	22.00m
Depth, moulded to upper deck....	12.50m
Draught, design.....	7.80m
Draught, scantling.....	8.20m
Deadweight, design draught... ..	11,000dwt
Deadweight, scantling draught.....	11,500dwt
Cargo capacity.....	10,900m <sup>3</sup>
Speed, 85% MCR.....	14.00knots
Main engine.....	MaK 6M43
Output.....	5400kW

General arrangement plans of the 11,000dwt molten sulphur and bitumen tanker, *FS Charlotte*, built to a Delta Marine design by Yardimci Shipyard for the French owner Fouquet Sacop.





## New yards take shape

**T**ODAY, a number of new shipyard projects are currently in various stages of progress in Turkey, and two of the furthest advanced are those being developed by Soli Shipping and Medmarine. In both cases, steel cutting has started, and the first complete vessel deliveries should be made next year.

Soli has established a yard in the free zone area near Izmit, and this has a maximum newbuilding capacity of around 45,000dwt. The yard is at present building a series of three 20,000dwt chemical tankers, designed by Delta Marine, for its own account.

Soli Shipyard covers an area of 102,000m<sup>2</sup> and has 20,000m<sup>2</sup> of workshop space. The building berth measures 200m x 56m, and Soli can assemble two vessels simultaneously here. A 600tonne capacity gantry crane is under construction and should be erected by the end of June.

The Eregli shipyard is a new yard being developed by Medmarine on the Black Sea coast. Facilities here include 17,000m<sup>2</sup> of covered workshop areas and two berths, 220m x 38m in dimension. As such, Eregli will be capable of building vessels up to Panamax size.

The site covers a total area of 160,000m<sup>2</sup>, making it one of the biggest in Turkey. Steel processing capacity will, Medmarine says, be around 25,000tonnes annually, and the yard is expected to be self-sufficient in terms of shotblasting and painting processes.

It is expected that when fully operational, the yard will employ around 1200 persons, excluding subcontractors. The main aim is to build chemical tankers, container ships, multi-purpose ships, and LPG tankers, as well as tugs and offshore supply vessels.



## Milestone reached by Celik Tekne

**I**N January this year, the Celik Tekne yard achieved an important milestone, both for itself and for Turkish shipbuilding generally, when it delivered *Ottomana*, a 27,000dwt double-skin, IMO Type II chemical/product carrier. This is believed to be the biggest vessel yet built by a private Turkish shipyard. She is 169m long overall and can sail at 15.50knots, powered by a 7860kW main diesel engine and CP propeller. This propulsion plant is notable that the main engine is a Japanese Mitsubishi two-stroke design (6EUC50LSII model), built under licence by Manises, in Spain, and believed to be the first Mitsubishi engine ever to be assembled in Europe.

Owned by Mediterranea di Navigazione, *Ottomana* is also notable as she marks the first time that the Italian classification society Registro Italiano Navale has issued a 'Green Passport' to an Italian ship. The document and associated review scheme are said to bring to life the voluntary IMO scheme to document all hazardous material built into a ship, leading to more environmentally-conscious ship recycling. *Ottomana* was presented in *Significant Ships of 2005*.

Celik Tekne is one of Turkey's biggest shipyards, and has one of the longest confirmed order books, with a total of 13 vessels booked for delivery between January 2006 and February 2008. Ten of these are IMO II chemical tankers, ranging in size from 5500dwt to 27,000dwt. In addition to *Ottomana*, Celik Tekne is building another, 18,000dwt, chemical tanker for



The 27,000dwt Type II chemical/product tanker *Ottomana* is believed to be the largest commercial vessel built in Turkey to date. She was delivered last year by the Celik Tekne yard for the Italian owner Mediterranea di Navigazione.

Mediterranea, as well as two 17,000dwt vessels for Turkish interests. The company's orderbook

also includes three 13,000dwt general cargo ships.



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## Combined chemical and gas tanker from Tersan

**T**HE Tersan shipyard in Tuzla is working on an interesting project to build a twin-skeg, shallow-draught 10,800dwt chemical/oil products/LPG tanker for the French owner, Petromarine. Due for delivery in April 2007, the design of the Bureau Veritas (BV)-classed *Lamentin* is the result of close collaboration between owner, shipyard, and the local Navtek design company.

This vessel features two 500m<sup>3</sup> LPG gas tanks mounted on deck, as well as 12 main cargo tanks with a total capacity of around 11,200m<sup>3</sup>. *Lamentin* is also unusual in that it will be one of the first cargo ships to have BV's Clean Ship Super notation, which is generally applied to passenger vessels. This designation has been achieved through the incorporation of a continuous monitoring system for exhaust gas.

The LPG tanks will be built in Turkey, while the gas systems, including pumps and compressors, will come from The Netherlands. Navtek managing director, Orkun Ozek, says, 'This project shows the value of Turkish yards working with Turkish designers. Tersan only received the contract in October 2005, yet it will be delivered in early 2007. The collaboration between the designer and yard, made possible because of our close proximity, is an important factor in the rapid turnaround of the project'.

Tersan is also currently putting the finishing touches to two 6477dwt river/sea tankers, *Lankera* and *Baku*, which will be delivered



The last in a series of 6477dwt river/sea tankers for Azerbaijan interests is seen here on the berth at the Tersan yard.

shortly to Azerbaijani interests. These are the last in a series of 10 of these vessels which the yard has built over the past three years.

In addition, the yard has recently launched a 4700dwt chemical tanker which will be completed in August. Tersan is now marketing this vessel, built to a new design developed by Navtek, to interested owners.

Also on the Tersan order book at present are three further 11,000dwt chemical carriers for Petromarine. These will be built to a similar design to *Lamentin*, but without the LPG capability, and are due for delivery in 2007-2008.

### Virtual rebuild for yard

Since acquiring the former Ada Marine yard in Tuzla two years ago, Tersan has invested heavily in an upgrade, virtually rebuilding it. Facilities created include a new 140m long, 27m wide berth and more than 4000m<sup>2</sup> of covered painting

and fabrication halls. In addition, several new cranes, with lift capacities up to 200tonnes, have been installed.

Tersan is also working to develop a new site, the Bogazici Shipyard, at Yalova on the Marmara Sea. This project has been held up by local planning regulations, but preliminary construction work is now in progress, and Tersan hopes to have the yard operational in 2007.

Facilities at this 250,000m<sup>2</sup> complex will eventually include a 220m long, 35m wide drydock which will be equipped with a 400tonne capacity overhead gantry crane. To begin with, however, the yard will utilise a shiplift measuring 140m x 75m that has a lift capacity of 15,000tonnes, and this has already been acquired on a second-hand basis.

Tersan says that although the yard will be able to build ships up to 55,000dwt in size, the intention is to concentrate on building specialised vessels of up to 25,000dwt. 

### TECHNICAL PARTICULARS *LAMENTIN*

Length, oa.....	119.45m
Breadth.....	20.00m
Depth.....	9.00m
Draught, summer.....	7.70m
Deadweight, summer.....	10,800dwt
Total tank capacity, 98% full.....	12,443m <sup>3</sup>
Main engines.....	2 x MaK 8M25
Output.....	2 x 2400kW
Auxiliary engines.....	Yanmar, 3 x 850kW
Speed.....	14.00knots



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## Um Shipyard and Volharding joint venture flourishes

UM Deniz Sanayi, located in Izmit, around 90 minutes drive from Istanbul, has the potential to become one of the country's most significant newbuilding yards over the next few years. Built originally in the early 1990s by the Um Shipping group, which at the time aimed to build VLCCs on the site, the yard has taken a long time to develop fully, partly due to damage sustained in the 1999 earthquake.

One of the largest and most modern shipyards in Turkey, the yard occupies an area of around 300,000m<sup>2</sup>, and has covered building facilities of approximately 40,000m<sup>2</sup>. Production facilities include fully automated profile and panel lines, and a large twin berth measuring 360m in length and 60m wide, which is served by an overhead crane with a lift capacity of 510tonnes. This is believed to be the largest sloping berth in Turkey and one of the largest in Europe.

In 2005, production resumed at Um Shipyard in earnest, largely as a result of a joint venture established with the Dutch Volharding group, named Volum. This venture is supervising all of the current newbuilding work being carried out at the yard, which is exclusively for Volharding.

The first two vessels, both 12,000dwt product tankers, are nearing completion on the berth and are due to be launched very shortly. Um Shipyard will deliver the hull, complete with propeller, shaft, and all piping, to Volharding, which will install the main engine and complete the final outfitting in The Netherlands, before delivery to a German owner.

Um Shipyard is also now working on a series of 917TEU container vessels to a relatively new Volharding design. Two of these vessels are currently on the berth and are due for delivery later this year, and work on two further sisters is expected to commence shortly. Four of these vessels are for the Dutch owner J R Shipping.

In this case, Um Shipyard will deliver the complete vessels, and all of the necessary outfitting work will be carried out in Turkey. Indeed it is the intention that Um Shipyard will only deliver complete vessels for Volharding in the future. More details of these ships can be found in *The Naval Architect's* May feature on The Netherlands.

To assist with this process, a self-sustained production barge that was previously in use in Holland, to outfit hulls built in the Ukraine, has recently arrived at Um Shipyard. After some docking work, this barge will be put into service at the Turkish yard later this year to help provide the necessary outfitting capacity.

Though the yard can, in theory, build relatively large vessels, the intention of the Volum joint venture is to focus on the smaller specialised types for which Volharding is renowned. So far, the yard has confirmed orders for 12 vessels, including container ships and multipurpose vessels, to be delivered in 2006, 2007, and 2008. The expectation is that a further 15 vessels at least will be built here through to the end of 2010.

New investment is now being made to upgrade the yard and allow it to undertake the significant newbuilding programme envisioned by



The Um Shipyard is one of the largest and most modern in Turkey; today, it is now being further upgraded to ensure efficient production for a series of 917TEU container ships to be constructed to a design from the Dutch shipbuilder Volharding. Seen here on the twin adjacent berths are the yard's first two vessels: 12,000dwt tankers for a German owner.

Volharding. The berth has recently been completed and slipway gates that will allow vessels to be floated out have been constructed. Work is also in progress on the development of support facilities, including a new fabrication hall, block production facilities, and warehousing, while new cutting machines and robot welding machines have also recently arrived on site. Most of the block and panel production at the Um shipyard can now be carried out under cover, in a highly automated environment, with final assembly on the slipway.

Um Shipyard has brought in a number of contractors from overseas to supervise out key tasks. These include Marine Services Noord (MSN), for piping, Muhlan, of Germany, for

painting, and Eekels, from The Netherlands, for electrical work. However, all of these companies utilise Turkish labour, and the yard currently has a total workforce of around 700 on site.

Chief executive officer Murat Megencioğlu points out, 'The Um shipyard has around 500 persons on the payroll and that makes us different to other yards in Turkey, which normally use subcontracted labour. We can see a strong future for the yard and aim to train and develop this core workforce'. In this context the Um group is planning to sponsor marine engineering courses at the nearby Kocaeli University to provide a pool of qualified and skilled labour in the vicinity over the coming years. 

## Admarin extends its activities

**S**TRATEGICALLY located in Tuzla, close to most of the country's leading shipyards, Admarin is one of Turkey's foremost ship designers. Originally founded by Altan Demirsoylu, company chairman, in 1978, Admarin has since designed a wide range of vessel types, including container ships, tankers, ro-ro vessels, yachts, and naval craft. The company claims a number of 'firsts', including designing *Ilona Theresa*, a 2500dwt chemical tanker delivered to Unifleet in 1994, which was the first chemical tanker to be exported from Turkey.

This was followed by a number of other export contracts, including the 5600dwt chemical tankers, *Emilia Theresa* and *Bitten Theresa*, which were delivered to Herning Shipping in 1996 and 1997 respectively, and a series of tankers for both Unifleet and Herning that were built between 1998 and 2001 by RMK Shipyard. Admarin also designed *Laila Teresa*, the first ice class 1A and stainless steel cargo-tank vessel built in Turkey, which was delivered to Herning Shipping in 2002.

The company's main focus is on designing commercial cargo vessels, and Admarin currently has more than 30 vessels under construction in Turkey, to which it is providing design and consultancy services. These are being built at a number of yards, including the Turkter, Torgem, Ceksan, and Anadolu yards in Tuzla.

In recent times Admarin has developed its own fleet by producing a 3450dwt chemical tanker design, the first of which, *Serra D*, entered service last year. Two larger vessels of a similar design, the 6100dwt *Kerem D* and *Isil D*, are now under construction, and these are scheduled for delivery in August 2006 and February 2007 respectively. Other notable design developments highlighted by the company include a 10,500dwt/11,500dwt chemical tanker which has proved very successful, with orders for 12 vessels, and a number of 18,000dwt-20,000dwt tankers for the vegetable oil trades.

### Leading role in new shipyard

Admarin is now taking its involvement in the shipbuilding industry a stage further by taking a leading role in a project to develop a new shipyard in the Free Zone area at Kosbas, in Kocaeli, Izmit Bay, at a total cost of around US\$20 million. The Admarin Shipyard, which also has another Turkish design company, Navtek, as a partner, has recently started operations and has contracts to build a total of six vessels.

This includes two 20,000dwt chemical tankers and two 11,000dwt vessels for Tekne Shipping, which will be built to designs supplied by Admarin. In addition, the yard is building one 10,500dwt chemical tanker for TB Shipping and an 18,000dwt chemical tanker for Aldemar Shipping, an associate company of Admarin.

The Admarin Shipyard features a twin berth, 170m in length and 50m wide, which can build two hulls simultaneously. In theory, it could be used to construct vessels up to 80,000dwt, but Mr Demirsoylu says the intention is to focus primarily on ships in the 5000dwt to 20,000dwt range. ⚓



The 1850dwt *Montipora* is an IMO Type II chemical tanker designed by Admarin and built at the RMK yard. She has since been sold to Highlander Shipping, part of the UK Crescent Shipping company, and is on charter to BP.

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### Ro-ro packages for Superspeed pair

The turnaround efficiency of two fast ro-pax ferries, ordered by Color Line from Aker Finnyards, will be assisted by ro-ro cargo access/transfer systems designed, and to be installed, by MacGregor. The ferries will link Norway and Denmark.

To be built by Aker Finnyards' Rauma facility for handover in 2007 and 2008, each 211m long vessel is designed to carry 1800 passengers and 2km of trailers at a service speed of 27knots. The first delivery will be deployed on the Kristiansand-Hirtshals route and her sister on the Larvik-Hirtshals route, their size and speed injecting a substantial increase in traffic capacity between the countries.

The ro-ro system will have access arranged at both bow and stern. The main elements of each outfit will comprise: bow door, bow ramp/door, stern ramp/door, hoistable tilting ramp, front door, liftable bulwark, hoistable car deck and deck access ramps, and tilting access ramp to car deck. MacGregor will also supply pilot/bunker and passenger doors as well as the hydraulic power packs to operate all this equipment.

*Contact: Göran Hugon, area sales manager, ro-ro ships, MacGregor Group. Tel: +46 31 850 812. Fax: +46 31 428 825. E-mail: goran.hugon@macgregor-group.com*

### 10-year anniversary celebrated with new US factory

Ayres Composite Panels, the Australian interior panel manufacturer, celebrates 10 years in business this year and in March opened Ayres Composite Panels, in Morgan City, USA. New machinery for this factory was purpose-built, and the facility passed its US Coast Guard-required audit with positive comments reportedly made by the auditors.

The USA is seen as a growing market for lightweight panel systems. It is hoped that, with keen interest being shown by the US military, and ever-increasing requirements for lightweight vessels in the USA, the new factory will be very busy.

*Contact: Ayres Composite Panels, 25 Clune Street, Bayswater, Western Australia 6053. Tel: +61 8 9279 3426. Fax: +61 8 9279 6192. www.ayrescom.com*

### Electrical power contracts worth US\$110 million

ABB, the power and automation technology group, recently announced that it has been awarded contracts worth US\$110 million to supply electrical power systems for 12 vessels and five offshore drilling platforms.

The ABB orders, all booked from January to March 2006, include a total electrical power system package for a second drilling vessel (the first option) for Norway's Mosvold Drilling Ltd, under management of Jon Fredriksen-



Seen here is a typical product from the US company Wright Computer Products Inc, which specialises in customised shipboard storage solutions. This particular inside-corner 'view-port' desk and shelf unit comes from a durable series suitable for ships of all types.

*Contact: Wright Computer Products Inc, P O Box 565, Woodbury, NJ 08096-7565, USA. E-mail: wcpinc@bellatlantic.net www.wcp-usa.com*

controlled SeaDrill Ltd, to be built at Samsung Heavy Industries, South Korea, with vessel delivery in December 2008.

In addition, a total electrical power system package will also be supplied for the second drilling vessel (the first option) for Stena Drilling Ltd, a subsidiary of Stena AB in Sweden, to be built at Samsung Heavy Industries, South Korea, with the vessel set for delivery in the first quarter of 2009.

Diesel-electric propulsion systems for two 157,000m<sup>3</sup> liquefied natural gas (LNG) carriers being built for MISC at Mitsubishi Heavy Industries' shipyard in Nagasaki, Japan will also be supplied by ABB. These will be the first LNG carriers in Japan, which will be delivered in December 2008, to be equipped with a state-of-the-art diesel-electric propulsion system.

*Contact: ABB Marine & Turbocharging. Tel: +47 90 84 73 21. Fax: +47 22 35 36 80. E-mail: terje.strand@no.abb.com*

### Fire detectors for new Chinese ferries

Apollo Fire Detectors' policy of ensuring that its ranges of conventional and intelligent fire detectors meet all major international approvals standards has helped to win a major marine contract in China. The Tianjin Xingang shipyard awarded the contract to supply an intelligent fire detection system for *Liao Hai*, a new ro-ro ferry, through Apollo's local representative.

*Liao Hai* measures 115m long and 21m wide, and has the capacity to transport 650 people and approximately 100 lorries. The fire detection system includes around 200 Apollo intelligent detectors, including multisensors, which have been approved for marine applications by the China Classification Society, following additional tests specific to the marine environment.

Most of the detectors to be used on the ferry have been fitted using Apollo's deckhead mounting base. This is a robust back box, made from either aluminium or polycarbonate, for use with standard 100mm detector bases. Fixing points are external, enabling a seal to be maintained, and therefore providing protection against contaminant ingress into the rear of the base. These boxes are particularly useful when securing bases to rough surfaces or in areas where there may be dripping water.

*Liao Hai's* fire detection system allows a two-minute delay in the event of an alert so that an incident can be investigated. If the alert is genuine, the system then proceeds to raise the alarm. Apollo zone monitors with inbuilt isolators have been installed to enable the fire

detection system to interface with other critical equipment onboard. A fire alarm triggers a preset sequence of events to ensure that passengers can be evacuated safely. Actions include operating fire doors and dampers, and closing down air conditioning fans to the passenger and car decks to prevent the spread of smoke.

*Contact: Apollo Fire Detectors Ltd, 36 Brookside Road, Havant, Hampshire PO9 1JR, UK. Tel: +44 23 9249 2412. Fax: +44 23 9249 2754. www.apollo-fire.co.uk*

### New name for power conversion solutions company

The company formerly known as Alstom Power Conversion, has now become Converteam. This name change has been made to better reflect the firm's shareholder shift and the new status as a stand-alone company, it is claimed.

Converteam operates in three core markets: marine and offshore, particularly with electrical propulsion systems for civil and military vessels; oil and gas, and process industries; and several other markets such as renewables and wind, test benches, and power generation.

Converteam employs more than 3300 people in its locations around the world: France, Germany, the UK, USA, Brazil, China, and India.

*Contact: Nathalie Renard, communications director, Converteam Group SAS, 9 rue Ampère, 91345 Massy cedex, France. Tel: +33 1 60 13 26 40. E-mail: nathalie.renard@converteam.com www.converteam.com*

### Italy: new target for ship handling equipment company

TTS is set to establish an office in Genoa, Italy, with a company that will focus on sales and service of ships equipment and cargo handling systems. This has come about through a wish to strengthen its market position in southern Europe, and around the Mediterranean.

The new company will also specialise in delivery of equipment for megayachts, one of TTS' focus areas. TTS Ships Equipment GmbH, in Bremen, has already had extensive deliveries in this area, and is actively focussing on marketing and sales of its products to owners and yards in Italy.

There is also great potential for maintenance and after-sales activities with regard to marine cranes and equipment for ro-ro vessels. TTS also believes that there are opportunities for its systems for cargo

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# SIGNIFICANT SHIPS OF 2005

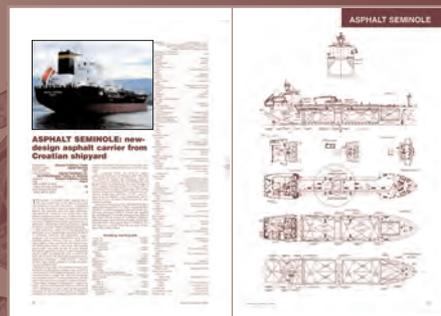
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*Contact: Göran Hugon, area sales manager, ro-ro ships, MacGregor Group. Tel: +46 31 850 812. Fax: +46 31 428 825. E-mail: goran.hugon@macgregor-group.com*

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ABB, the power and automation technology group, recently announced that it has been awarded contracts worth US\$110 million to supply electrical power systems for 12 vessels and five offshore drilling platforms.

The ABB orders, all booked from January to March 2006, include a total electrical power system package for a second drilling vessel (the first option) for Norway's Mosvold Drilling Ltd, under management of Jon Fredriksen-



Seen here is a typical product from the US company Wright Computer Products Inc, which specialises in customised shipboard storage solutions. This particular inside-corner 'view-port' desk and shelf unit comes from a durable series suitable for ships of all types.

*Contact: Wright Computer Products Inc, P O Box 565, Woodbury, NJ 08096-7565, USA. E-mail: wcpinc@bellatlantic.net www.wcp-usa.com*

controlled SeaDrill Ltd, to be built at Samsung Heavy Industries, South Korea, with vessel delivery in December 2008.

In addition, a total electrical power system package will also be supplied for the second drilling vessel (the first option) for Stena Drilling Ltd, a subsidiary of Stena AB in Sweden, to be built at Samsung Heavy Industries, South Korea, with the vessel set for delivery in the first quarter of 2009.

Diesel-electric propulsion systems for two 157,000m<sup>3</sup> liquefied natural gas (LNG) carriers being built for MISC at Mitsubishi Heavy Industries' shipyard in Nagasaki, Japan will also be supplied by ABB. These will be the first LNG carriers in Japan, which will be delivered in December 2008, to be equipped with a state-of-the-art diesel-electric propulsion system.

*Contact: ABB Marine & Turbocharging. Tel: +47 90 84 73 21. Fax: +47 22 35 36 80. E-mail: terje.strand@no.abb.com*

### Fire detectors for new Chinese ferries

Apollo Fire Detectors' policy of ensuring that its ranges of conventional and intelligent fire detectors meet all major international approvals standards has helped to win a major marine contract in China. The Tianjin Xingang shipyard awarded the contract to supply an intelligent fire detection system for *Liao Hai*, a new ro-ro ferry, through Apollo's local representative.

