

BULK CARRIER FOCUS

TECHNICAL NEWS AND INFORMATION ON BULK CARRIERS

OCT 2005 Issue 2

Welcome to the second issue of *Bulk Carrier Focus*, a technical publication produced by Lloyd's Register exclusively for the bulk carrier industry.



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Lloyd's
Register

Bulk carrier market update

Despite the recent period of booming freight rates, ordering of bulk carriers has been relatively restrained. The question now is whether this will be sufficient to prevent the bulk carrier market from crashing.

Freight rates have only one way to go as the market rebalances itself.

Forecasters and economists are predicting an optimistic future for bulk carriers on the demand side, although there is some reservation about the level of reliance being placed upon dry bulk trade growth generated by China.

The long-term outlook for dry bulk trade is underpinned by growth in global steel production. Having expanded by 7.1% per year between 2003 and 2005, steel production is forecast to grow by 2.4% per year from 2006 onwards, which is still ahead of the long-term growth rate of 1.6%. This growth is dominated by demand from China, where steel production is anticipated to grow at 6% per year, reaching 515.6 million tons in 2015; as a result, Chinese ore imports will increase to 544.4 million tons annually by 2015 and steel production will grow to represent 36% of global output.

Other dry bulk commodities are forecast to increase, although not as dramatically as the ore trade's 4.4% annual growth. Looking ahead to 2015, seaborne trade of steam coal is set to increase at an average annual rate of 3.6%, coking coal at 1.8%, and grain/soya trades at 2.9%.

A potential downside for dry bulk markets could be oversupply, with over 20 million dwt of new bulk carriers being delivered every year for the rest of the decade and very little scrapping likely until 2008. This new tonnage will be able to absorb the demand, as the fleet grows at approximately 5% each year. With an easing of port congestion expected over the next 18 months, further aiding supply, freight rates have only one way to go as the market rebalances itself.

Given the trade growth rates outlined above, freight rates are expected to fall quickly, but not to distress levels. One-year daily time charter rates for capes are predicted to average out at \$50,700 in 2005, falling to \$25,500 in 2006, \$19,000 in 2007, and declining to a trough of \$14,900 in 2010. Chart 1 shows the forecast rates to 2015.

In terms of future contracting behaviour, there is still some ordering anticipated for larger ships, driven by cargo growth. In addition, a considerable proportion of contracting will be for replacement tonnage for the ageing handy fleet. There are currently over 1,600 handysize ships over 20 years of age in the fleet, many of which are expected to be replaced by handymax bulk carriers; in the contracting forecast (see Chart 2) this is reflected in the 50,000-79,999 dwt range.

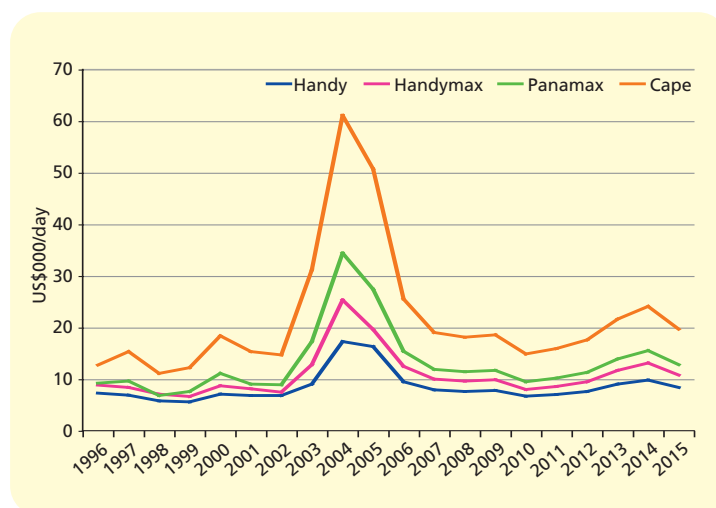


Chart 1: one-year daily time charter rates.
(Source: MSI)