*Liao Hai* measures 115m long and 21m wide, and has the capacity to transport 650 people and approximately 100 lorries. The fire detection system includes around 200 Apollo intelligent detectors, including multisensors, which have been approved for marine applications by the China Classification Society, following additional tests specific to the marine environment.

Most of the detectors to be used on the ferry have been fitted using Apollo's deckhead mounting base. This is a robust back box, made from either aluminium or polycarbonate, for use with standard 100mm detector bases. Fixing points are external, enabling a seal to be maintained, and therefore providing protection against contaminant ingress into the rear of the base. These boxes are particularly useful when securing bases to rough surfaces or in areas where there may be dripping water.

*Liao Hai*'s fire detection system allows a two-minute delay in the event of an alert so that an incident can be investigated. If the alert is genuine, the system then proceeds to raise the alarm. Apollo zone monitors with inbuilt isolators have been installed to enable the fire

detection system to interface with other critical equipment onboard. A fire alarm triggers a preset sequence of events to ensure that passengers can be evacuated safely. Actions include operating fire doors and dampers, and closing down air conditioning fans to the passenger and car decks to prevent the spread of smoke.

*Contact: Apollo Fire Detectors Ltd, 36 Brookside Road, Havant, Hampshire PO9 1JR, UK. Tel: +44 23 9249 2412. Fax: +44 23 9249 2754. www.apollo-fire.co.uk*

### New name for power conversion solutions company

The company formerly known as Alstom Power Conversion, has now become Converteam. This name change has been made to better reflect the firm's shareholder shift and the new status as a stand-alone company, it is claimed.

Converteam operates in three core markets: marine and offshore, particularly with electrical propulsion systems for civil and military vessels; oil and gas, and process industries; and several other markets such as renewables and wind, test benches, and power generation.

Converteam employs more than 3300 people in its locations around the world: France, Germany, the UK, USA, Brazil, China, and India.

*Contact: Nathalie Renard, communications director, Converteam Group SAS, 9 rue Ampère, 91345 Massy cedex, France. Tel: +33 1 60 13 26 40. E-mail: nathalie.renard@converteam.com www.converteam.com*

### Italy: new target for ship handling equipment company

TTS is set to establish an office in Genoa, Italy, with a company that will focus on sales and service of ships equipment and cargo handling systems. This has come about through a wish to strengthen its market position in southern Europe, and around the Mediterranean.

The new company will also specialise in delivery of equipment for megayachts, one of TTS' focus areas. TTS Ships Equipment GmbH, in Bremen, has already had extensive deliveries in this area, and is actively focussing on marketing and sales of its products to owners and yards in Italy.

There is also great potential for maintenance and after-sales activities with regard to marine cranes and equipment for ro-ro vessels. TTS also believes that there are opportunities for its systems for cargo

handling in ports around the Mediterranean. In Italy, as well as in other EU maritime nations, work is continually being carried out to try and relieve traffic on road networks through 'marine motorways'. This, however, requires solutions that increase the speed of loading and discharging of goods, and such systems are delivered by TTS.

Contact: Johannes D Neteland, president and chief executive officer, TTS Marine ASA.  
Tel: +47 55 94 74 02.  
E-mail: johannes.neteland@tts-marine.no

**Hatlapa acquires new business division**

From April 1 2006, the managing partners of Hatlapa Uetersener Maschinenfabrik GmbH & Co KG (Hatlapa) took over KGW Schweriner Maschinenbau's (KGW) ship technology and cargo handling division. This was then integrated into a newly founded company, KGW Marine GmbH, located in Schwerin.

Around 20 KGW employees, covering sales, design and development, as well as service

and commissioning personnel, will remain with the new company, keeping responsibility for existing orders. The production facilities completely remain in the hands and under management of KGW, and production of marine products will mostly be carried out at Schwerin.

Contact: KGW Schweriner Maschinenbau GmbH, Tornescher Weg 5-7, D-25436 Uetersen, Germany.  
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# No-water-ballast tanker – a new concept from Japan

The Shipbuilding Research Centre of Japan is proposing a remarkable new environment-friendly idea - the NOBS, a vessel that does not need to carry water ballast. Although mainly being considered for large oil tankers, the principles are applicable to other ship types.

NORMAL oil tankers or bulk carriers always need to carry some ballast water at some time, to maintain a necessary draught for safe navigation and to avoid bow-foot slamming and propeller racing when the ship is empty of cargo. When a ship is empty of cargo, ballast water is pumped in to ensure structural integrity, and when she loads cargo, that ballast water is discharged. Today, there is additional concern that when ballast water is discharged, change and destruction of ecosystems may arise due to reproduction of marine microorganisms that may be carried in water which has been taken on in other parts of the world.

The International Convention for the Control and Management of Ship's Ballast Water and Sediments was adopted at IMO in February 2004. This Convention requires that a ship's ballast water is to be exchanged with sea water, with hopefully lesser contents of marine micro-organism, in the open sea, also that a ballast water treatment system is to be provided.

To overcome these problems, The Shipbuilding Research Centre of Japan (SRC) has developed a remarkable new ship, the so-called Non-Ballast Water Ship (NOBS) concept. This aims to maintain sufficient draught to avoid slamming in the forward bow area and propeller racing when a ship is empty of cargo, by modifying the hull design. SRC has been carrying out the research and development into NOBS oil tankers and bulk carriers since 2001, and the patent applied for the concept has been submitted to major countries throughout the world.

Moreover, since 2003, R&D into large oil tankers has been promoted by Japan Ship Technology Research Association as a national project under the initiative of the Ministry of Land, Infrastructure and Transport, supported by the Japan Railway Construction, Transport and Technology Agency, The Nippon Foundation, and also by private enterprise. In addition, up to 2005, three major Japanese organisations have been involved: Mitsubishi Heavy Industries Ltd, IHI Marine United Inc, and Nippon Kaiji Kyokai (ClassNK), working in association with the Shipbuilding Research Centre of Japan. Now, the Non-Ballast Water Ship has been confirmed as suitable for practical use.

### Concept of NOBS hull design

The main feature of the NOBS is a transversely raked bottom - required to maintain a draught in order to sail safely without ballast water. The resulting decrease in displacement was compensated for by widening the breadth.

Comparison of Particulars (Initial Planning)		Suezmax Tanker		VLCC	
		Conventional Ship	NOBS	Conventional Ship	NOBS
Length, bp		265.00m	267.00m	316.00m	317.50m
Length, at water line		271.00m		322.50m	
Breadth, moulded		43.00m	56.00m	60.00m	70.00m
Bottom raking		0°	15.2°	0°	10.8°
Diameter of propeller		8.60m	7.70m	9.50m	8.55m
Loaded condition	Draught	16.00m		19.10m	
	Displacement	160,000tonnes	162,500tonnes	300,000tonnes	303,000tonnes
Empty condition		With ballast	Without ballast	With ballast	Without ballast
	Draught at AP	8.82m	7.90m	9.74m	8.76m
	Draught at FP	5.84m	3.00m	7.04m	3.10m
	Displacement	68,650tonnes	28,100tonnes	122,370tonnes	50,000tonnes
	Ballast water	43,050tonnes	0	75,370tonnes	0

Fig 1. Proposed outline dimensions for a NOBS Suezmax tanker and a VLCC, compared with conventional hulls.

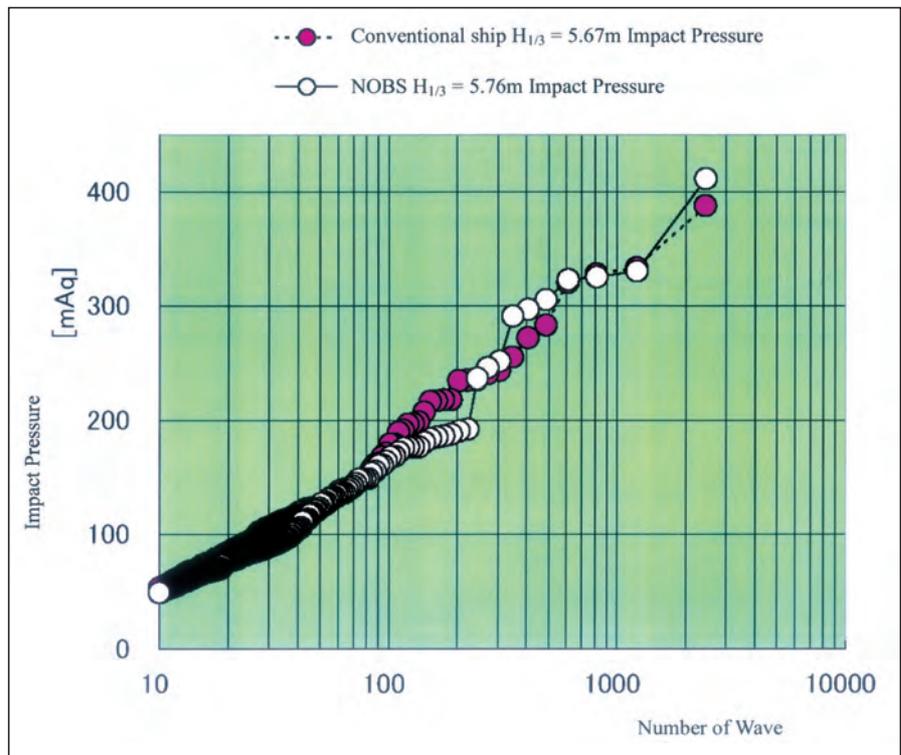


Fig 2. Comparison of wave impact pressure in the forward bow area.

Specifically, NOBS has a hull design with a wider breadth than a conventional ship, a larger transverse bottom rake in order to ensure displacement around the draught, and a fat body in way of bow and stern areas in order to distribute the displacement, all these being combined with a smaller and efficient propeller.

### Objectives of development

Through R&D on this project carried out since 2001, it was decided that larger ships such as

Suezmax tankers and VLCCs should be selected to be developed as NOBS vessels (Fig 1), since many items were to be considered and also the most effective benefits could be expected. To avoid slamming in the forward bow area and propeller racing when a ship is in the empty condition and bearing in mind the known effects of this phenomena and the navigational records of conventional oil tankers, the following objectives were set for NOBS development: *continued*

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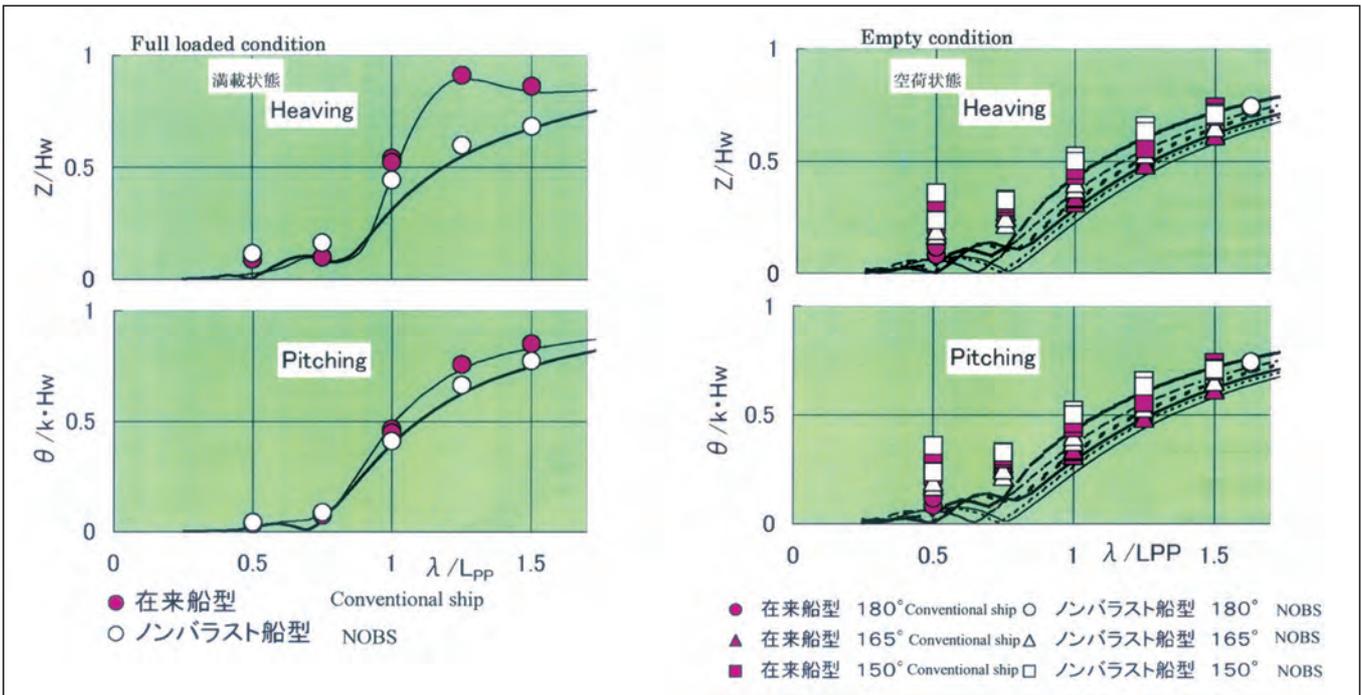


Fig 3. Comparison of ship motion in fully loaded and empty conditions for a NOBS and a conventional ship.

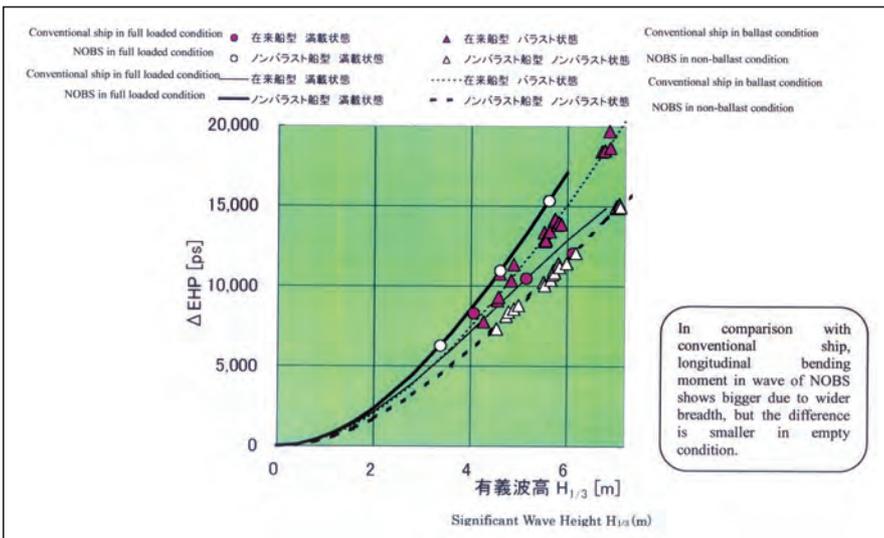
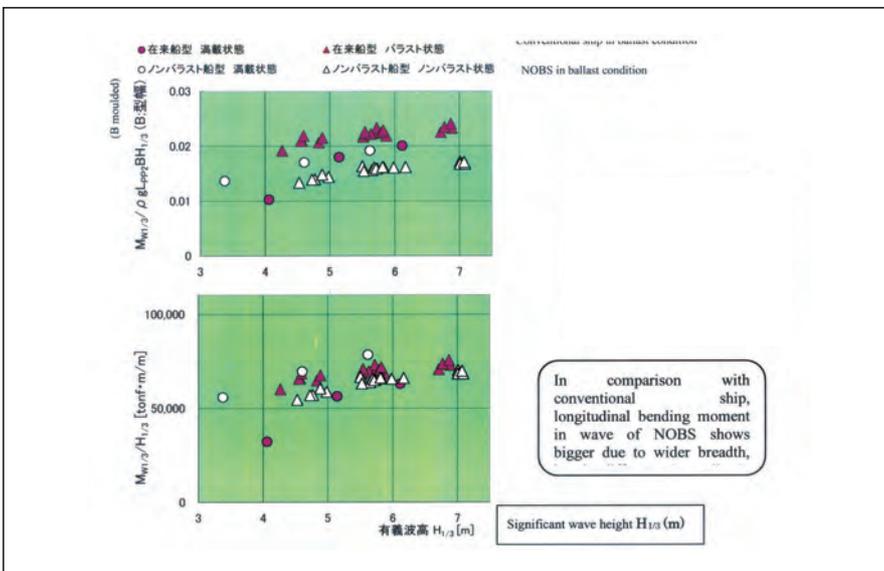


Fig 4. Comparison of the increase in wave resistance for a conventional ship and a NOBS.



- in an empty condition without ballast water, safe operation of a NOBS ship must be proven under normal sea conditions with a 3m draught at the forward perpendicular and full immersion of the propeller - as with a conventional ship in the ballast condition
- a NOBS has to maintain a necessary draught for safe navigation in very rough weather conditions with approximately one quarter of the ballast water that a conventional oil tanker would carry
- compared with a conventional ship of the same deadweight, NOBS should have at least a 5% energy saving
- the strength of the hull structure of a NOBS should be satisfactory and must comply with all regulatory requirements
- the seaworthiness of a NOBS is to be sufficiently maintained
- a NOBS with its wider breadth is to keep equilibrium against rolling
- a NOBS is to have favourable manoeuvrability to comply with the requirements of IMO Resolution A.137(76) 'Standards for Ship Manoeuvrability'
- the costs of construction and maintenance of a NOBS are to be 'considered sufficiently'.

**Results of research**

Following comparison tests carried out on model NOBS ships against conventional ships in relation to propulsion efficiency in still water, increase of resistance in wave, dynamic motion in waves, and wave loads, the following are confirmed:

- frequency and impact pressure of bow-foot slamming and propeller racing in non ballast water condition of a NOBS indicate similar values of those of conventional ships

Fig 5. Comparison of wave longitudinal bending moments for a conventional ship and a NOBS.



Fig 6. Manoeuvrability calculations for a NOBS.

application of a NOBS in lieu of conventional ships, in both main engine power and fuel consumption

- the strength of the hull structure of a NOBS was confirmed to be sufficient under every expected voyage condition
- ship's motion, increase of resistance, and wave longitudinal bending moment character of a NOBS are on the same level as those of conventional ships, and there are no problems in seaworthiness (Figs 3, 4, and 5)
- a NOBS shows a large decrease ratio in rolling motion, therefore bilge keels will not be required
- a NOBS has favourable manoeuvrability characteristics, with stabilised heading to clear the requirements of IMO's Resolution for 'Standards for Ship Manoeuvrability' (Fig 6)
- although the weight of the hull structures will be increased by the reinforcement against an increase in the longitudinal bending moment caused by the extra hull breadth, it is expected that this disadvantage can be compensated by improvement in the propulsion performance.

Further results of experimental tests are shown in Figs 6A, 6B, 6C, and 6D.

**Toward the practical use of a NOBS**

Research has now been proved that the new-concept NOBS tanker is capable of sailing safely as an ocean-going ship without ballast water in consequence of the study of the principal dimensions, hull design, and that the objectives of the R&D have been achieved. On the basis of these good results, outline designs for a Suezmax tanker and a VLCC have been drawn up and are illustrated in Figs 7 and 8.

In addition, the transfer of ballast water possibly containing undesirable marine microorganism can be completely eliminated. A NOBS would be free from the requirements of the Ballast Water Management regulations, which are being considered at IMO to be mandatory; thus, this evolutionary new concept is expected to contribute greatly to marine environmental preservation as a totally new and environment-friendly ship type of the next generation.

**Anticipation of NOBS in other ship types**

As mentioned above, the practical use of NOBS is confirmed for larger oil tankers. Bulk carriers and container ships, also medium and small oil tankers, have been excluded from the three-year research project, however, other research has been progressed with shipbuilders, and results have been obtained. On the basis of these, the Shipbuilding Research Centre would consider the possible merits and disadvantages of a NOBS as follows:

- since NOBS only requires approximately one quarter of the ballast water of a conventional oil tanker, it is expected that the

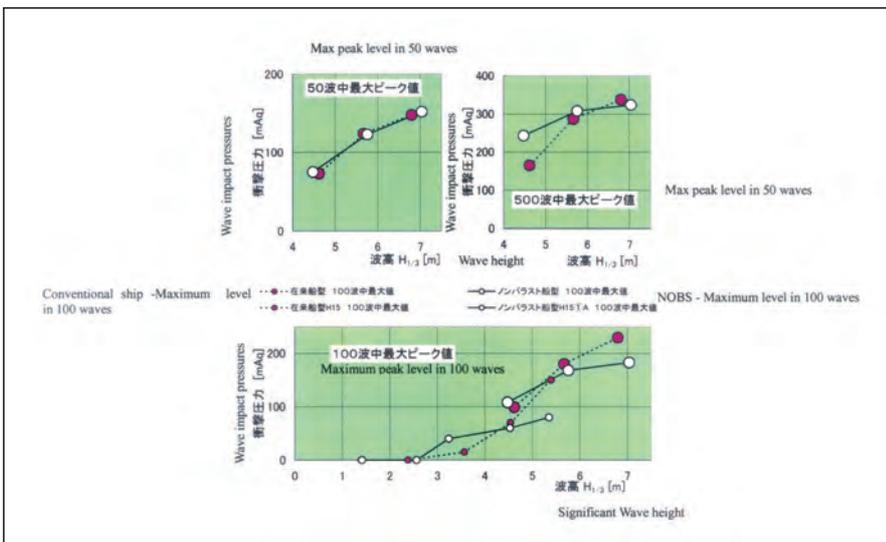


Fig 6A. A more detailed comparison of tank tests for wave impact pressure in the forward bow area.

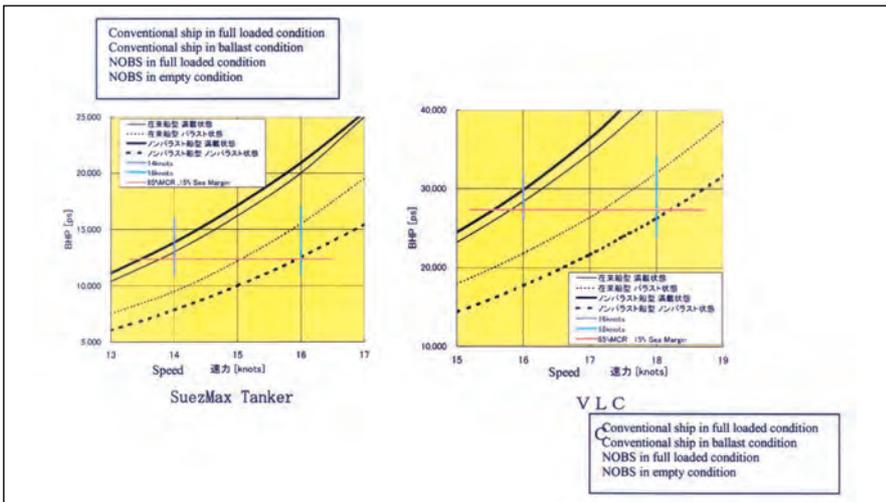


Fig 6B. Comparison of the required power for a NOBS compared with a conventional ship.

at normal ballast condition (Fig 2). This means that a NOBS is capable of sailing safely as an ocean-going ship without ballast water, in the same way as conventional ships with ballast water of 30%-40% of the displacement

- it was confirmed that a NOBS maintains a necessary draught for safe navigation in

very rough sea conditions with approximately one quarter of the ballast water of a conventional oil tanker

- the propulsion performance of a NOBS in loaded condition was shown to be satisfactory, but in an empty condition it improved, on average by 6.4%. The conclusion is that energy can be saved by

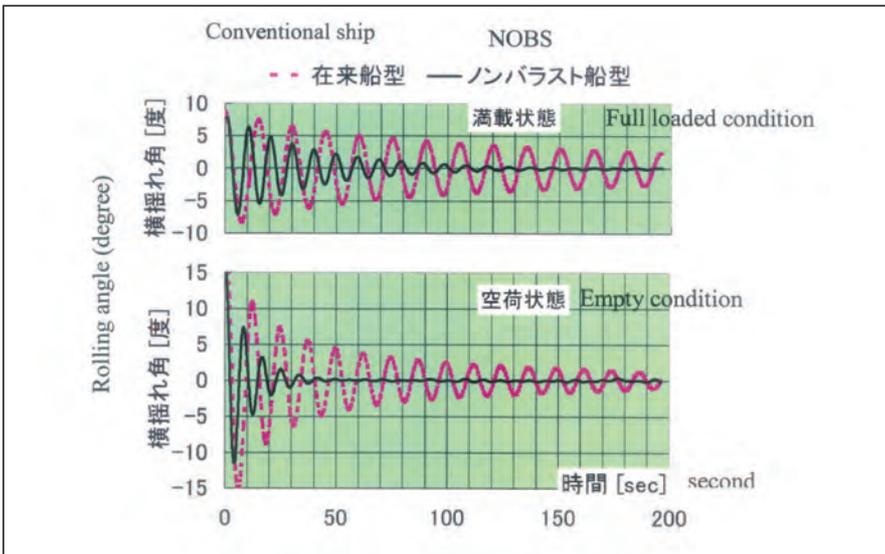


Fig 6C. Rolling motion test comparison.

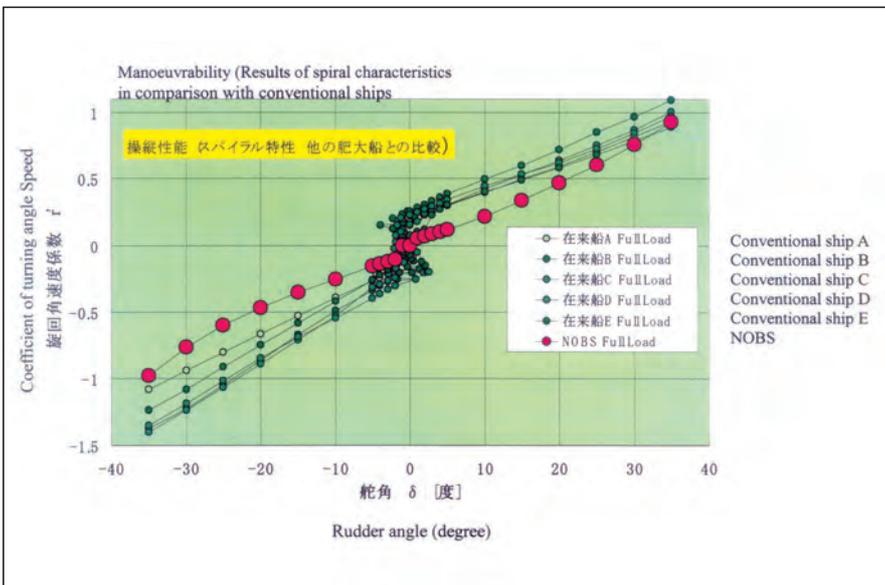


Fig 6D. Results of manoeuvrability simulations by the planar motion mechanism (PPM) test system.

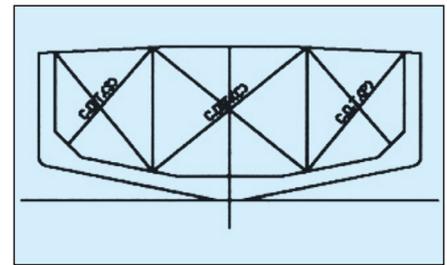
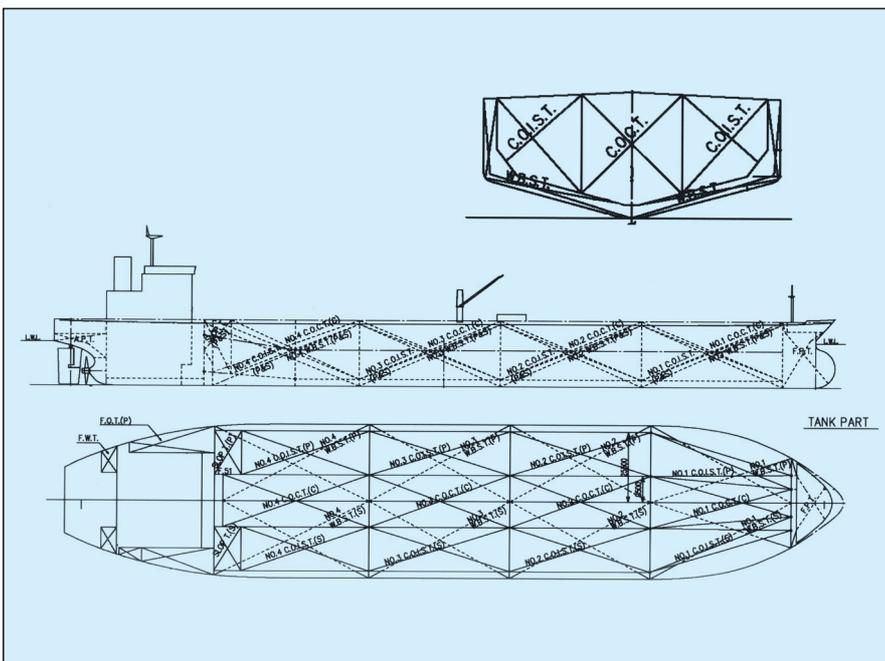


Fig 8. Preliminary cross-section for a NOBS VLCC.

cost of construction and maintenance could be reduced by 5% by virtue of reduced coating of ballast tanks, and a reduction of the installation of treatment equipment to comply with IMO's Resolution on Ballast Water Management, as adopted in February 2004

- it is expected that the propulsion performance of NOBS in an empty condition should also be improved since the results of model tests for a large oil tanker show reductions of more than 6% over conventional ships
- the weight of hull structures will be increased by 10% due to reinforcement against the extra longitudinal bending moment, resulting from the wider hull breadth (at present understandings), ie,  $Lw \propto (B + D)$ . However, from an owner's economic point of view, studies may be undertaken to achieve reduced lightweight by reduction of steel volume without losing strength
- during construction and in drydock for repairs it will be necessary to arrange different sizes of blocks to support the raked bottom plating.

In an economic comparison of NOBS with conventional ships, the increase of construction costs due to an increase in hull weight would be expected to be re-paid in only a few years as a result of further study. This recent research into NOBS was confined to a type of ship with a raked bottom and a broader hull. However, it is hoped to extend research into a type of ship with a raked bottom and a deeper draught.

This would have a different hull design but producing the same effect as NOBS, depending on the specification. Any operational and harbour restrictions would have to be taken into consideration.

Lastly, it is expected that the outcome of the R&D project will be reflected to early construction of a NOBS ship. This will consequently contribute to the global marine environmental preservation, while answering the needs for ballast water management now under consideration at IMO.

Fig 7. Preliminary dimensions, together with a profile, tank plan, and cross-section for a Suezmax NOBS tanker, showing the transverse rake.

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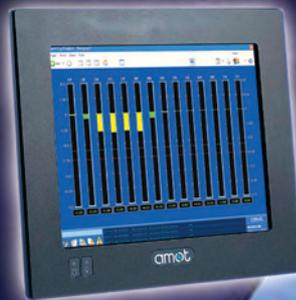
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## Tank-gauge technology to meet latest regulations

**A**N entirely new concept in digital monitoring technology for marine tank gauging, to meet the newest regulations, is being launched by UK company PSM Instrumentation Ltd. This new iCT range of sensors and monitoring instruments claims to cut costs and to provide accurate and reliable data; pressures and temperatures are covered as well as levels.

The range of sensor utilises a combination of hydrostatic pressure, TDR radar, and acoustic wave, and is suitable for nearly all types of vessel and offshore platforms. All sensors can be connected to a common field bus, thus saving cabling and installation time. Programming is carried out remotely and directly onto the bus, again saving time on set-up and calibration.

The data and processing capability of the new iCT sensors is claimed to bring new and unique benefits to owners and operators. One example is that, by harnessing GPS satellite communications, it will be possible for an office ashore to check bunkers routinely for capacity and consumption in real time. For the first time, transfer of such data will be, says PSM, at a viable cost.

**With its new range of iCT tank sensors, PSM Instrumentation claims to be offering important new benefits to owners.**



## New range of gas-freeing fans

**A**NEW series of fans specially designed to ventilate atmospheres in confined spaces, such as cargo and ballast tanks, and to supply fresh or drying air, has been launched by Alfa Laval, of Tumba, Sweden. Sufficient power is provided to direct air flow to large tank bottom spaces, thus avoiding the risk of vapour pockets accumulating. Time spent on gas-freeing operations should be significantly reduced, claims the manufacturer, due to the high performance offered.

Both water-driven and air-driven models are offered. The A6K-S unit is air-driven, supplied from a working deck line, while the W14K-AL and W8K-AL are both water-driven units that use water from a deck fire line to drive the motor. All water used remains outside the air stream, thus reducing the risk of water mixing with air and which may be statically charged.

All three models are said to be lightweight and easy to operate despite a heavy-duty construction. They are all designed to fit a standard 318mm deck opening and are approved by Bureau Veritas.

**This A6K-S model is air-driven and is one of three efficient gas-freeing fans newly launched by Alfa Laval.**





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## Mechanical transmissions from Rolls-Royce

THE combination of a medium-speed engine, a reduction gearbox, and a CP propeller continues to be a cost-effective and efficient solution to marine propulsion. Within specific power limits, Rolls-Royce can provide all the components, either as individual pieces of equipment or as systems, and they also form an important part of design and equipment packages from UT-Design.

For general offshore, fishing, and merchant vessel applications, the company specialises in single-input, single-output gearboxes. Reduction ratios of the smaller units in the range allow the main engine to run at the preferred speed, generally in the range 720rev/min to 1000rev/min, while an efficient large propeller is turned at its optimum speed. The two largest frame sizes, the 4500 and 6000, cover ratings from around 6000kW to 12,500kW and are mainly intended for engines running at 500rev/min-600rev/min, with appropriate reduction ratios.

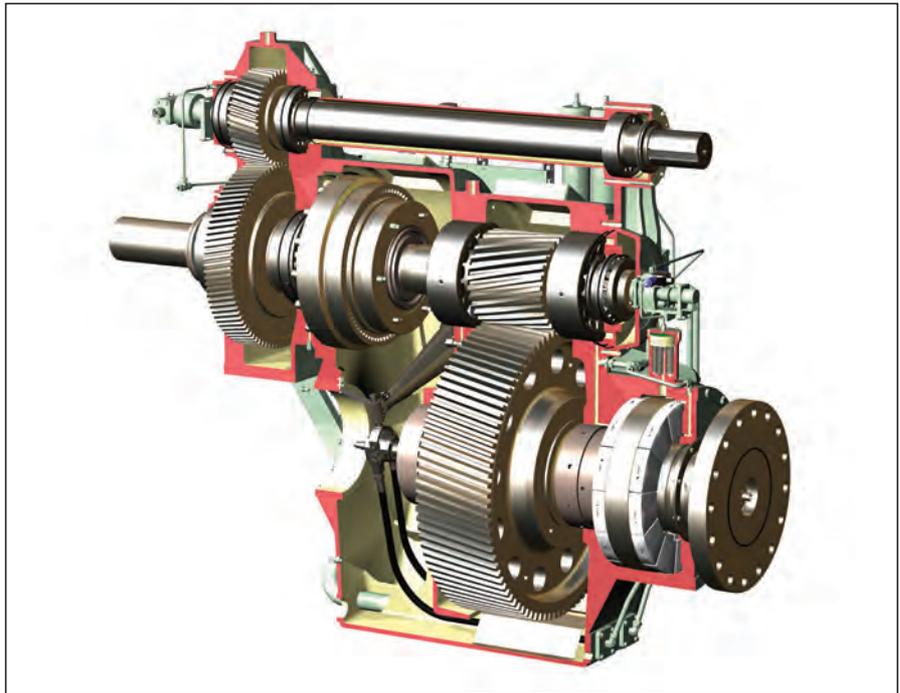
Many installations have used mechanically operated pitch control for the CP propeller hub where the hydraulic servo mechanism is housed in the main wheel of the gearbox and a rod connects this to the mechanical pitch-setting components in the hub. Today, there is a move to standardise on hydraulically operated propeller hubs, where all the hydraulic pitch-setting mechanism is contained within the hub.

Hydraulic power for such a system is derived from a gearbox-driven pump. With the latest system, in the unlikely event of hydraulic failure, the propeller pitch remains at its last setting for safety's sake. Special valves minimise the amount of energy required to generate the necessary hydraulic actuating pressures. They also hydraulically lock the chosen pitch setting accurately, again reducing energy consumption, especially in vessels where the propeller may remain at the same pitch for days on end.

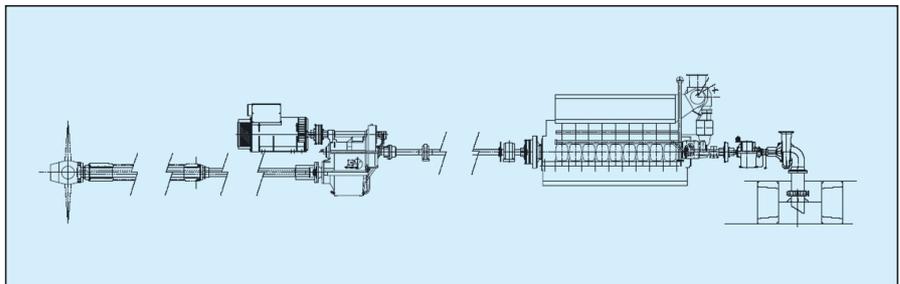
A typical gearbox in the AGSC range has the input shaft vertically offset above the output shaft, but versions offset horizontally to port or starboard are also in the portfolio. The gearbox incorporates a multi-plate clutch so that the engine can be disengaged from the propeller shaft.

For offshore and fishing applications a primary power take-off is popular. This is built-in as part of the gearbox and enables a shaft generator to be run from the main engine. In this case, the power take-off is driven from the input side of the clutch so that the generator turns whenever the engine is engaged. For some applications, particularly merchant vessels, a power take-off on the output side is preferred, since an alternator, which can also function as a motor, can provide a power-take-in capability to give propulsion redundancy.

At present, the main gearbox range covers input torques from 10kNm to 300kNm. In due course, two new models will be put on the market, AG550 and AG650. These will supplement the current 600-size gear, with a maximum single-stage reduction ratio of 6.2:1, enabling faster running engines to turn large propellers more efficiently.



A section through a typical Kamewa Ulstein gearbox with single-stage reduction, clutch, and primary power take-off.



One shaftline of a Rolls-Royce UT 755 offshore supply vessel showing the main components. The shafts and stern tube have been shortened.

Several of the gearbox sizes in the Rolls-Royce product range from Kamewa Ulstein can be specified with an optional two-stage reduction to give an even larger choice of ratios. In addition, Allen Gears in the Rolls-Royce group also provides gearboxes for special applications such as naval vessels.

A good example of the application of Rolls-Royce gearboxes is in the very popular offshore platform supply vessel, the UT755, designed and equipped by Rolls-Royce. No fewer than 100 of these versatile offshore support vessels have been built or ordered since its introduction in the 1990s. Number 100 will be a UT755LC model, to be built by Simek for Myklebusthau Offshore, in Norway.

This vessel will have twin-screw propulsion assisted by four tunnel thrusters, two forward and two aft. Each propeller shaftline comprises a Bergen C25:33L8P diesel engine producing

2320kW and coupled to a Kamewa Ulstein reduction gear which, in turn, provides output to a 2.9m diameter Kamewa Ulstein CP propeller.

The AGSC 600 gear will incorporate a primary power take-off for an 1800kVA shaft generator. The two shaft lines will be the same but with handed rotation. This arrangement will provide a speed of around 15knots and the main engines can be operated at variable speeds between 750rev/min and 900rev/min.

Given a typical offshore supply vessel operating pattern, reduction in engine speed combined with the optimum propeller pitch will provide a lower overall fuel consumption. The electrical system is designed to accept variable frequency from the shaft generators.

Where azimuth thrusters are used for propulsion, they incorporate their own gear reduction and, with CP propellers, will provide full manoeuvring capability. A good example of

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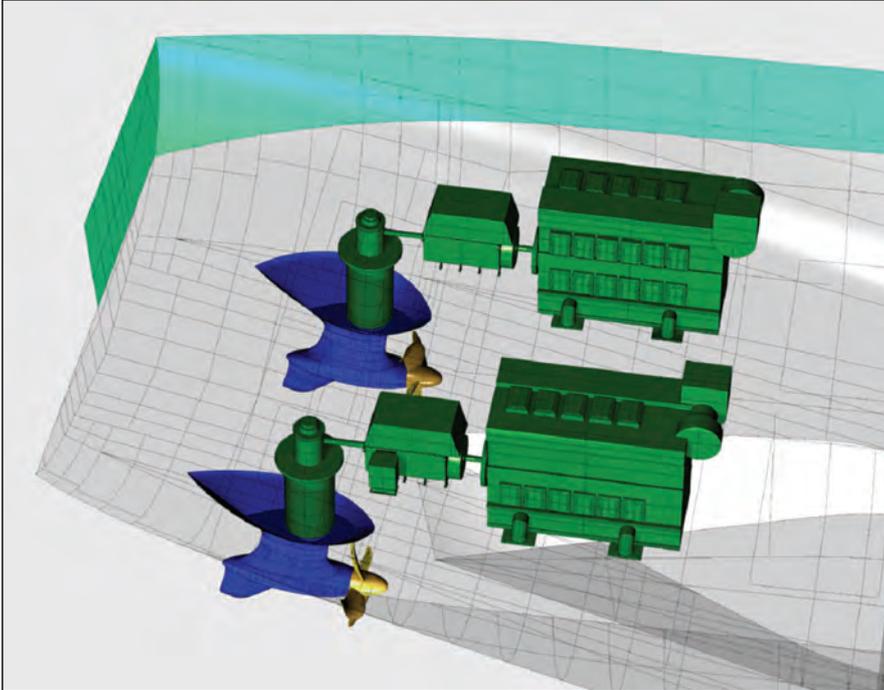
innovative thinking in this direction is a product tanker for Bergen Tankers now nearing completion at the RMK yard, in Turkey. The design of both the 4250dwt vessel itself and its propulsion system is by Rolls-Royce. This NVC-Design 604 PT product tanker has two medium-speed main engines, two shaft generators, and

two Ulstein Aquamaster Azipull thrusters - the company's streamlined steerable units with pulling propellers.

Each independent propulsion line comprises a Bergen main engine of 1400kW driving an AZP 085 Azipull thruster equipped with CP propeller. A 1000kW generator is interposed in the short

shaft between the engine and the thruster. This simple mechanical layout is claimed to offer flexibility and lower losses than a diesel-electric plant, while the system is less demanding to operate. It is also very compact since the main engines can be mounted far aft with very short shaft connections to the thrusters.

In port one engine can be shut down. The other is declutched from its thruster and drives its generator, supplying power for the hydraulic deepwell cargo pump power packs and the vessel's hotel load. This mechanical transmission layout is especially suitable for product tankers in the range from 3000dwt to 20,000dwt since the compact engine room enables the tank volume to be increased by 5% to 7% within a given ship length. The hydrodynamic properties of the Azipull thrusters are said to confer good course stability in relatively short, wide, ships, and the propulsion system layout is simple, yet provides a high level of system redundancy. ⚓



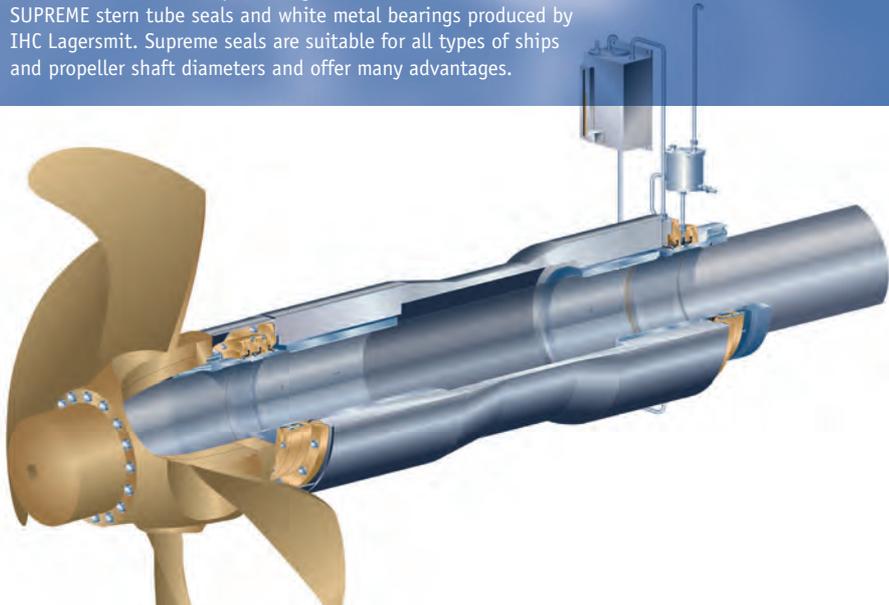
A new NVC-604 PT product tanker for Bergen Tankers has this compact Azipull mechanical transmission layout with shaft generators, providing flexibility and redundancy.



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# The Royal Institution of Naval Architects

## Design and Operation of Container Ships

22 - 23 November 2006, London, UK

### First Notice & Call for Papers



The trend towards increased size of container ships presents unique challenges for owners, designers, operators and classification societies. The high speeds and unconventional structural arrangement of container ships can increase the risks associated with innovation. Questions of structural strength, severe weather loads and stability must be addressed. Thought is also being given to deck cargo arrangements; problems with securing the containers to resist green water and potential problems with the safety and speed of loading and unloading are beginning to be addressed.