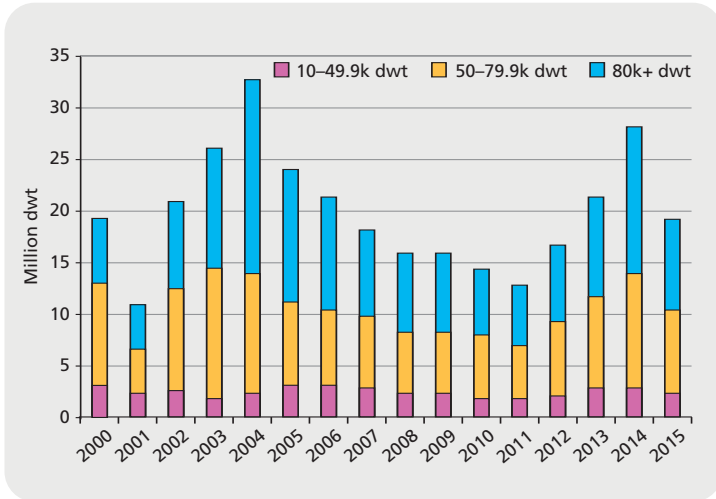


Chart 2: contracting forecast. (Source: MSI)

Ship prices will also fall, although not to pre-boom lows as some level of resilience in prices is expected due to full order books and rising costs, particularly with reference to steel prices. Average prices for cape, panamax and handymax ships in 2006 are forecast to be \$59 million, \$35.5 million and \$31 million, respectively, gradually falling a further 20-25% to a low in 2010.

To highlight just how sensitive these predictions could be to the vagaries of the 'China effect', if Chinese steel production were to fall by 10% then seaborne iron ore trade would reduce by 7-8%. This would reduce capesize time charter rates by 20-22%, taking the predicted average 2007 rate to \$14.8 per day and the trough in 2010 to \$11.4 per day – rates that have not been seen since the late 1990s.

The Asian dominance in dry bulk imports, predicted to grow from 51% to 57% by 2015, is also having an effect on trades by increasing Pacific-bound dominance.

If Chinese steel production were to fall by 10% then seaborne iron ore trade would reduce by 7-8%.

One of the most noticeable effects is in the distribution of the different sub-segments making up the bulk carrier fleet. At the beginning of this decade, handysize ships made up 41% of the fleet in deadweight terms, capes 32% and panamax 27%. As Chart 3 shows, today the fleet is now practically split into thirds by deadweight. However, the future shows a very different picture. The tonnage being delivered over the next few years will consist largely of capesize and panamax tonnage and, with replacement tonnage for the handy fleet falling into the handymax category, the sub-50,000 dwt proportion of the fleet will reduce significantly. Most gains will be made in capesize tonnage, which will represent 41% of the fleet by 2015.

The outlook for the bulk carrier market may not be as bright as it was in the recent past, but it is not yet in freefall. In fact, if the China effect is sustained then the boom-and-bust cycle may have been broken – or at least its extremes truncated – and bulk carriers may prove to be a more stable and sustainable shipowning environment. There is, of course, the risk associated with the reliance on Chinese steel production, which could be exacerbated in the future by a fleet heavily weighted towards capesize vessels. The probability of a major downturn in Chinese steel production may be considered relatively small, but the consequences would nonetheless be considerable. The risk is certainly sufficient to warrant owners keeping at least one eye on the steel markets.

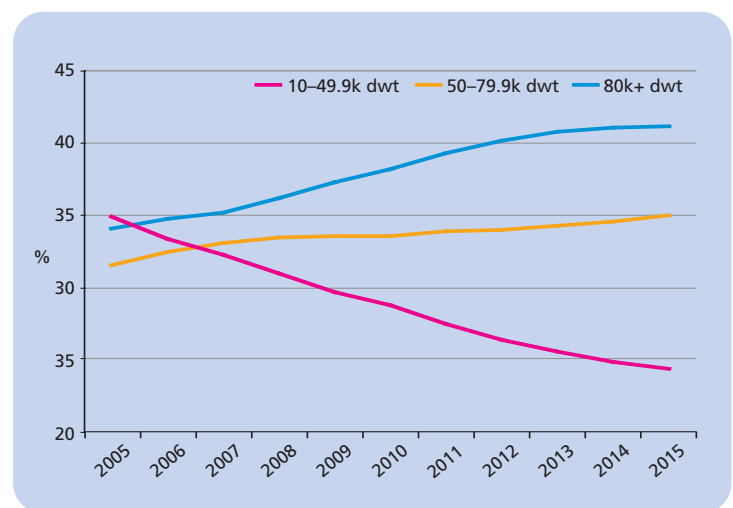


Chart 3: distribution of fleet by size. (Source: MSI)

For further information contact

Ian Harrison, Business Manager – Bulk Carriers, Lloyd's Register
 E: ian.harrison@lr.org
 T: +44 (0)20 7423 1491
 F: +44 (0)20 7423 2213

Rules and regulations



The common rule projects continue and clarifications of revised SOLAS requirements are being developed. An update on the progress of some of the main issues is given here.