To meet demands for this new generation of container ships, naval architects and operators are constantly striving for innovation. This conference will explore the very latest in container ship thinking.

RINA invites papers exploring all topics associated with container ship design, including:

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## Largest-ever ZF gearbox and propeller

**I**N March this year, ZF Marine delivered the largest gearbox that the company has yet built, as well as its largest CP propeller; however, the W103100 gearbox and KH1350 propeller are not destined for installation in the same vessel - partly due to the peculiar laws of marine hydrodynamics.

The gearbox, the design of which commenced in November 2004, was delivered to the Turkish shipyard Marmara for installation in a 16,000dwt product tanker. The customer is Niveko, ZF Marine's representative in Turkey, who has been very successful in selling the company's large gearboxes and CP propellers.

Due to the size of the gearbox, it was impractical to support the shafts in roller bearings, therefore great effort was made by the design team in Friedrichshafen to develop a box using plain (white-metal-lined) bearings to support the heavy gear shafts and Michell-style tilting thrust pads. These transfer propeller thrust from the output shaft to the ship's foundation.

Another two ZF W103100 gearboxes were assembled in May and these are due to be



This W103100 gearbox, the largest yet built by ZF Marine, is destined for installation in a 16,000dwt product tanker at the Marmara Shipyard in Turkey.

### TECHNICAL PARTICULARS W103100 NC GEARBOX

Input torque.....	16.0kW/rev/min
Reduction ratio.....	4.238
PTO Capacity (Type 5).....	1500kW
Bearing type.....	plain
Thrust block type.....	Michell
Weight without oil.....	28tonnes
Length x breadth x height.....	2600mm x 2580mm x 3900mm

### KH1350 CP PROPELLER

Hub diameter.....	1350mm
Blades.....	4
Diameter.....	.5600mm
Total weight with hub.....	18tonnes
Shaftline length.....	15.00m
Shaftline weight.....	17.5tonnes

transported to the new back-to-back (full load) testing facility at Friedrichshafen, before final delivery to the customer.

#### Propeller for tug upgrade

Regarding the record propeller, ZF Marine's customer is MaK Americas, and the project concerns the re-powering of a 50-year-old push-tug, *Joseph Thompson*. Luckily, this

vessel has been working all its life on the fresh-water Great Lakes, thus there is very little hull corrosion. For this reason, the high capital investment cost for a new propulsion plant can be justified.

The tug operates as part of an integrated tug/barge (ITB) system, carrying bulk cargoes, and is hydraulically secured into a special notch in each barge's stern to form a single unit. ⚓

## New coupling design for CP propeller shafts

**T**HE time-saving shaft coupling solution, the TOK concept from the SKF Group, is well-known; it builds on the SKF oil injection method. Now the company has launched an improved system, the OKCX coupling, which benefits from a new high-friction carbide coating, which is applied by the plasma technique. The friction level is now said to be twice that of a normal steel-on-steel interface.

As a result, the coupling can be smaller (light and compact) or stronger (for higher torques), or a combination of both; large flange couplings can be replaced and reinforcement sleeves avoided. All these benefits add to the previous ones of reliability, strength, and cost savings. Torque capacity is said to be 50% higher than the traditional OK coupling.

Special benefits can be realised where an OKCX coupling is employed in a CP propeller installation. Such propellers call for a hollow shaft, through which hydraulic oil is supplied to the variable-pitch blades, but this construction calls for an internal reinforcement sleeve. OK says that with its new design, a lower contact pressure results, making internal reinforcement obsolete. ⚓

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## Balanced tuning of main and secondary drivelines with flexible components

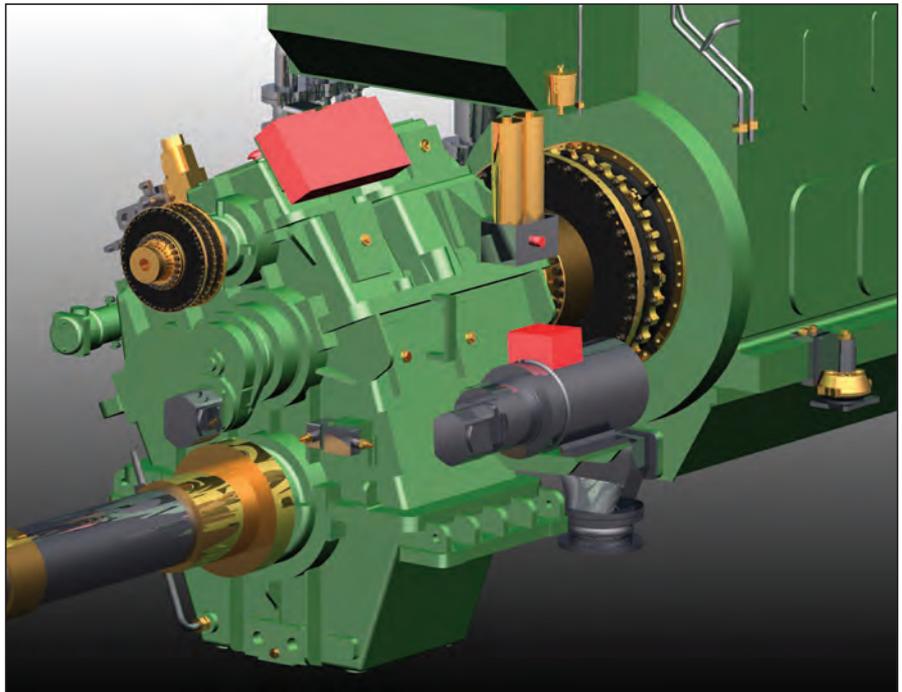
**P**OWER take-off (PTO) drives from main-drive gearboxes are excellent devices to make use of main engine power - and are valid for both four- and two-stroke engines. Depending on engine performance and characteristics, there is, in general, sufficient output available for power take-off purposes. Additionally, by reversing the PTO to become a PTI (power take-in), additional or get-you-home power can be added to a main transmission train. At the same time, the degree of redundancy is increased.

Depending on the ratio of PTO/PTI power to main propulsion power, a careful selection of the flexible coupling connections is necessary, reports the German coupling specialist Vulkan, since prime and/or secondary stiffness directly influences gear-mesh vibratory loads. High stiffness levels can give rise to high vibratory loads and cause additional noise levels within a mesh. Backlash in couplings or a gear train amplifies this effect. Thus, a high level of design input is required.

At the same time, transient loads due to electric starts/stops, clutch-in/clutch-out operations, and propeller imbalances (perhaps due to ice or debris) can inflict additional loadings. Small auxiliary PTOs form only a small part of a main gear drive layout and have to be protected efficiently from the relative big main-power transmission and its corresponding main excitation levels (gas plus mass forces).

A recent boom in offshore activities worldwide and rising fuel costs are particularly driving needs for efficient PTO/PTI arrangements. PTI drives with disconnected main engines, and electric drives from a reversed PTO train, can offer high levels of manoeuvrability, especially in low-speed ranges. At the same time, shaft-generator drives from two-stroke main engines are once again increasing in popularity, as explained in an article in the March 2006 edition of *The Naval Architect*, page 22.

A deciding factor for the selection of flexible couplings in front of or behind a gearbox is certainly the low natural-frequency tuning, with



A typical four-stroke power transmission arrangement, showing Vulkan RATO couplings fitted to control torsional vibration, and Vulkan-DMR anti-vibration mounts for linear flexibility.

operation above the critical speed map. This ensures low vibratory loads in the driveline - even under misfiring conditions.

In addition to torsional aspects, these flexible couplings must be capable of accepting the reaction forces due to misalignment of adjacent machinery components. Here, Vulkan RATO-S + R couplings, manufactured for the largest installations in ro-pax ferry drivelines, can offer comfortable operating behaviour.

It is important for designers to connect an understanding of torsional vibration with the

linear vibration behaviour of main engines - even under severe sea-conditions, while at the same time, from the comfort angle, reducing structure-borne noise levels. This is especially true for passenger or other special ships. A well-designed package enables operators to work under reduced noise and vibration levels, and passengers to enjoy a pleasant voyage. Isolation or reduction of noise paths through flexible driveline couplings or anti-vibration-mounted machinery is therefore a prime goal of Vulkan's couplings. 

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## Coupling combinations for new catamaran and icebreaker

FOR a new 98m long wave-piercing catamaran ferry, soon to be completed by Incat, of Australia, Geislinger couplings of the E56/15/26U/1 + BI100/40/2H/2 types were chosen, following reliable performance on five other vessels with similar arrangements. These couplings transmit the output from four MAN B&W (Ruston) 16RK280 high-speed diesel engines, each rated at 7200kW at 1000rev/min, and offer a very low weight, which is important on such ferries.

Each torsional-elastic damping coupling is directly connected to the input shaft of a ZF gearbox and carries one half of the Geislinger Gesilco unit. The second half is the only component to be assembled by the shipyard. Since this latter unit weighs only 20kg, it was possible to carry each one into the main engineroom and to tighten all connection bolts within four hours for the whole shipset.

Since the composite material exhibits good behaviour, the coupling generates extremely low reaction forces during any engine movement, and thus the bearing load in adjacent components is maintained at a very low level.

In a separate project, Geislinger has supplied two coupling combinations of the BE 125/20/125U + GFL S71K8 type for a new offshore support ship, *Pacific Endeavour*, completed earlier this year by Aker Langsten in Norway. This vessel is especially interesting since she is designed to navigate in severe ice conditions in the Sakhalin oilfields of the Russian Far East, and to act as an icebreaker.

The machinery arrangement is diesel-electric: four Rolls-Royce Bergen B32/40-9LA engines, with a total output of 16,580kW, drive alternators to supply current to two propulsion motors each rated at 7000kW and turning at 750rev/min. The Geislinger coupling combinations connect each electric motor to its



A cutaway view of the Geislinger E 56/15/26U/1 + BI 100/40/2H/2 coupling combination chosen for the new Incat 98m catamaran ferry.



One of the two Geislinger BE 125/20/125U + GFL S71K8 coupling combinations fitted between the propulsion motors and azimuthing thrusters in the recently completed offshore support ship/icebreaker *Pacific Endeavour*. This diesel-electric vessel is heavily ice-strengthened for operations in the Sakhalin oilfields of the Russian Far East.

Rolls-Royce azimuthing thruster. Severe conditions on such icebreaking vessels drove the owner, Swire Pacific, to seek an optimum and safe coupling design.

This Geislinger solution was chosen following earlier success on the icebreaker support ships *Nordica* and *Fennica* (*The Naval Architect* February 1993, page 54), built by the then Finnyards, at Rauma, and which featured a somewhat similar diesel-electric/azimuthing power plant. For *Pacific Endeavour*, Geislinger supplied an all-steel BE 125/20/125U coupling

to absorb extreme torsional loads, while the Flexlink part covers any misalignments occurring during operation.

Successful ice trials with *Pacific Endeavour* were carried out in the Arctic, in ice thicknesses of between 4m and 6m, capped with 1.5m of snow. At times, due to unusual weather conditions, the ice thickness proved to be beyond the vessel's initial design specification and beyond that expected in the Sakhalin area; nevertheless, the ship is said to have performed admirably. ⚓

## Replacement clutch for dredger jet pump drive

AN interesting project undertaken last year by Wichita was the replacement of a conical clutch of another make by a MSV 327/AX/BRG clutch on a trailing suction hopper dredger *HAM 316*, built in 1998 and operated by Van Oord. The latter company had been experiencing problems with the original clutch and decided to replace it with a design which would integrate perfectly with the existing Vulkan Rato-S flexible coupling which was adjacent. Engineering costs were minimised by careful design to ensure a perfect fit in the existing drive line between the diesel engine and a gearbox for the dredge jet pump.

The new clutch weighs 1015kg, has a diameter of 788mm, an inertia of 27kg/m<sup>2</sup>, and a much larger friction area than previously, of 13,785m<sup>2</sup>. ⚓

The internal components of the new clutch fully assembled in the dredge jet pump driveline.



# The Royal Institution of Naval Architects

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

14 - 15 September 2006, Busan, Korea

### Second Notice



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

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



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

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



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

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# Ensuring successful construction of a megayacht

At The Royal Institution of Naval Architects' recent international symposium on ship design, held in La Spezia, Italy, Barry Gilmour, executive chairman of Oceanic Investment Corp (owner of consultancy Burness Corlett - Three Quays), argued that owners contemplating building a large luxury yacht should follow the example of the cruise liner industry and employ a professional project director and a total project management system.\*

THIS article is directed towards those involved in the construction and conversion of large bespoke luxury yachts, which are generally in excess of 50m length, and often colloquially referred to as superyachts, megayachts, gigayachts, or simply large luxury yachts. The market for this class of ship has been growing for several years now with no signs of slowing down, hence there are many new projects in the pipeline.

The current trend is for luxury yachts to become larger, more complex, and to include facilities for submarines, internal tenders, docking systems, heliports, and similar wonders, and therefore their design and construction is becoming technically more demanding. However, a client's traditional method of procuring and building such vessels remains unaltered, and this is ultimately leading to problems that require changes to industry practice.

When addressing the subject of large luxury yacht construction, it is important to understand the needs of the client, and marketing strategy teaches us that the client is always 'king' (in the large luxury yacht market, he sometimes really is), hence it is useful to remember that clients are, by definition, ultra-high-net-worth individuals, captains of industry or members of royal families, and in the main, 'the majority' of such clients are very used to getting exactly what they want.

They are 'discriminatory corporate purchasers' as opposed to non-discriminatory organisations, who are normally involved in the construction of commercial vessels, hence from the client's perspective, the procurement and the construction process differs.

Despite these factors, large luxury yacht clients do not always get what they want, and to effectively examine the subject, it is necessary to focus on 'the minority' of clients that do not get what they want and the reasons why.

## Clients and their attitudes

Large luxury yacht clients originate from many sources and cultures and are essentially all different, however, some commonality exists:

- firstly, there are those who are actively involved in every aspect of the project, and

\* Extracts from the paper 'Large Luxury Yacht Design and Construction', by B E K Gilmour, from Oceanic Investment Corp, presented at the International Symposium on Marine Design, held on April 12-13, 2006 in La Spezia, Italy, and organised by The Royal Institution of Naval Architects.

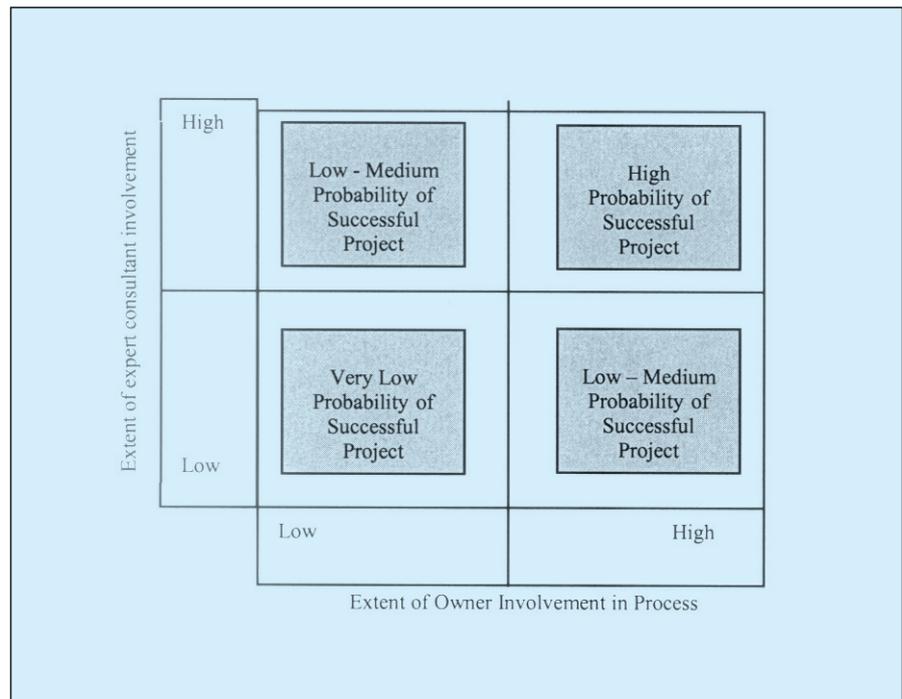


Fig 1. Probabilities of success.

who personally derive as much pleasure from being involved in the construction process as they do from the use of the vessel

- secondly, there are those who, at the other extreme, are 'hands off', not particularly involved in the project but extremely interested in the yacht delivery date, its use, the relaxation, enjoyment, and fun it provides
- thirdly, there are clients who fall somewhere in the middle.

This classification is further complicated by those clients who employ qualified and experienced professional advisors at the early stages of the project, a late stage of the project, or at no stage at all.

## Professional advisor/risk

The probability of a client obtaining what he wants, on time, and to budget favours 'hands-on' clients who employ professional advisors from an early stage. 'Hands-off' clients who do not employ qualified advisors at an early stage or at all, face a greater risk of not getting what they want, and this is broadly captured in Fig 1 which is based on the permutation of client type and timing of professional advisor involvement.

## Reasons

A holistic view of defining whether a client gets what he wants is normally adopted by Oceanic Investment Corp, and the company's definition of a successful project means:

- the yacht must be built to the correct specification
- the yacht must be delivered in accordance with the contract delivery schedule

- the yacht must be delivered in accordance with the contract price.

Some reasons why a client does not receive his vision emanates from the following:

- the yacht is not delivered on schedule
- the final price of the yacht is significantly higher than the contract
- the enjoyment of the yacht is destroyed by major contractual problems which may involve litigation
- the yacht does not comply with the contract/performance specification
- the final product simply does not conform to the client's initial vision.

## Root causes

The root causes of reasons for the client not receiving his vision includes the following:

- the vision originally captured in the statement of requirements is unclear and insufficiently defined
- the conversion process from statement of requirements to performance specification is inadequate
- the builder quotes too low a price and relies on variations to contract (VTCs) to improve financial results
- clients who consider building a new yacht for some time, then 'rush' to contract, with inadequate performance specification and contract documentation
- clients who do not employ qualified and experienced professional advisors
- the absence of a qualified project director and the application of a total project management system

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- the client's professional advisors, and in particular interior designers, who win their assignment based on a clear statement of requirements and competitive contest, who then go beyond their brief, which creates confusion in the minds of the clients and renders them unsure as to what they really want.

In this connection there have even been attempts to persuade a client that he really needs a few extra metres in length or a significant increase in accommodation volume, even though the contract has already been signed.

### Construction process

In industry, a typical contract framework involves the client appointing consulting engineers for the execution of a rigorous evaluation process, to prepare different design options and thereafter develop a contract specification that exactly conforms to the client's requirements. Hence in most cases, this method ensures the client secures what he wants.

However, the most common type of yacht building contract is more akin to 'design and build', where the client's advisors prepare a performance specification and contract documentation.

This performance specification is circulated to shipyards for tendering and, whilst containing specific requirements, the responsibility for the design and construction and achieving regulatory compliance, allows the builder a degree of interpretation.

Therefore, for a number of reasons, the builder can propose changes to the performance specification, which may compromise the client's original vision and requirements, which combined with the complication of the buyer appointing his own interior designer, audio visual and navigation/communications expert, for example, can result in a risk that the client may not receive exactly what he wants.

With 'design and build'-type contracts, a key success factor is the use of experienced professional advisors to prepare a detailed statement of requirements, which is converted into a robust performance specification and contract documentation. Without this, there is little hope of determining what the client wants or whether he receives it.

A typical statement of requirements includes the following generic headings:

- Function* - facilities/accommodation/theatres of operation/helicopter operations/sports
- Form* - exterior-interior style/speed and range
- Technology* - propulsion/materials/HVAC/ noise and vibration
- Legislation* - SOLAS/environmental
- Financial* - budget/terms of payment.

It is possible to capture highly technical requirements in a detailed performance specification, which allows the yard to estimate accurately price and delivery. This also enables VTCs to be identified and rendered capable of assessment and evaluation; however, this exercise is apparently more difficult when attempting to specify stylistic or interior outfit issues, since it seems that some stylists and

interior designers consider the subject more of an art form and therefore iterative, evolving, and incapable of tight specification.

This is possibly where the art versus science debate enters, but is of crucial importance to large luxury yacht clients, since 25%-30% of a total large yacht cost can be represented by the interior, yet this area is not always captured in a robust specification and may need many revisions that can even extend beyond the builder's design 'freeze' date.

This is highly undesirable since builders are undertaking a contract, which involves responsibility for all areas of the project and therefore, when faced with uncertainty and risk, they will literally interpret the specification, state exclusions, or employ what has now become common practice for the interior, a provisional cost (PC) sum.

### Provisional cost sums and buyer-supply items

At this juncture it is worth introducing PC sums. The terminology of a provisional cost sum is adequately defined in ISO, BSI, defence contracting, and other documentation as:

*A sum that is allowed for something that is foreseen but that cannot be accurately specified at the time of tender.*

*Tenderers are asked to include for such items under the definition of a provisional cost sum. At a later stage, provisional costs are to be deleted from the contract sum and replaced with the actual cost (if required).*

*Provisional sum means any sum included or so designated in the contract as a specific contingency for carrying out work, the supply of goods, materials or services which may be used in whole, part or not at all, in accordance with the specific requirements stated therein, or at the direction and discretion of the client's engineer.*

Therefore, PC sums refer to items that are incapable of being accurately specified at the time of tender. However, when that item is capable of being specified, the original PC sum should be converted to a fixed price (prime cost), which includes the agreed overhead/handling cost.

However, in large luxury yacht construction, this is not always the case and circumstances exist where even when the PC sum is able to be specified and is outsourced for a fixed price, the contract is not amended.

This is an undesirable situation for the client, since even though PC sums should be founded on realistic and accurate estimates and be capable of audit, it is often difficult for the client to analyse, identify, and effectively defend costs, delays or alleged 'knock-on' effects which are claimed to emanate from the PC sum.

Furthermore, the yacht builder may hold the opinion that all costs involved in a PC sum are reimbursable, even though such costs could be caused by rework or under performance and this view can be supported by ambiguous contract wording.

Therefore, contracts must be careful to address the methodology of specifying the process of converting a PC sum into a fixed price and also

define the meaning of such words as 'cost' and 'reimbursable cost', otherwise the situation can be a 'breeding ground' for cost and time claims.

PC sums can typically be found in the following areas:

- interior outfit
- audio visual equipment/navigational and communications/security equipment
- specialist equipment, ie, unique features
- classification society costs.

### Interior outfit

Clients expect their yachts to include all the facilities found in the most luxurious mansions and do not marvel that this floating palace can be capable of silently travelling through the water at speeds of more than 20knots. However, they do attribute great importance to the interior design and the atmosphere of luxury, comfort, enjoyment, and excitement that it provides.

In the construction of large luxury yachts, the interior designer is vitally important and is becoming a principal discipline involved to achieve the client's satisfaction. Hence, the interior designer should have a responsibility for not only creating the lifestyle environment but simultaneously ensuring the client's conceptual vision is efficiently converted into the required product. This is achieved by conducting the necessary value engineering exercises and capturing all elements of the design in a clear and unambiguous specification capable of measurement and accurate costing, the same as other service providers.

However, this issue is not always satisfactorily addressed, which is vitally important, as the interior outfit is capable of generating high value VTCs. A client who contracts for an agreed interior PC sum reasonably expects to receive the designated interior for that price, and he therefore gets a nasty shock when this increases by more than 20% (which can represent several million US Dollars) to receive something he thought he had already purchased. These extra costs typically arise from:

- differences between the contract PC sum and that finally agreed with the interior subcontractors (it is interesting to note that as the interior subcontractor's price increases, the breakdown of the original PC sum often shows that, somewhat strangely, so does the builder's component)
- specification changes caused by revisions to the originally planned accommodation, created by changes in the view of the interior designer or inadequate ergonomics
- interior outfit materials specified by interior designers, but which do not conform to regulatory requirements.

Furthermore, the contract may not refer to the number of interior subcontractors to be engaged on the project, but when the interior outfit quotations are sought it is not unknown for builders to share the contract between several suppliers on the rationale of speciality, risk, and other factors.

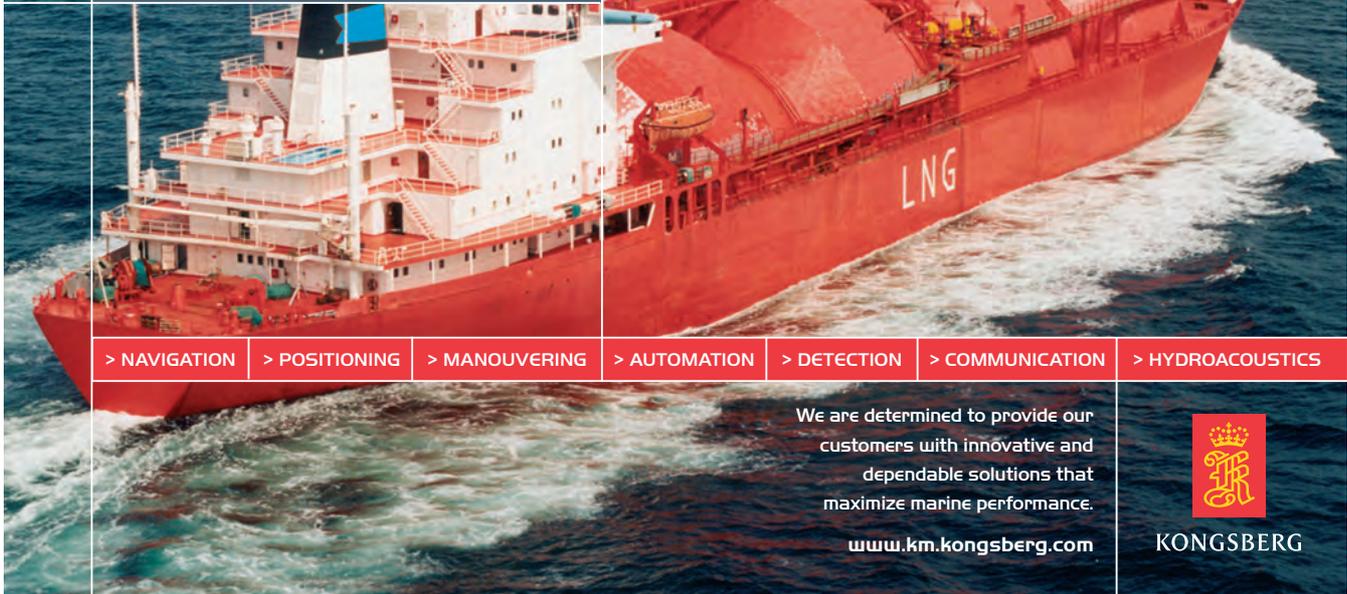
This subject should be addressed in the original tender since it can result in higher costs for the client. The question must be asked 'reduces whose risk?' since the client can be asked to pay

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heavily to reduce the builder's operational risk and even though the risk has apparently been reduced, the percentage handling charge for the increased PC sum remains in place, creating further cost.

Therefore, unless the client appoints a professional owner's representative/project director, and management team, it can be difficult to identify the true causes of such claims and professionally manage them, especially if 'mutual dependencies' exist. This is especially so, for example, due to the closed nature of the large yacht industry. It is not uncommon for interior designers to recommend interior outfitters, not just on the basis of capability and price, but also those who are willing to accommodate and incorporate any alterations without too much difficulty or questions.

Having said this, it is possible that despite best efforts some lack of clarity may exist at contract signing with regard to the exact requirements of the client's and VIP guest accommodation; this should be resolved as soon as possible. However, notwithstanding this aspect, it is difficult to understand why crew or staff accommodation should also be represented by a PC sum, as they are eminently capable of being accurately defined and specified from the very start.

Also, once the designer's broad requirements are known and the client has approved his accommodation, colour schemes, finishes and materials, the builder could quote a bill of quantities, which allows for fixed prices on an area or volume basis.

#### Audio-visual equipment, navigation, and security equipment

Audio visual, navigating/communications, and security equipment are grouped under the same heading, as they are essentially 'bought-in' products. The functions required from this equipment can be adequately identified, together with the brand and model equivalence. Nevertheless, due to the time between contract signing and equipment installation, it is better to leave ordering exact equipment until later in the construction process, otherwise it could be technically obsolete by the time it is required.

Moreover, the ability to provide additional functions may also have evolved and technology advance can reduce the price of equipment, hence this is an area where a PC sum can be advantageous to the client.

#### Specialist equipment

In some cases, novel designs or prototype equipment are represented by a PC sum. However, Oceanic Investment believes that where the equipment is capable of being tightly specified and the builder enlists the services of specialist subcontractors on a fixed price contract, there is no reason for the client to be faced with a PC sum.

#### Classification society costs

Classification costs can sometimes be presented as a PC sum. Oceanic Investment would resist this approach, since a shipyard should be able to accurately estimate this cost; moreover, repeat attendances by class are not normally due to the needs of the client.

#### Buyer's supply items (BSI)

An area which seems to be gaining some popularity is where the client nominates major supply items or subcontractors (ie, engines, main propulsion, or interior outfitters) thereby benefiting from discounts and reductions in sales commissions.

Here, it is vital that the client employs an exceptionally efficient and experienced project director and total project management system, otherwise delays and costs caused by inaccurate specification, increased weight, late delivery or poor quality of the buyer's supply items (BSI), have the potential to interfere seriously with a shipyard programme, cause delay, and actually increase costs.

Additionally, when difficulties arise, and irrespective of previous 'understandings', it is not unknown for builders to take an indifferent managerial approach to problems with BSI.

#### Project management

This leads to the subject of project management. The statement of requirements outlines the client's vision for the yacht, which is converted into a performance specification and tendering documentation.

The project director's role is to efficiently and effectively manage the whole project and activities of the client's team to ensure that the project is delivered in accordance with the performance specification and contract. However, whilst the builder appoints his own project manager, the large yacht client does not always follow suit and appoint a project director to manage and protect his interests.

As a consequence, due to the client's personalised approach to the venture, a project director may not be involved in formulating the statement of requirements, performance specification or building contract, even though he




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possesses the commercial knowledge and experience to heavily influence and contribute to the price.

As many will be aware, this is the reverse of project management for large commercial ships, where the newbuilding director/superintendent or project director is appointed first, acts as the common thread for the whole process, and is responsible for interior designer(s), naval architects, or other professional advisors.

By a client's 'project director', our company means the appointment of a fully qualified senior manager with substantial experience in the design, construction, and operation of large yachts, or other complex projects. He or she is able to implement the total project management system and is familiar with techno-operational issues, commercial, legal and negotiating processes, as well as being familiar with computerised project systems such as CPA and PERT.

### Project director

The project director is a vital appointment and requires a person with appropriate qualifications and experience whose role includes the following activities:

- initiation (starting the project/creating the team)
- planning (organisation and programme)
- monitoring and controlling (VTCs, delays, force majeure, and other factors)
- directing (firm leadership, decision making)
- commissioning.

A project director who lacks demonstrable qualification and experience is unacceptable for managing the construction of large and complex vessels since the learning curve is steep and dearly paid for by the client. This situation is not helped by yacht industry practice of often appointing the captain of the client's existing yacht to act as the project manager to totally manage the whole yacht construction, even though in some cases he does not possess the required qualifications or experience.

This scenario differs from commercial shipping practice, where the vessels tend to be built by new construction superintendents/managers, and the captain and chief engineer are appointed at a much later stage in the process.

What is possibly worse, to compensate for inexperience or lack of capability, it is not unknown for some clients' yacht captains or engineering personnel to look towards the builder for support, which disturbs the balance of the contractual relationship.

It is essential that the project director possesses a firm understanding of large luxury yachts and experience in dealing with the needs of discerning clientele. Whilst someone who is used to building a series of large bulk carriers may have the required qualification, he will not necessarily possess the yacht experience, together with the discretion, tact, and loyalty required by clients.

Therefore, for the construction or conversion of large luxury yachts, the early appointment of an experienced project director, and the application of a total project management system is highly recommended, especially if elements in the

Fig 2. Comparisons: - commercial shipping versus large yachts.

	Passenger/ Commercial Ships	Yachts
Owner status	Corporate, non-discriminatory	Individualistic/ charismatic. Discriminating
Ownership rationale	Financial return	Personal/ pleasure
Knowledge	Highly professional and qualified team	Generally informed
Employee qualifications	Strictly regulated, only employees with the highest qualifications and experience	Various
Vessel ownership	Fleets of extremely large vessels which operate throughout the year on a worldwide basis	Generally 1, possibly 2-3
Service needs	Tight schedules with high risk in event of failure	Generally flexible unless chartering
Newbuild organisation	Permanent team of highly professional individuals	As required, often captain or owner's representative who may not possess experience in design and construction of large complex vessels

building contract which relate to key dates, milestones, or information responses, are to be effectively scheduled into the project management programme.

### Commercial shipping

Since commercial shipping practices have already been mentioned, it may be useful to draw on some broad comparisons between the yacht industry and commercial shipping.

In commercial vessel construction, it is relatively normal practice for a total project management system to exist with interior designers, naval architects, and other specialists to report directly to the newbuilding or project director.

Commercial vessels are designed to make a financial return in a highly competitive and regulated environment, hence a total project management system is a necessity, not a luxury,

since owners can be faced with astronomical costs and bad publicity in the event of failure (ie, the vessel is late to take up a cruise, or major malfunctions occur during the maiden voyage of a new flagship).

It can be argued that building luxury yachts is different to the construction of large commercial vessels. However, the practice of large luxury passenger vessels is strikingly similar, often more complex and, where construction is demanding, it requires the highest level of production programming. Projects are also dependent on highly efficient, 'no-nonsense' project management, which requires discipline, skill, and experience.

This system appears capable of reducing the techno-commercial risk in the construction of large complex vessels. It could therefore be asked why such a system is not widely adopted in the construction of large yachts, since, unlike



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large commercial ships, a client's project director and total project management system are not established yacht building practice. The reasons for this are unclear and may simply be due to:

- the evolution from simpler, smaller vessels into larger more complex yachts
- building discrete one-off projects as opposed to a series of projects
- the individualistic nature of yacht clients who do not create a newbuilding team, but rather appoint a collection of independent professional advisors.

Apart from a lack of control, this non-team building approach introduces unnecessary conflict and tension between the client's professional advisors due to competing ego needs, self-protectionism, and a desire to maintain their independence by accepting responsibility to no party other than the client.

This does not make for highly disciplined project management and could lead to a lack of clarity and confused reporting lines. Hence the introduction of a project director and a total project management system should prevail to globally act in the client's best interests. Its absence can be a prime reason for the client not receiving the vessel he wants.

### Conclusions

So, what is the way forward? For a number of reasons, Oceanic Investment Corp believes it is in the client's best interests to adopt the following recommendations:

### Process

The implementation of a total project management process that, *inter alia*, focuses on the following elements:

- statement of requirements - concept
- interior design
- performance specification
- yachtbuilding contract.

A statement of requirements calls for following the necessary process, spending quality time with the advisors to ensure that an adequate statement of requirements, and being prepared in advance of the concept design.

For interior design, the performance specification must include a fully detailed interior specification, including accurately scaled layouts, visual packs, 3D walk-throughs, colour charts, materials, and all other information necessary to allow the builder to submit a convertible PC sum, fixed price quotation or bill of quantities for the interior, and which is unlikely to be revised due to stylistic, ergonomic or any other reasons.

Regarding a robust performance specification, once the statement of requirements has been prepared, it is essential to ensure that it is converted into the performance specification, and that all iterations and revisions have been undertaken before going to tender.

For a yachtbuilding contract, it is essential for clients to ensure that a robust and comprehensive yachtbuilding contract is in place.

### No need to re-invent the wheel

It is false economy to embark on a steep and expensive learning curve using unqualified or inexperienced crew and personnel for the construction of a large luxury yacht, especially when the client can appoint qualified and highly experienced project directors from organisations who have a proven track record and pedigree in the construction of many large vessels.

### PC sums/fixed price

The contract should preferably minimise the inclusion of PC sums and replace them with fixed prices or detailed clauses that formally describe how the PC sums will be converted to fixed prices once they are capable of specification.

### Employ a project director

Employ a project director to establish a newbuilding team and implement the total project management system at an early phase. This will ensure that the project is effectively and efficiently managed from start to finish.

This should be considered as an investment, since money spent at the early stages can save millions of dollars in avoiding VTCs and delays at a later stage.

Oceanic Investment Corp would like to believe that if the foregoing points are adopted, this would greatly assist in helping to deliver the luxury yacht a client expects, on time and in accordance with the contract price. 

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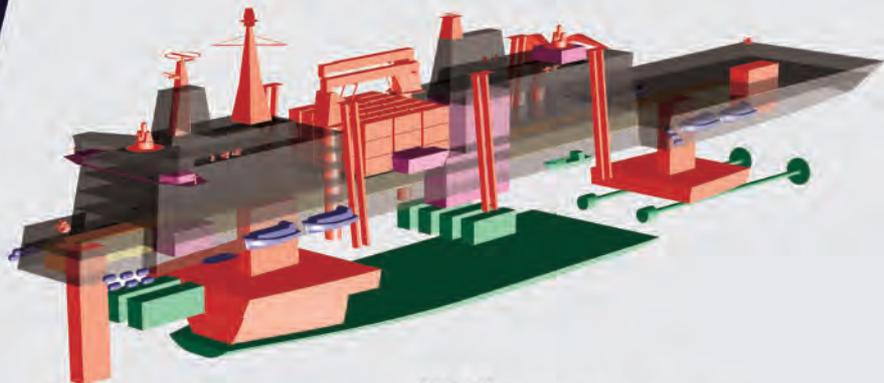
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# Star First: a new-generation reefer ship from Shikoku Dockyard

THIS time last year, we reported (page 50) on the design of the first new-generation refrigerated cargo ships to be ordered for some years, following a visit to Shikoku Dockyard. These were four pallet-friendly ships of 585,000ft<sup>3</sup>, placed by domestic owner Nissen Kaiun, and the first of these, *Star First*, has now been completed (with an increased capacity of 615,000ft<sup>3</sup>) and is in service on charter to Star Reefers. This is the 51st refrigerated cargo ship to be completed by the Japanese shipyard.

While based on traditional concepts, these new vessels feature all the latest technology to ensure efficient operation together with reliable refrigeration machinery. This includes an environment-friendly NH<sub>3</sub>/CaCl<sub>2</sub> brine refrigeration system (ODP and GWP are both zero), plus a humidification plant and complete facilities for both controlled-atmosphere and modified-atmosphere cargo transport to ensure freshness and ripening control.

A newly developed hull form, model-tested at Mitsui's Akishima tank, is employed for better propulsive and stability performance, also for improved wake distribution to reduce propeller-exciting forces. As noted last year, the hull is 5m longer than previous Shikoku Dockyard reefer designs, with an extra 1m on the breadth.

Despite an emphasis on pallets, the holds, and the upper deck spaces, are all planned for efficient stowage of containers and up to 276FEU can be loaded, alternatively 436TEU plus 58FEU. Boxes of 40ft length can be loaded in all holds, but electrical sockets for 200 reefer units are only provided on deck. Hatch covers were designed by MacGregor-Kayaba. Further flexibility is provided by fittings for car transport, as well as ordinary general cargoes, including special dangerous categories.

The four cargo holds are divided into eight fully insulated and air-tight zones, with 15 air-



The first large refrigerated cargo ship for some years - the 615,000m<sup>3</sup> capacity new-generation design *Star First*, lead vessel of a series of four ordered at the Japanese reefer ship specialist Shikoku Dockyard by Nissen Kaiun.



*Star First* features a newly developed hull, lengthened by 5m and expanded by 1m width from earlier designs for improved stability. As can be seen here, the stern is slightly tunnelled.

### TECHNICAL PARTICULARS STAR FIRST

Length, oa.....	162.50m
Length, bp.....	150.00m
Breadth, moulded.....	26.00m
Depth, moulded.....	14.10m
Draught, design moulded.....	9.05m
Draught, summer moulded.....	9.70m
Gross.....	14,030gt
Deadweight, summer draught.....	13,202dwt
Cargo capacity.....	615,000m <sup>3</sup>
Containers.....	276FEU or 436TEU + 58FEU
Refrigerated containers (on deck only).....	200
Main engine.....	Mitsui-MAN B&W 7S60MC-C
Output, CSR.....	14,240kW at 101.4rev/min
Output, MCR.....	15,820kW at 105rev/min
Speed, fully loaded.....	22.00knots
Speed, banana condition.....	23.00knots

tight cargo compartments fitted with independent coolers. Effective floor area, based on vertical side walls, is approximately 6730m<sup>2</sup>, and the minimum clear height on any level is 2.3m - greater than on earlier ships to allow new-type cartons to be stowed effectively. In fact, all inside walls of the cargo compartments are vertical so as to achieve maximum pallet stowage. All insulation work - using a combination of traditional and panel types without shoring boards - was carried out by Ask Sansin Engineering.

Three brine chiller units (screw compressor type) are installed for cargo refrigeration, based

on the premise that one will be on standby except during cooling-down periods. Air cooler fans, providing air in a ductless forced-circulation layout, can be adjusted in five steps by frequency control, and fresh air is supplied by an automatic computer-controlled arrangement that senses the CO<sub>2</sub> gas content. In fact, the whole layout is masterminded automatically by micro-computers.

As far as the controlled-atmosphere (CA) and modified-atmosphere (MA) arrangements are concerned, there are eight CA zones, identical to each insulated zone. For the MA method, N<sub>2</sub> gas is continuously flushed to up to 200 refrigerated

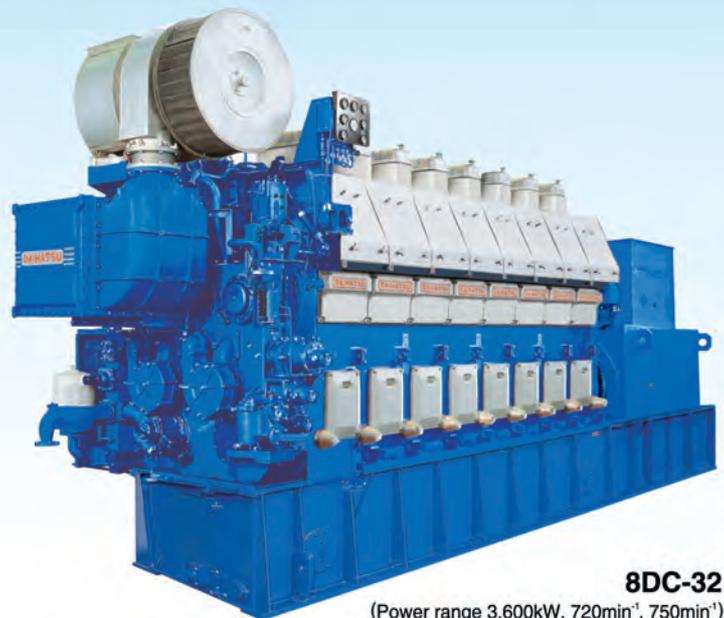
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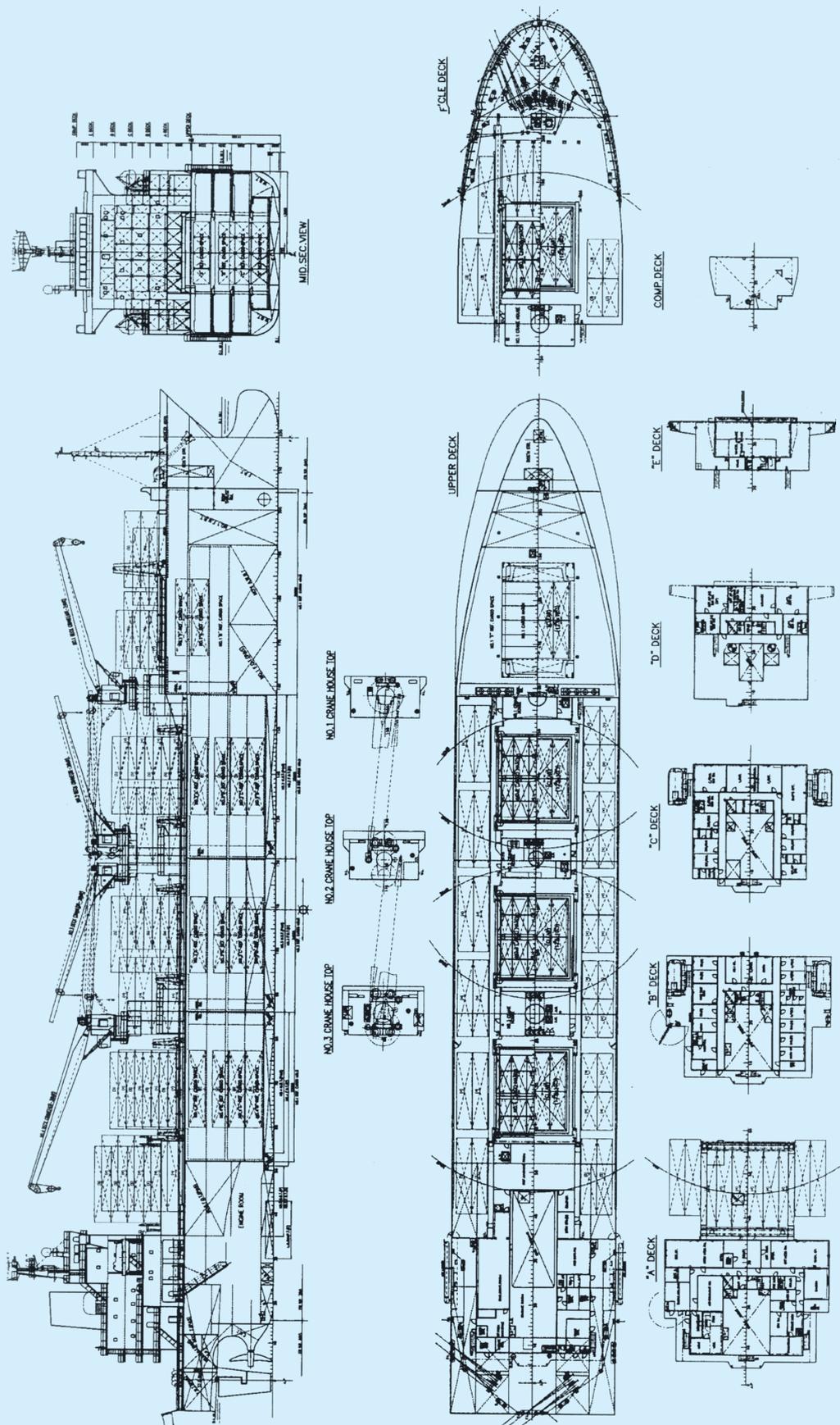
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General arrangement plans of the 615,000m<sup>3</sup> capacity refrigerated cargo ship *Star First*, built by Shikoku Dockyard for Nissen Kaiun and chartered to Star Reefers.

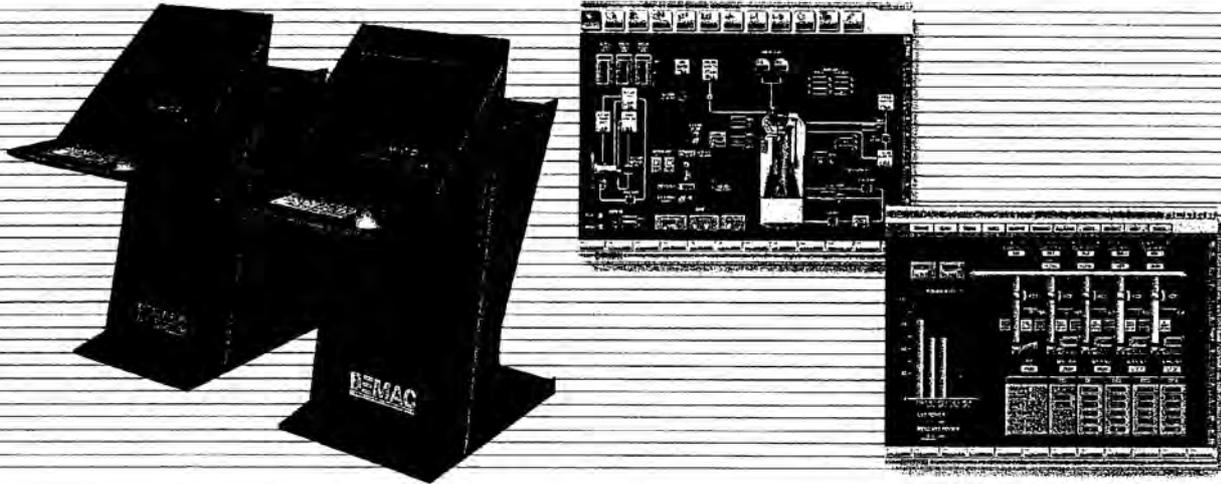


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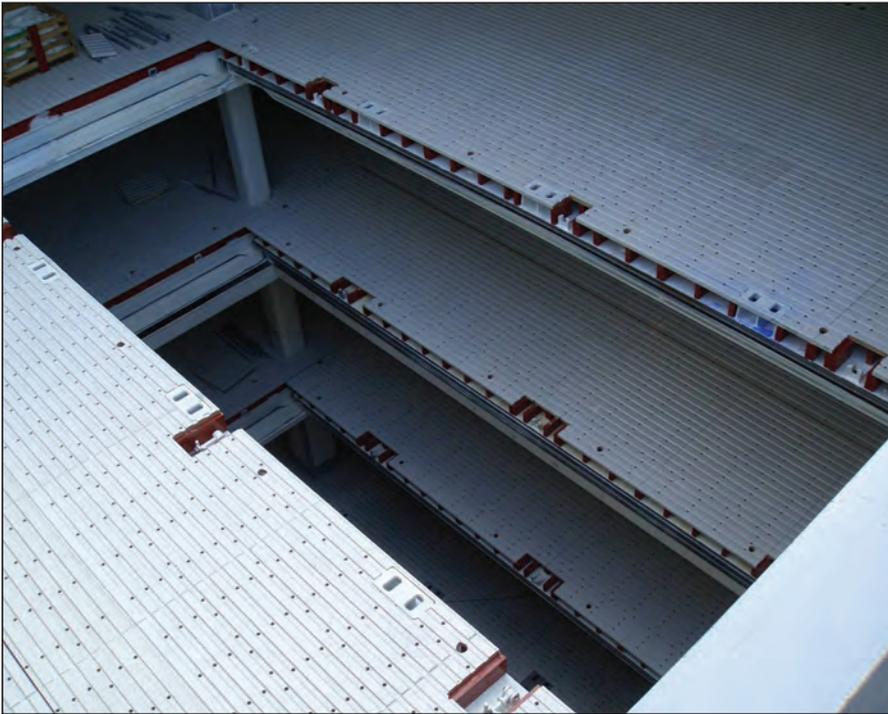
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Looking into one of the four holds, which are divided into eight insulated zones and 15 compartments with independent coolers. Height at each level has been expanded to 2.3m to allow new-type cartons to be handled efficiently.



Vertical side walls are adopted throughout, for more efficient cargo stowage. The insulation system is a mixture of panel and traditional systems without shoring boards.

containers without any monitoring or active control of their atmosphere (N<sub>2</sub> content). The refrigerated containers are however generally monitored by a wide/narrow broadband system of the power cable transmission type, supplied by Uzushio Electric. Maekawa Marine Engineering designed and installed the

complete refrigeration system on *Star First*, but the portable N<sub>2</sub> gas generator will be arranged by the charterer.

The ship's humidification system is engineered to maintain the humidity of each cargo compartment within 90%-95% relative humidity; these figures are at hold

temperatures between 5°C and 12°C, under ambient conditions of 35°C and relative humidity of 70%. Such conditions will prevent banana and citrus cargoes from drying out.

An outfit of IHI deck cranes is installed, with the fore and aft units of 40tonne capacity, and the two centre ones (mounted together on a single pedestal) are each of 8tonnes. Heeling angles during container handling are controlled by an automatic system using an electric reversible propeller-type pump of around 600m<sup>3</sup>/h capacity, working in conjunction with a pair of 300m<sup>3</sup> dedicated heeling tanks.

Propulsion power for a design loaded condition of 22knots on a draught of 9.05m or 23knots on a draught of 7.5m in banana condition is provided by a Mitsui-built MAN B&W 7S60MC-C low-speed engine. This develops a continuous service output of 14,240kW at 101.40rev/min and drives a Nakashima FP propeller (Nakashima additionally supplied an electric bow thruster with a thrust of 12tonnes). The shaft is fitted with a Kobelco sterntube bearing and seal system. Electrical power is supplied by four 1200kW Nishishiba Electric alternators driven by Yanmar diesel engines. Ⓢ



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# Chikyu ready for service

Japan's large new deepsea research ship, actually completed in mid-2005, was expected to sail on her first test expedition recently, after months of trials, off the coast of Hokkaido.

THE spring of 2006 will see the entry into full service of the unique research/drilling vessel *Chikyu*. She has been constructed for the Japan Agency for Marine-Earth Science & Technology (JAMSTEC), which placed the order with Mitsubishi Heavy Industries. This builder decided to subcontract both construction and marine outfitting of the hull to Mitsui Engineering & Shipbuilding (MES). Thus, the major part of the vessel has been constructed at MES's Tamano yard, adjacent to the company's engine works, which has provided the power plant for *Chikyu*. Final outfitting of the drilling equipment and associated systems was carried out by Mitsubishi at its Koyagi yard near Nagasaki.

With two shipyards involved with the construction of *Chikyu*, several very different sea trials were carried out. The first was from the Tamano yard, in May, 2003, for full testing of the power systems. In June, 2003, a further trial was carried out to check positioning and navigation systems, at the end of which the vessel sailed on to Koyagi where the drilling derrick, blow-out preventer (BOP), and associated equipment were installed. The next sea trial was carried out in December, 2004, with actual delivery being early in 2005. Since that time, crew training and drilling exercises have been taking place at two locations off the Japanese coast.

Although *Chikyu* has the appearance of an oil drilling ship, she will actually be used solely for scientific purposes in a research programme



The new Japanese drilling research ship *Chikyu* at sea. She was built by Mitsui's Tamano yard under subcontract from Mitsubishi, but most of the drill and research equipment was installed at Mitsubishi's Koyagi yard.

known as the Integrated Ocean Drilling Programme. The work in this project is being shared with another drill ship from the USA, while European countries will provide mission-specific platforms able to operate in areas inaccessible to *Chikyu* or the US drill ship.

The uniqueness of *Chikyu* is based around its scientific use only and around its deep drilling capability of 7000m below the sea bed in water depths of up to 2500m. To accomplish such deep drilling, some 10km of drill string pipe has to be carried for the riser-style drilling, which has been specified so that core samples can easily be retrieved from any depth. To enable such deep drilling operations, the highest-ever drilling derrick, at 70.1m, has been installed. It has a hanging capacity of 1250tonnes.

All of this has led to *Chikyu* being one of the largest drilling vessels at some 57,000gt in a hull of 210m length, breadth of 38.0m, with a depth of 16.2m. Dynamic positioning is provided by six azimuthing thrusters, each of 4200kW, plus one tunnel thruster in the bow able to deliver 2550kW of power. All the thrusters can be controlled together for dynamic positioning, using reference figures acquired from a global positioning system (GPS). A maximum speed of 12.00knots is possible.

The thruster arrangement is designed to hold *Chikyu* in position with wind speeds of up to 23m/sec and in significant wave heights of up to 4.5m with an average period of 8.2sec. The system was well tested during one of the sea trials when the ship was struck by a typhoon with wind speeds up 30m/sec and waves of 8.0m height.

Power for all services on board is provided by a total of eight 12ADD30V-powered diesel-alternator sets built at the MES Tamano works.

The Japanese ADD design from the Advanced Diesel Engine Development Co (a consortium of Hitachi, Kawasaki, and Mitsui) is yet another example of highly innovative and successful technology from that country, but which has not gained the market share that perhaps it should - in theory - have. Its output is primarily aimed at a sector where competition from more economic diesel engines is fierce; it also features no reversing gear. Thus, those engines that have been sold tend to be installed in government-funded vessels.

On *Chikyu*, six 12-cylinder engines, each of 5270kW output, provide main power for the thrusters and derrick machinery, while two 6ADDV30 engines are arranged for auxiliary supply services. All current is generated at 6.6kV, and the overall installation was previewed in the October 2000 issue of *The Naval Architect*.

When *Chikyu* left the Tamano yard, the only upper works on the hull were the bridge house and aftermost deck house and funnel, leaving Mitsubishi's Koyagi yard to install all equipment and facilities associated with drilling operations. The enginerooms are located right aft while accommodation and service areas for up to 150 persons is arranged in the bridge house, situated well forward at the aft end of the large forecastle deck. Above the latter is a large heli-deck able to take helicopters with a 30-person capacity to allow for ease of crew changes.

The drilling derrick and moon pool are situated just aft of midships, with stowage of associated drilling equipment, including the 380tonne blow-out preventer, arranged in the base of the drilling tower. Pipe racks are arranged both forward and aft of the drilling

## TECHNICAL PARTICULARS CHIKYU

Length, oa .....	210.00m
Breadth, moulded .....	38.00m
Depth, moulded .....	16.20m
Draught, moulded .....	9.20m
Gross .....	57,000gt
Maximum drilling water depth.....	2500m
Maximum drilling depth .....	7000m
Main engines (diesel-electric) .....	6 x 12ADD30V
Output .....	6 x 5270kW
Auxiliary engines .....	2 x 6ADD30V
Output .....	2 x 2640kW
Speed, service .....	10.00knots
Speed, maximum .....	12.00knots
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Classification .....	ClassNK, DPS-B + Ice Class IB



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derrick with adequate craneage for handling, while the riser pipe rack is further aft, again with suitable cranes installed for handling purposes. Below the riser pipe racks, eight large drilling mud tanks are installed in the hull.

The very deep drilling capability of *Chikyu* has been specified to allow investigation of the earth's mantle, which is nearer the oceanic crust in the deep oceans, as part of the IODP targets. Within that general area, movement of the Pacific Ocean plate beneath the Nankai Trench and Japan Trench, which causes many of the earthquakes which Japan experiences, can be investigated by drilling directly into the location where the plates meet.

With such deep drilling in mind the, BOP carried by *Chikyu* is capable of withstanding pressures of up to 103MPa (15,000lb/in<sup>2</sup>). Likewise, the drilling pipe is manufactured from high-tensile steel while the casing pipes are of high-alloy steel to provide sufficient strength and anti-corrosiveness for the type of drilling envisaged.

Since the core samples brought up from the drilled holes are extremely important, *Chikyu* has a four-deck-high laboratory complex arranged just aft of the bridge house. The uppermost of these decks is arranged so that it is on the same level as the drilling floor, and is known as the Roof Deck. Here the 9.0m-long core samples are cut into 1.5m-long pieces ready for subsequent investigations. There is also a down-hole measurement laboratory and 10 refrigerated containers for storage of cores.

Below this is the core processing deck, which has a microbiology laboratory which includes incubators among its equipment. There is also an X-ray and CT scanner laboratory to check that the physical properties and structure have not been altered by the cutting. In the core laboratory, also on this deck, X-ray fluorescence



An impression of the new ship, showing the six 2400kW azimuthing thrusters that provide both propulsion power for a modest 10knot service speed, as well as dynamic positioning. An additional tunnel thruster in the bow can assist when required.

is used to measure the major chemical components of each core, while the paleomagnetic laboratory is designed to be shielded from the earth's magnetic field to enable high-precision residual magnetism of the core sample to be measured as part of the data required or determining the core content age.

The deck below, known as the Laboratory Street Deck, has facilities for further analysis of core samples, including gas chromatograph analysis of organic substances in the sediment

of the cores. There also a paleontological and petrological laboratory included. The lowest of the four research decks contains a data integration centre and conference room.

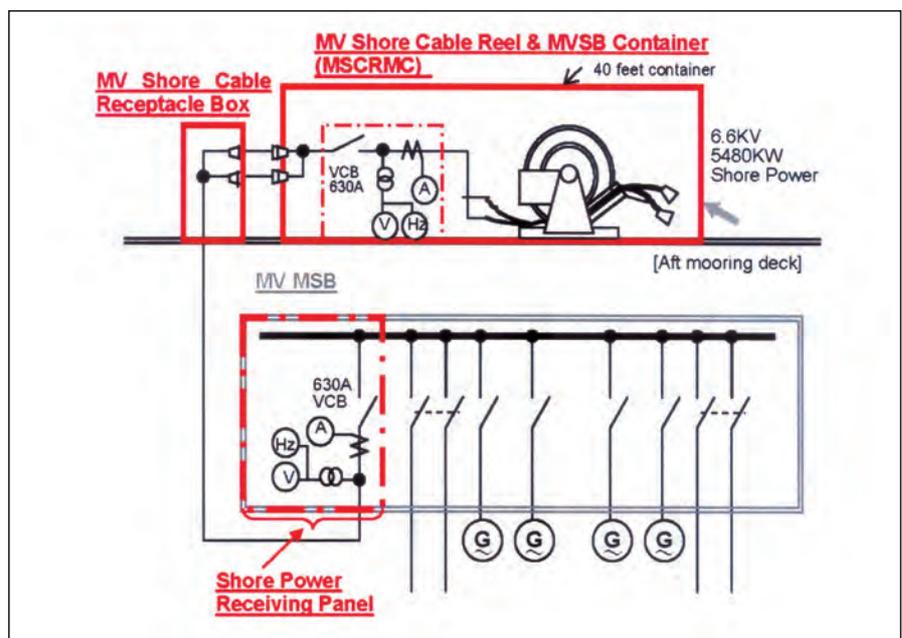
Core samples processed on *Chikyu* will be further analysed, and preserved, at the Centre for Advanced Marine Core Research, located at Kochi University, while overall planning for operations carried out by *Chikyu* is made at the Centre for Deep Earth Exploration (CDEX), within JAMSTEC.

## Cold-ironing packages for shore electrical supply in port

WITH much emphasis today being placed on the environmental aspects of marine technology, the concept known as cold-ironing has become an attractive option to minimise exhaust emissions while a ship is in port. Cold-ironing is a system whereby a ship shuts down its auxiliary diesel-alternators while at a quay and plugs into a shore supply of electricity.

Several Baltic ferries already feature this technique, and one of the first deepsea vessels to fit this system is believed to be the Mitsubishi-built *Hatsu Shine*, lead ship in a new series of

A diagram showing a JRCS 40ft container (top) with its cable reel, for accepting 6.6kV shore supplies. Below is the ship's switchboard with the shore power connection. This arrangement is for a new 9000TEU container liner to be built next year. JRCS plans to fit the container in a standard cargo slot at the very aft starboard end of the ship. A second container might be needed on the other side of the hull. An alternative version with a transformer has been designed for low-voltage retrofits.



7024TEU S-class container liners being built for the Taiwan-based Evergreen Group; a special article on this ship appeared in *The Naval Architect* January 2006, page 7. Evergreen is using its equipment at the US West Coast ports of Los Angeles and Long Beach, where environmental controls are most severe; however, this owner anticipates that more and more harbour authorities elsewhere will call for such equipment in the future and will install the special shore sockets (or similar) required.

Now the Japanese electrical equipment specialist JRCS Corp has launched two new AMP (alternative maritime power) arrangements to meet such requirements - one for high/medium-voltage circuits in new ships, and the other, a retrofit system for lower-voltage systems. As an

example, JRCS illustrates an arrangement for a new 9000TEU container liner, to be built next year and featuring four medium-voltage diesel-alternators (4 x 2760kVA).

The company will provide a cable reel and medium-voltage cabling, both fitted in a 40ft container, which sits in a slot at the extreme starboard aft end of the hull. This is planned to be portable if a ship changes route. A second container might be necessary on the port side. A container avoids the need for a new switchboard.

Equipment will include a shore power reception panel and a shore cable receptacle box able to supply 5480kW of shore power at 6.6kV to the ship. Prevention of blackouts during changeover to shore supply and *vice versa* would be ensured by synchronisation prior to the change.

For a project involving an existing Japanese-built container ship of 5000TEU with four 2750kVA alternators operating on low-voltage electrical circuits, JRCS proposes to retrofit equipment during a routine drydocking. Special equipment for such a ship would call for a stepdown transformer (to modify a 6.6kV shore supply) and to provide 2480kW of power, but the main switchboard on this typical vessel would not have space for a separate circuit for reception of shore power.

Therefore, by making use of an existing bow thruster circuit, shore power would be supplied through a bow thruster changeover switchboard, without any major modifications of the main switchboard. Ⓢ

## New semi-open bulk carrier design from Oshima

AS has been reported on many occasions in past issues of this journal, Oshima Shipbuilding is an expert in bulk carrier design and construction, having completed many innovative designs over the last 10 years or so, including ships with box-shaped holds, full double-hull versions, and part double-hull types - the NewBulk or Hy-Con concept. This company's latest offering is a 54,000dwt bulk carrier of the Super-Handymax size and what is called a semi-open design. Despite the double-hull construction, a fully loaded deadweight of 54,000dwt is possible.

In this type, full-width (25.80m) hatch openings are adopted at all holds, but with a cross-deck at the fore and aft end of each opening, so that the hatch area is actually less than the hold dimensions. The structural benefits of adopting such a design are a robust hull and easy access to the double-bottom tanks under loaded conditions.

A semi-open arrangement means that the ship can still retain a large hold volume, and should be attractive to operators wishing to carry a range of cargoes, including steel products, pipes, general goods, wood and pulp products, packaged lumber, and logs (the last-mentioned is an option). Four 30tonne jib cranes (at 26m outreach) are fitted on the centreline between the hatches.

At the same time, Oshima has created some alternative semi-open versions of 50,000dwt, 52,000dwt and 54,000dwt, which can include hopper-type holds or bench-type bottoms in hold Nos 1 and 5.

Additional features of this new semi-open series include improved cargo loading and discharge efficiency, reduced fuel consumption, environment protection, reduced maintenance work, and better operational safety. To help reduce fuel use, two pairs of Oshima's new patented wake acceleration fins (WA-FIN) are fitted at the stern, while Oshima's Seaworthy Bow form is adopted to improve seakeeping and limit resistance in rough weather conditions.

For superior manoeuvrability and course-keeping, a mariner-type Schilling rudder - operating in association with a rotary-vane



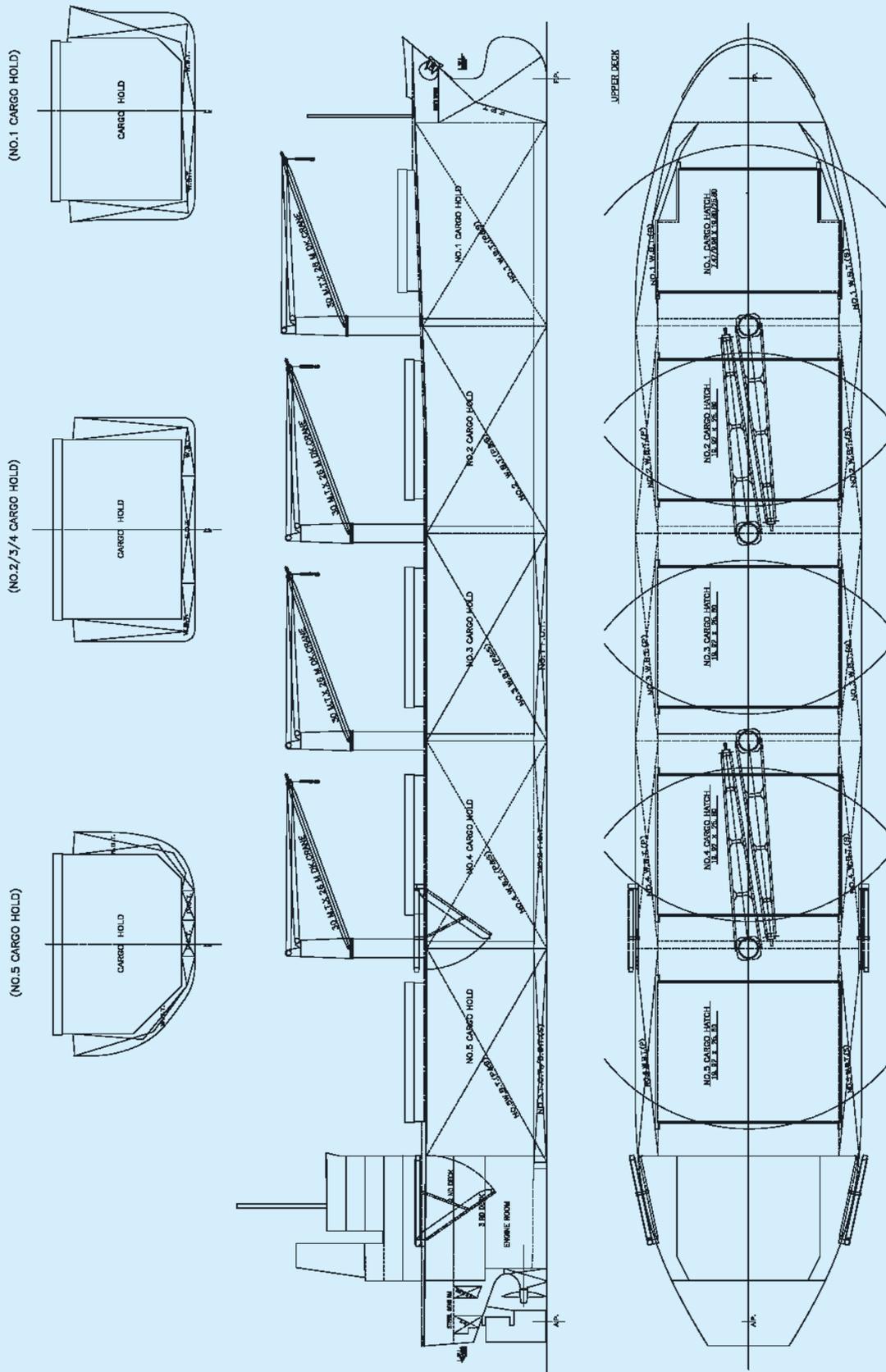
By the end of May this year, Oshima will have delivered four examples of its new 54,000dwt Super-Handymax semi-open bulk carrier, the first in November 2005. Five ships of the 52,000dwt type have also been completed. Seen here is the 54,000dwt *Simurgh*, delivered to a Japanese owner. A further 20 ships (approximately) of all sizes (50,000dwt to 54,000dwt) remain on order.

steering gear - is fitted. This arrangement is patented by Oshima and Japan Hamworthy Co.

A fuel pre-heating system is specified in lieu of heating coils to reduce maintenance and to restrict steam consumption, while a non-toxic

tar-free paint system is applied in the ballast tanks for health and environment reasons, and the pure-epoxy CIT system from Chugoku Paint is used on the exterior shell, weather deck, and cargo hold to reduce maintenance. Ⓢ

General arrangement plans of Oshima Shipbuilding's new 54,000dwt semi-open type bulk carrier, which claims several useful operating benefits, as well as improved propulsion efficiency.



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# Mineral fibres help prevent cracks in ballast-tank coatings

**E**XTENSIVE research by the Danish paint manufacturer Hempel has resulted in a most interesting new product, Hempadur Fibre 4760. This is especially aimed at solving the problem of cracks in ballast-tank coatings, which can lead to premature corrosion. By adding synthetic mineral fibres to the composition, Hempel is adopting the benefits already proven in other industries; the fibres provide reinforcement to epoxy formulae and offer attractive levels of improvement in both tensile strength and elongation.

Such an advance should be of great interest to owners operating ships with double-skin hulls, where access is often difficult, and the spaces tricky to inspect and maintain. Hempel claims to be the first company to adopt mineral-fibre technology for epoxy-type ballast-tank coatings.

Coating cracks - particularly along edges and in corners, where thicker or even excessive layers are sometimes applied - can occur for many reasons, including mechanical, thermal, vibration, wet/dry cycles, or navigating in ice. Hempel experimented with several different possibilities to overcome cracking problems, but three principal additives, synthetic minerals, wollastonite, and cellulose, showed the most promise. The company eventually chose synthetic minerals as offering the best overall protection.

Experiments using the Mandrel system, the NACE TM0304 resistance method, and impact tests showed that all three additions offered 'dramatic' reductions in cracking compared with conventional epoxy coatings, but that synthetic minerals were superior - the fibres play a special part when stress is severe enough to break the paint binder.

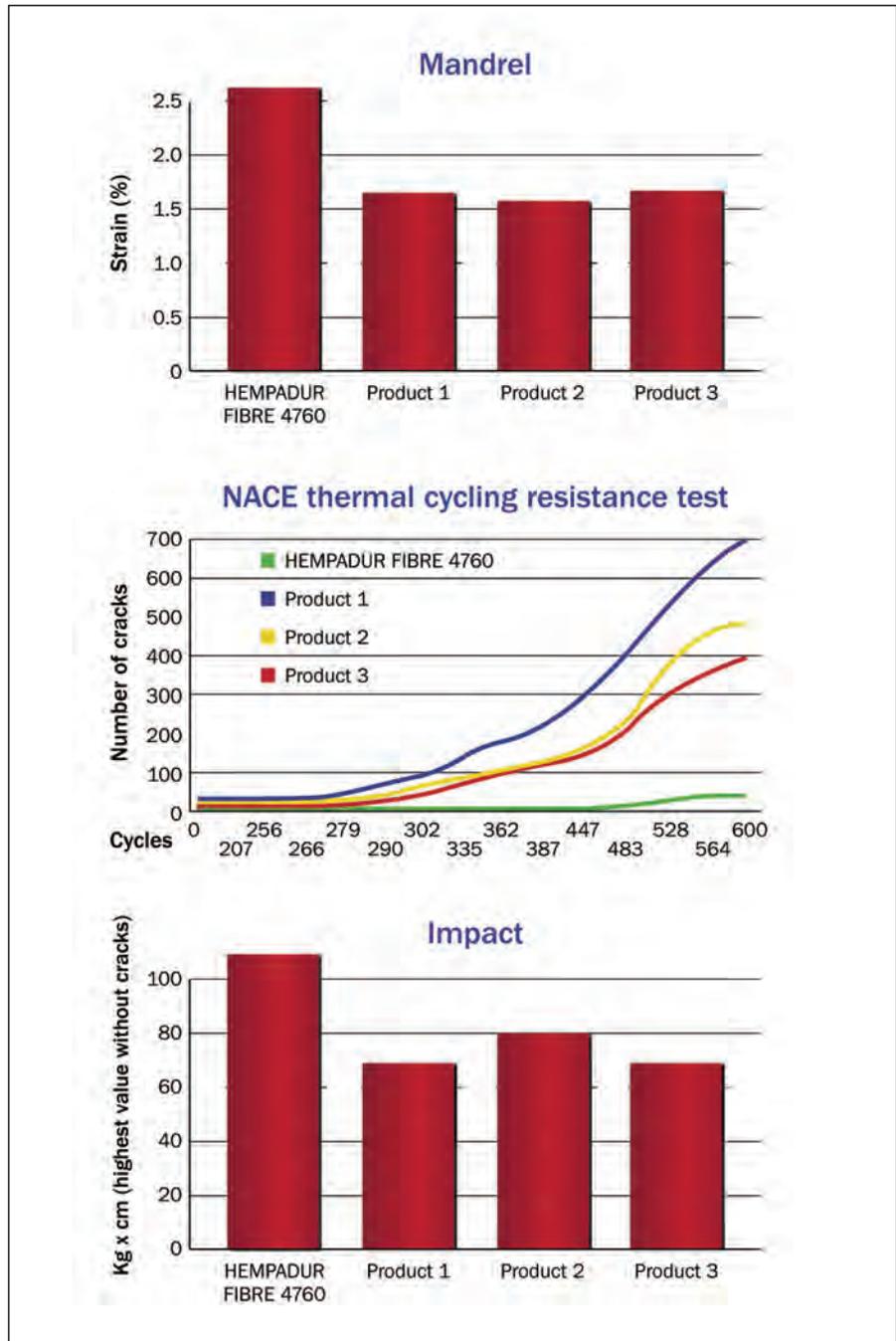
Hempadur Fibre 4760 has been given B1 certification by Det Norske Veritas and a NORSOK prequalification from the National Institute of Technology, in Norway. The product is offered in an aluminium pigmented shade, which is recommended as a primer coat in order to optimise corrosion protection in submerged conditions.

Although mainly intended for ballast tanks, Hempadur Fibre 4760 is also recommended for most other ship surfaces as a universal primer, including hull, decks, superstructures, and cargo holds. If used in such locations, the new coating can help to restrict the several different products often used onboard a new ship.

Application is said to be easy, whether by brush, spray, or roller, and curing will take place down to temperatures down to -10°C, ie, similar to conventional epoxy systems. For ballast tanks, cargo holds, oil tanks, void spaces, and cofferdams, Hempel recommends a standard specification of two coats of Hempadur Fibre 4760, each of 100micron-200micron dry film thickness. A minimum total of 300micron should be applied, says the company.

## Progress with Hempasil Nexus

Meanwhile, Hempel has today notched up 50 references for its Hempasil Nexus biocide-free



Three graphs showing the significant improvement in cracking performance offered by Hempel's new ballast tank coating, Hempadur Fibre 4760. Although developed mainly for ballast tank use, the product can also be applied as a universal primer in many other key locations onboard a ship at the newbuilding stage.

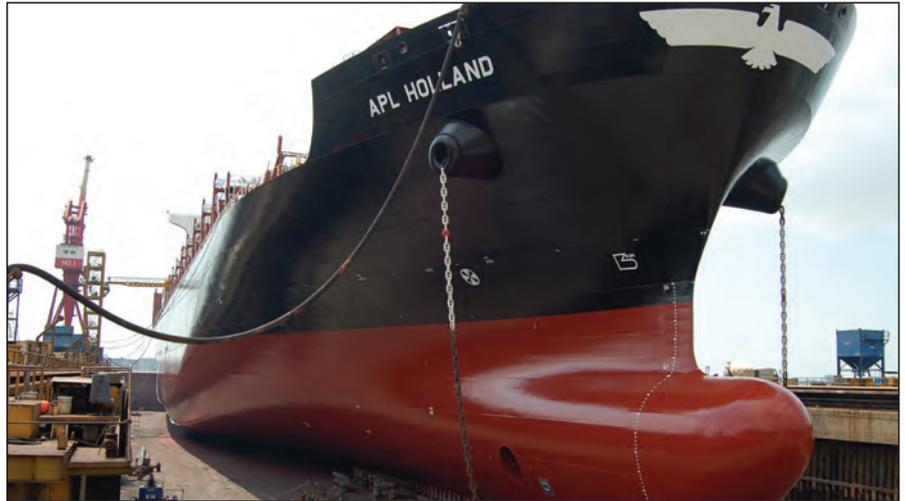
foul-release hull coating, with its innovative three-pack Nexus tie-coat. The product is mainly aimed at high-activity ships, high-speed craft, and for rudders and propellers. Nexus is the Latin word for connection between two equal parts, and this brand name symbolises that it is

building a bridge from the anti-corrosive coats to the anti-corrosive properties within itself, and from the silicone-based topcoat into its own silicone part.

Real-life results with Hempasil Nexus indicate fuel savings in the order of 2%-4%, and a very

large container liner could save an estimated US\$1 million over 10 years, based on a fuel price of US\$300/tonne and 1% saving. The system is claimed to have the same mechanical strength as normal antifouling systems and not to be any more sensitive to mechanical damage than other antifouling systems. 

A Hempasil Nexus foul-release coating was applied during February this year in Singapore to the container liner *APL Holland*. Apart from red, the product is also available in grey, blue, and black. Photograph: Hempel A/S.



## Sixty months of smoothness with new coating

A NEW coating has recently been launched by Jotun. SeaLion foul-release coating (FRC) is a silicone-based elastomeric coating with a smooth, non-stick, water-repellent, and self-cleaning surface. It claims to keep hulls, propellers, and rudders free from fouling, and to provide a smooth surface, for at least 60 months.

The success of SeaLion foul-release system is dependent upon three products working in harmony, that is: Safeguard Universal ES, an anti-corrosive bridge coat; SeaLion tie-coat - a high-adhesion component; and SeaLion top-coat, a smooth upper layer.

To combine the features of the anti-corrosive on the one hand and the smooth topcoat on the other requires a good tie-coat. However effective the bridge coat and efficient the surface of the top-coat, the ability of the tie-coat to form perfect adhesion between the two is critical. Jotun has developed the SeaLion tie-coat, which acts like an epoxy-type seal on the inside and a silicone-like seal with the SeaLion top-coat. Naturally, no biocides are released.

SeaLion's smooth surface should result in less fouling of hulls, propellers, and rudders, and lead to improved vessel performance and fuel benefits. By comparing SeaLion with most TBT-free antifouling products over a 10-year perspective, fuel savings are estimated to be 1.5%, according to Jotun.

It is not only fuel costs that should be reduced by using SeaLion, a vessel also needs less paint. Often, up to 40% of a silicone FRC can be lost into the atmosphere on application, but SeaLion is claimed to reduce volumes lost, due to little dry spray. SeaLion is said to be easy to apply, and at the recommended film thickness, there should be no sagging.

Generally, silicone-based elastomeric coatings are less hard than traditional TBT-free antifouling. SeaLion dries faster than other similar coatings which reduces the risk of damage. Whilst care must be taken to avoid scraping or scratching, this coating provides a cushion effect which offers good protection against bumps. 

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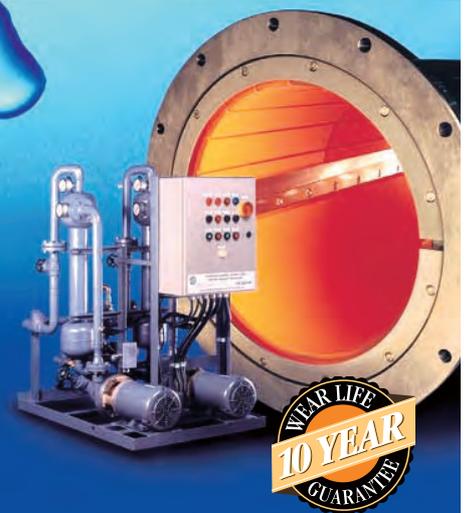


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# Composite shows its superiority in icy waters

UNLIKE a conventional 'paint', Ecospeed, manufactured by the Belgian company Subsea Industries, is a tough, durable, and ice-resistant composite which can be usefully employed as a marine coating. The qualities of this unusual product are said to be most suited to extreme environments, such as the Baltic Sea area, where strength and a high degree of protection are vital to shield hulls, propellers, and rudders.

As an example of the qualities that the product can exhibit, the general cargo ship, *Patriot*, which mainly operates in the Baltic region and Finnish inland waterways, was recently coated with Ecospeed. This ship sails through extreme weather conditions, and frequently comes into contact with ice during the winter season.

An extreme durable hull protection system was essential in protecting the vessel against these weather conditions, whilst the rudder needs protection against cavitation and pitting. When using a conventional paint system, significant damage occurred from heavy ice impact, especially around the area of the bow. As is common, the 'scraping effect', caused by ice, removed the applied paint layers back to bare steel.

Nine months after being applied with Ecospeed, the coating on *Patriot* is claimed to be in perfect condition, though the ship was subjected to the worst of winter weather, including frequent contact with ice.

Moreover, the captain of *Patriot* noticed a very significant increase in speed after the Ecospeed coating. This is claimed to be due to a decrease of frictional resistance, and therefore less fuel consumption is obtained owing to the surface profile of the coating.

Ecospeed is a barrier-type coating which completely isolates steel from salt water and corrosion. Most coatings break-down due to corrosive products permeating through and thereby allowing corrosion to occur. Ecospeed, however, is a glass-like isolator, which is claimed as 100% impermeable and is therefore highly efficient in protecting against corrosion.

The coating contains no active or toxic constituents. However, it has a mechanical self-cleaning surface, which, in effect, is its own antifouling system, too. The toughness and smoothness of the coating provides effective non-stick properties preventing marine fouling when operating at speed.

Ecospeed is a homogeneous coating that protects both hull and propeller from corrosion and marine fouling for an extended period of time. Concerning propellers, Ecospeed, it is claimed, substantially reduces the effects of cavitation and pitting, giving a greatly enhanced service life.

Fuel costs may also be reduced using this product, and only two 500micron layers need to be applied. When a vessel is re-floated after application, Ecospeed is conditioned to a mirror-like finish. It is this finish that provides an extremely low drag, allowing more economical cruising speeds and fuel savings.



*Patriot's* bow prior to coating with Ecospeed.



*Patriot* was coated with Ecospeed, and despite working in extremely cold conditions, nine months after application, the coating was reportedly in perfect condition.

An optimal surface smoothness can also be regained at all times. Fouling can occur after no or little activity, but even then, in-water hull cleaning can easily maintain the condition of the hull and return it to an optimum condition.

The coating can also be cleaned by high-pressure water jetting (300bar) in drydock without damaging it. The Ecospeed coating features stable, homogeneous layers, which also makes repairs simple to carry out. ⚓



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## Tank lining and coating system for new Turkish acid-carrier fleet

WHEN Turkey-based KS Shipping decided to add a series of five new chemical tankers to its fleet, the company required a protective tank lining system for ultra-demanding performance. USA-based Advanced Polymer Coatings (APC) presented its relatively new MarineLine-based lining and coating system. This was offered to help ensure that the KS ships could carry the maximum types of cargoes possible by providing resistance to a wide of chemicals including acids and also have the added strength to withstand basic mechanical damage.

The fleet of five 15,300dwt ships required unusual classification. Key engineering specifications outlined the requirement that the tanks were able to carry acids with a specific gravity of up to 1.9 and meet all IMO II specifications. In addition, a key demand was that a barrier be installed in order to prevent mechanical damage to the tanktops. Each of the ships contains 18 cargo tanks and two slop tanks.

MarineLine was eventually chosen by KS Shipping. To answer the need for a mechanical barrier, a special MarineLine-impregnated glassfibre-reinforced matting system was developed to cover and protect the tanktops and bulkheads. This lining is around 95mm-130mm thick, providing high tolerance to mechanical damage (more than 10 times greater impact resistance than the coating alone).

Construction of these vessels is taking place at Cicek Shipyard, in Turkey. The first vessel, *Puli*, has already been completed and is in service (presented in *Significant Ships of 2005*). Her tank lining system began with a MarineLine coating applied in two spray coats to the deckhead and bulkheads. A MarineLine base coating was also applied to the tanktops. This

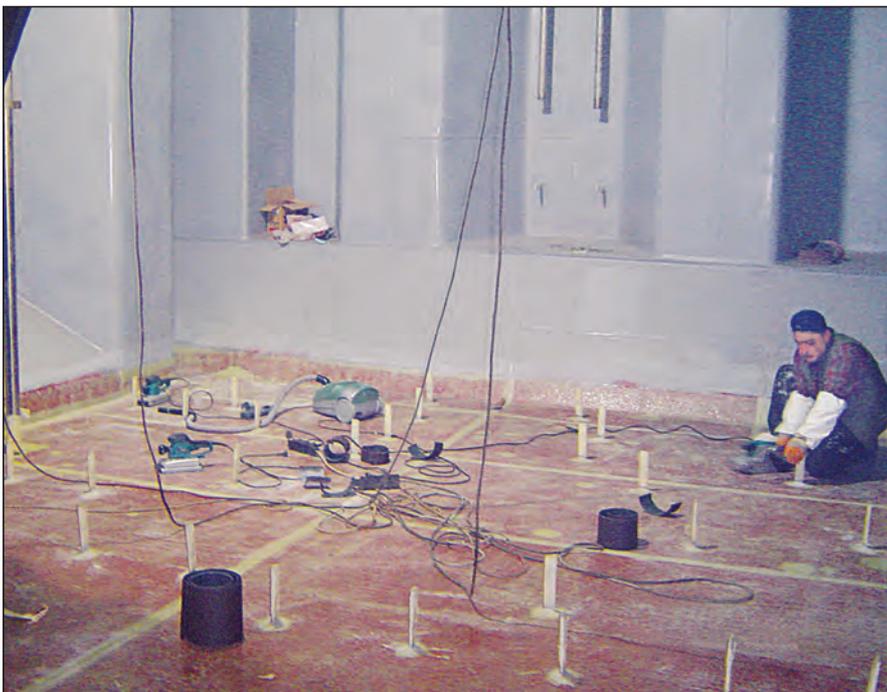


A MarineLine-impregnated glassfibre system being applied to a cargo tanks in one of the new KS Shipping tankers.

area was then wetted out with MarineLine glassfibre rolled into the resin. Next, the glassfibre-reinforced surface was smoothly sanded before a final coating of MarineLine was applied. The entire tank area was then heat-cured.

*Puli* was recently purchased from KS Shipping by Uni Tankers, of Denmark, and renamed *Fionia Swan*. The second ship, *Puli I*, has also been completed with the MarineLine coating and lining system, and is expected to be delivered in the coming autumn. This ship has also been sold to The Netherlands-based company Lauranne Shipping. Construction of a third vessel, *Puli II*, is in progress now at Cicek, and the final two ships in the series will be completed after that.

As IMO II-approved chemical tankers, these vessels carry a Bureau Veritas 'Clean Sea' notation as well as Ice Class 1A certification, so they can operate in the Baltic all-year round. They also are designed to carry the maximum number of different cargoes, complying with the industry's highest standards. This enhanced lining system should provide excellent resistance to a wide range of ultra-aggressive agents, while the MarineLine-impregnated glassfibre lining delivers ongoing protection against mechanical damage. Ⓢ



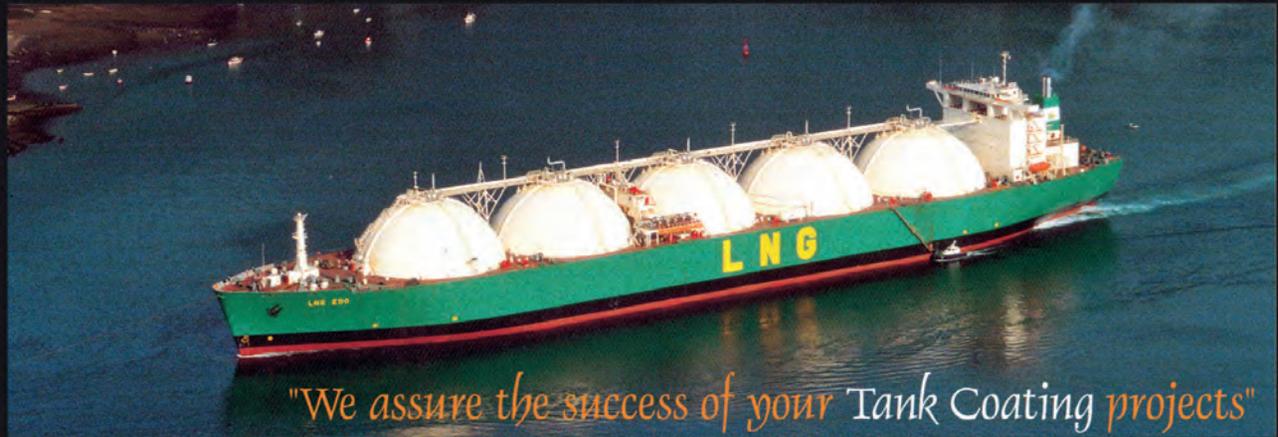
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## Paint price hikes still cause concern

As reported earlier this year in our March issue, the costs of many raw materials associated with paint manufacture are major influences on prices today. This subject continues to cause concern, reports International Marine Coatings (International Paint).

Particularly alarming is a further rise in the price of zinc, which at the beginning of May had risen to US\$3510/tonne, compared with US\$2390 in February this year; zinc is extensively used in anticorrosive primers. Likewise, copper now costs a huge US\$7807/tonne (previously US\$5145), while aluminium has risen slightly to US\$2870 (previously US\$2650).

In other news, the first ship to be coated by International Paint Japan, the re-formed organisation following the agreed split from Nippon Paint in 2004, has been floated out at Universal Shipbuilding's Tsu works. This is the first of two 75,500m<sup>3</sup> LNG carriers - Medmax size - for joint operation by Hyproc and MOL. Each ship is being coated with more than 150,000litres of products, including Intershield 300 in the ballast tanks, and Intersmooth 465 SPC on the underwater hull.



Seen here at the end of April at Universal Shipbuilding's Tsu yard are three of International Paint Japan's technical team in front of the first of the new Medmax LNG carriers for Hyproc Shipping Co (wholly owned by Sonatrach, the Algerian state-owned hydrocarbon company) and MOL. The ship has just been floated out.

### BOOK REVIEW

#### Ship Stability for Masters and Mates Sixth Edition

By C B Barrass and D R Derrett. Published by Butterworth-Heinemann, Linacre House, Jordan Hill, Oxford OX2 8DP, UK. 2006. 534 pages. ISBN 13: 987-0-7506-6784-5. ISBN 10: 0-7506-6784-2. Soft back. Price: £29.99.

Dr Barrass is a lecturer in ship technology at Liverpool John Moore's University, UK, and is well known as an authority on ship stability and squat. Captain Derrett was formerly head of the navigation department at Hull Nautical College, UK.

Earlier versions of this textbook are well known in the profession, and its popularity is shown by the fact that the fifth edition, published in 1999, has been reprinted six times. This new edition is considerably enlarged, having some 20% more pages and 12 new chapters.

The book is written specifically for students studying for their Transport Certificates of Competency for Deck Officers and Engineering Officers, and STCW equivalent international qualifications. It reflects the major changes

made in 2004 to the syllabuses for the courses concerned. The new chapters deal with, amongst other things, floodable length curves, icing allowances, loadline marks, synchronous and parametric rolling, the effects of side winds on stability, and air draught considerations.

The chapter on squat has been considerably revised, with extra worked examples and a section added on squat in wide and narrow rivers. Two case studies have been added to the chapter dealing with interactions between ships and between ship and shore.

Although the title of the book suggests it is limited to considerations of stability, it also contains four chapters (50 pages) as an introduction to ship strength, starting with the bending of a simple beam. It then progresses to the derivation of strength curves for ships and the bending and shear stresses in still water and in waves.

One chapter shows how the small angle stability of a ship dictates her periods of roll and pitch in still water. A second, new, chapter goes on to introduce the concepts of synchronous and parametric rolling.

As with earlier editions, many worked examples are included within the chapters, and

exercises are set at the end of each chapter. The answers to these are provided. An appendix gives specimen recent examination questions with the marking scheme adopted.

The section giving advice to students on how to approach, and do well in, examinations, has been expanded. The advice is generally common sense but it is surprising how many candidates do not follow a sensible approach and end up doing less well than they should and could. As in previous editions there is an appendix presenting 'Revision one-liners' as an aid to examination preparation. The number of one-liners has been increased from 65 to 100. A glossary of terms has been introduced, as have photographs of a number of merchant ship types.

The extensive revision has improved the value of the book, which is well targeted at its intended audience. It can be thoroughly recommended to masters, mates, and engineer officers preparing for their SQA/MCA written and oral examinations. It will also help ONC, HNC, and HND students, and provide a quick and handy reference to others working in the maritime field.

*E C Tupper*

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### First Notice & Call for Papers



Advances in structural modelling have allowed regulators to move away from the traditional deterministic approaches that were based on empirical formulae derived from experience. Modern methods allow for a more predictive approach and mark a significant step in the evolution of ship design.

The notion of goal-based ship construction standards was introduced to the International Maritime Organisation (IMO) in 2002. These standards are to give the IMO a greater role in determining the standard to which ships are built. The job of ensuring that ships meet these standards will still lie largely with the classification societies. The IMO is scheduled to introduce goal-based standards by 2010.



In response to industry requests, and with these new developments at the IMO in mind, The International Association of Classification Societies (IACS) has developed common structural rules (CSR) for Bulk Carriers and Tankers. These were implemented on 1 April 2006.

The concept of risk based design has been made possible by the advances in numerical modelling. This concept can be used to determine the most efficient means by which to reduce risk. This technique was used in the formulation of the Common Structural Rules



This conference will bring together classification societies, regulators, naval architects, shipbuilders and operators to discuss the impact of these new concepts and regulatory changes. Papers are invited on all related topics including the following:

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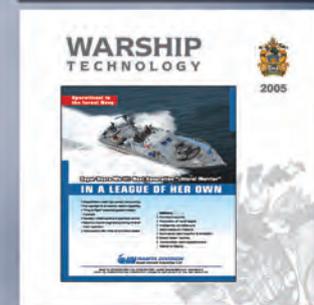
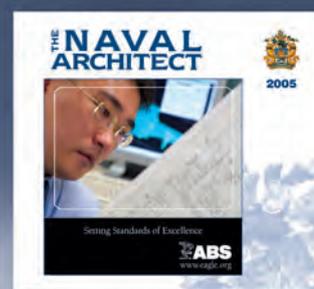
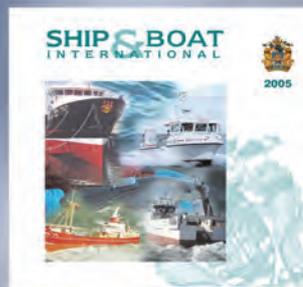
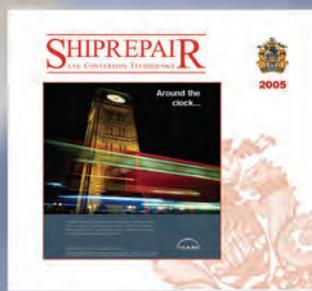
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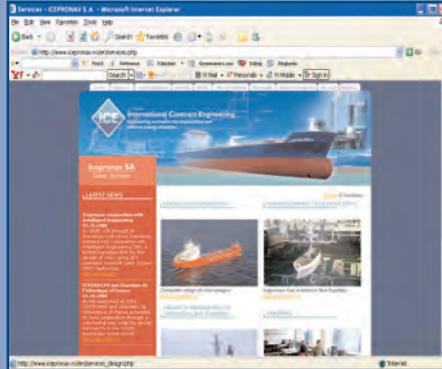
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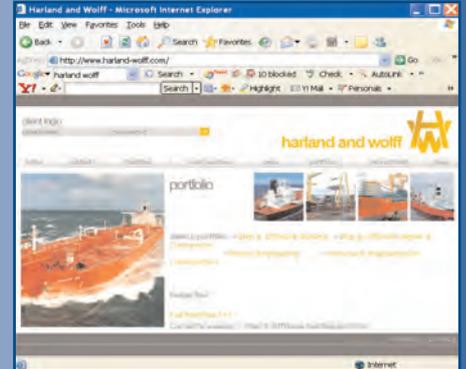
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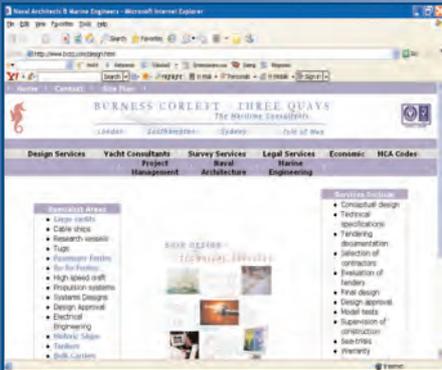
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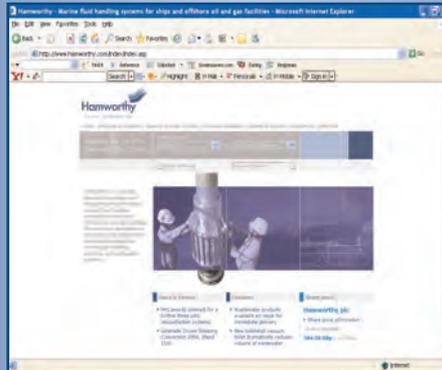
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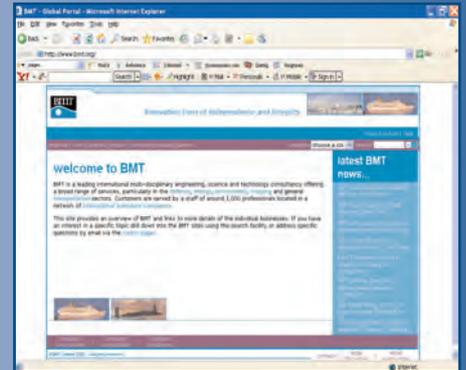
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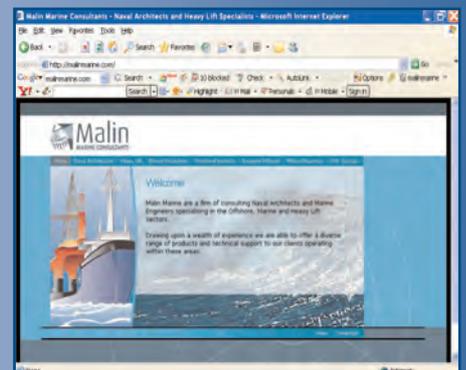
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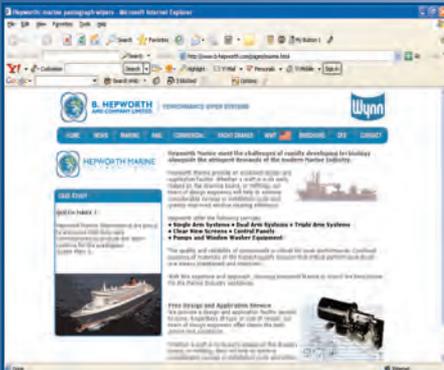
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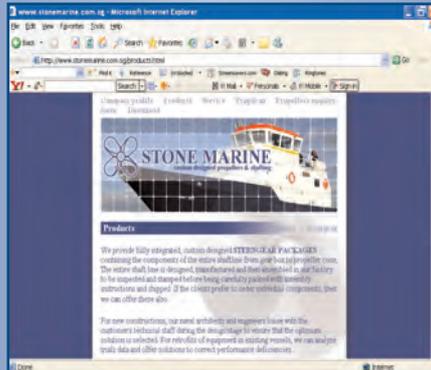
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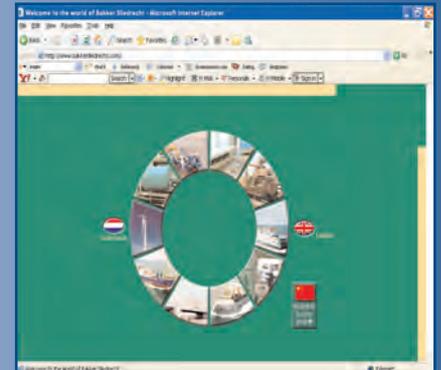
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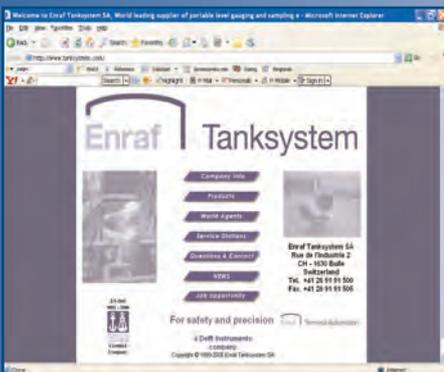
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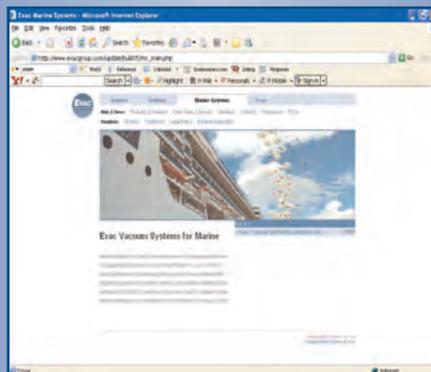
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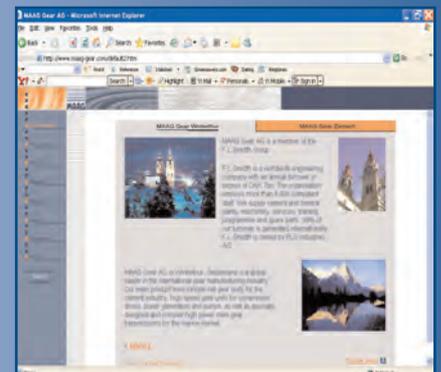
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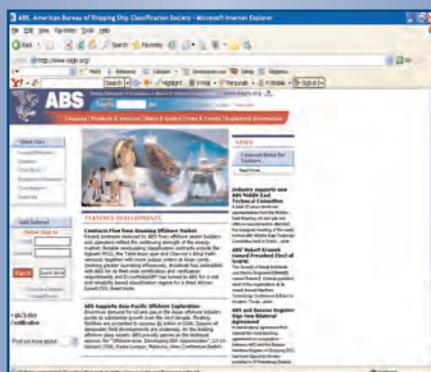
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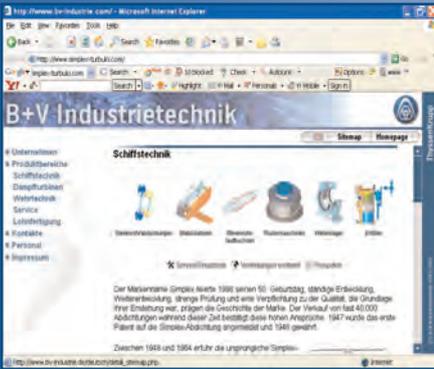
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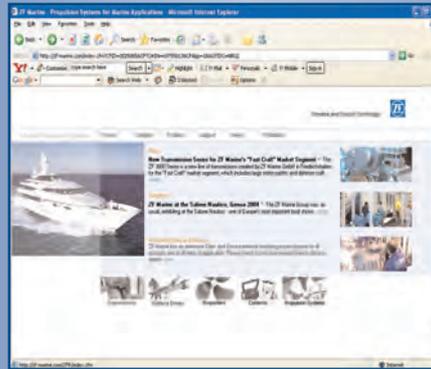
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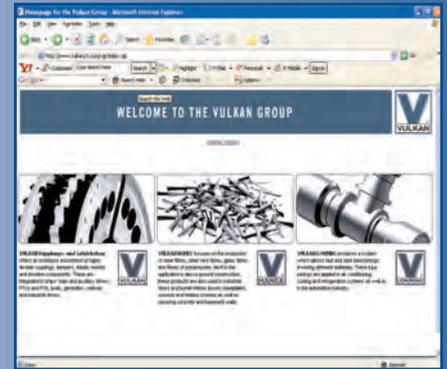
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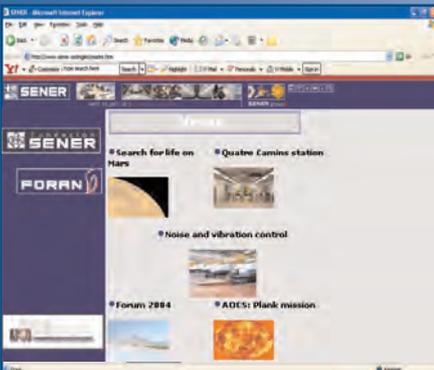
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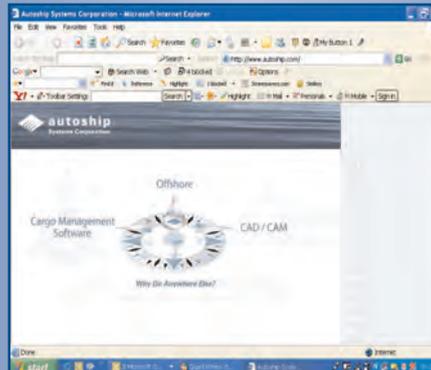
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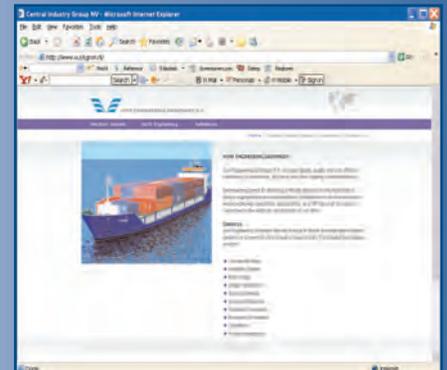
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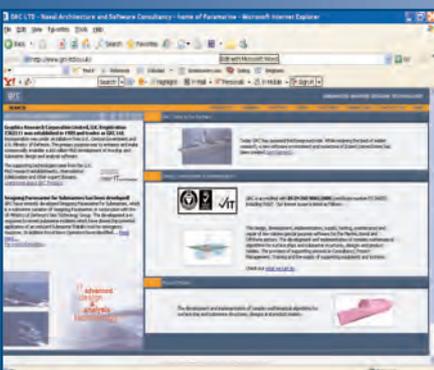
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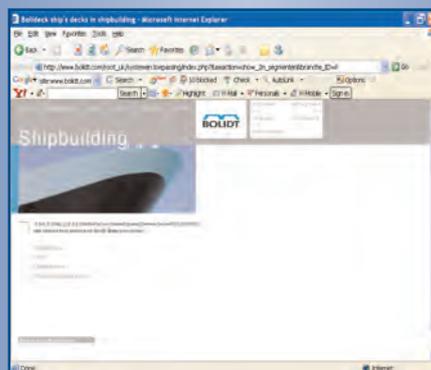
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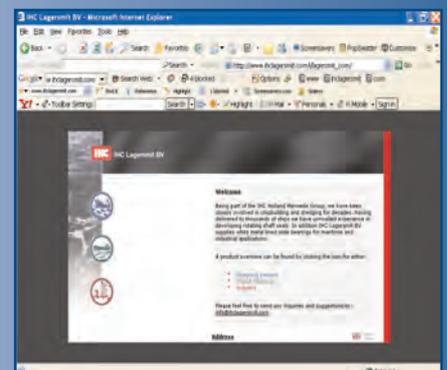
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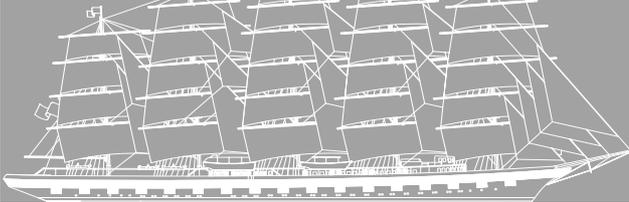


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E-mail rachael.brough@informa.com  
www.lloydslistevents.com/lm1779

**July 10-12, 2006: 3rd International ASRANet Colloquium, integrating structural analysis, risk, and reliability,** Glasgow, UK. Contact: Professor P K Das, Department of Naval Architecture and Marine Engineering, Universities of Glasgow and Strathclyde, Henry Dyer Building, 100 Montrose Street, Glasgow G4 0LZ, UK.

Tel: +44 141 548 3462.

Fax: +44 141 552 2879.

E-mail: p.k.das@na-me.ac.uk

**July 17-18, 2006: Engine & Machinery Failure Seminar, understanding roles and requirements in failure detection and analysis, seminar,** London, UK. Contact: Lloyd's Maritime Academy, London.

Tel: +44 20 7017 5511.

E-mail: suzanne.kaye@informa.com

www.lloydsmaritimeacademy.com/lm1781

**September 4-6, 2006: MARTEC 2006, 5th regional conference on marine technology,** Makassar, Indonesia. Contact: Ir Ganding Sitepu or A Y Baeda, MT, Faculty of Engineering, University of Hasanuddin, Jl Perintis Kemerdekaan KM 10, Makassar 90245, Indonesia. Tel and Fax: +62 411 585637.

E-mail: kapal9uh@indosat.net.id

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Tel: +44 20 7235 4622. Fax: +44 20 7259 5912. E-mail: conference@rina.org.uk

**September 11-12, 2006: Dismantling of Obsolete Vessels,** Glasgow, Scotland. Contact: Professor Purnendu K Das, Department of Naval Architecture & Marine Engineering, Universities of Glasgow and Strathclyde, Henry Dyer Building, 100 Montrose Street, Glasgow G4 0LZ Scotland, UK. Tel: +44 141 548 3462.

Fax: +44 141 552 2879.

E-mail: p.k.das@na-me.ac.uk

**September 26-29, 2006: SMM, international shipbuilding fair,** Hamburg, Germany. Contact: Hamburg Messe und Congress GmbH, St Petersburger Strasse 1, 20355 Hamburg, Germany.

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Tel: +33 298234035. Fax: +33 298233857.

E-mail: billard@ecole-navale.fr

**October 25-28, 2006: Shipport China 2006, 5th international shipbuilding, port and marine technology and transportation equipment exhibition,** Dalian, China. Contact: Business & Industrial Trade Fairs Ltd, Unit 103-105, New East Ocean Centre, 9 Science Museum Road, Tsimshatsui East, Hong Kong.

Tel: +852 2865 2633.

Fax: +852 2866 1770, 2866 2076.

E-mail: shipport@bitf.com.hk

**November 22-23, 2006: ShipRepair & Conversion 2006,** Amsterdam, The Netherlands. Contact: Informa, London.

E-mail: katie.devaney@informa.com  
www.shiprepair.com

**December 4-7, 2006: Gastech 2006, international conference and exhibition for the LNG, LPG, and natural gas industries,** Abu Dhabi. Contact: DMG World Media (UK). Tel: +44 1737 855000. Fax: +44 1737 855482.

E-mail: info@gastech.co.uk

www.gastech.co.uk

**January 23-25, 2007: INMEX Malaysia.** Contact: Ms Anjali Pandit, manager - events & expos, PDA Trade Fairs.

Tel: +91 80 2554 7434. Fax: +91 80 2554 2258.

E-mail: anjali@pdatradeairs.com

www.pdatradeairs.com/inmexmalay.html

**March 12-14, 2007: International conference on advancements in marine structures,** Glasgow, UK. Contact: MARSTRUCT - Network of Excellence on Marine Structures, Professor P K Das, Dept of Naval Architecture and Marine Engineering, Universities of Glasgow and Strathclyde, Henry Dyer Building, 100 Montrose Street, Glasgow G4 0LZ, UK.

Tel: +44 141 548 3462. Fax: +44 141 552 2879.

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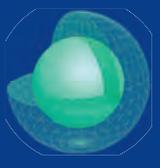
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