Common rule projects

In June this year, senior representatives of IACS member societies met in Paris to discuss the progress of the two common rule development projects – the Joint Tanker Project (JTP) and the Joint Bulker Project (JBP).

In order that the many aspects of the industry feedback on these projects can be addressed, the implementation date for both sets of rules has been put back by a further three months. It is now intended that the rules will be formally adopted in January 2006 by the IACS members and enter into force on April 1, 2006.

SOLAS

Chapter XII, regulation 6.5 – cargo hold structure

Following the adoption of the revised chapter XII at MSC 79 in December 2004 and subsequent submissions to MSC 80, further interpretation of regulation 6.5 is being sought.

It has been noted that, given the timing of implementation (July 2006), ship designers and

builders need clarification in good time to allow designs to be developed. To achieve this goal the Committee agreed that:

- an intercessional working group will take place on September 12-13, 2005 to interpret the regulation
- the results of the intercessional working group will be approved during the 24th session of the Assembly (between November 21 and December 2, 2005).

The intercessional working group has been instructed to prepare a unified interpretation of SOLAS regulation XII/6.5.1 and 6.5.3, on the basis of the discussion by the Committee at MSC 80, recognising that:

1. regarding 6.5.1, protection of the structure of the cargo holds can be achieved by structural design features such as mandatory application of a "Grab Notation" for bulk carriers together with additional protection of

hatchways and coamings from grab wire damage. Additional structural design features to facilitate cargo friendliness may also be the subject of guidelines by industry organisations and classification societies; and

2. regarding 6.5.3,

2.1. the term "single failure of one structural member" is generally considered to mean localised mechanical damage such as local permanent deformation, cracking or weld failure that might result from accidental damage within the cargo hold; and

2.2. that the intent of the regulation regarding the external hull envelop within the cargo area is addressed through the structural design requirements that meet the environmental and operational loads defined in the relevant IACS requirements.

The Common Rules for bulk carriers are now expected to enter into force on April 1, 2006.

We are currently identifying the Lloyd's Register classed ships to which the regulation applies and we will assign a memorandum item to those ships where a restriction may apply.

Chapter XII, regulation 14 – loading restriction

In accordance with regulation 14, from July 1, 2006, some bulk carriers will be subject to a restriction from sailing with any hold empty – effectively banning the use of the alternate hold load condition – when carrying heavy cargoes. Regulation 14 states:

Bulk carriers of 150 m in length and upwards of single-side skin construction, carrying cargoes having a density of 1,780 kg/m³ and above, if not meeting the requirements for withstanding flooding of any one cargo hold as specified in regulation 5.1 and the standards and criteria for side structures of bulk carriers of single-side skin construction, adopted by the Organization by resolution MSC.168(79), as may be amended by the Organization, provided that such amendments are adopted, brought into force and take effect in accordance with the provisions of article VIII of the present Convention concerning the amendment procedures applicable to the Annex other than chapter I, shall not sail with any hold loaded to less than 10% of the hold's maximum allowable cargo weight when in the full load condition, after reaching 10 years of age. The applicable full load condition for this regulation is a load equal to or greater than 90% of the ship's deadweight at the relevant assigned freeboard.

Vessels contracted on or after July 1, 1998 or with keels laid on or after July 1, 1999 will have been built in compliance with

the requirements of chapter XII, demonstrated by complying with UR S17, S18 and S20, and will have been assigned the Enhanced Survivability Notation (ESN). Vessels contracted on or after July 1, 1998 will also have been built in accordance with UR S12, meeting the requirements for side shell structure. Such vessels will not be subject to the restrictions. Note, however, that 'ESN-Hold 1' does not signify compliance.

We are currently identifying the Lloyd's Register classed ships to which the regulation applies and we will assign a memorandum item to those ships where a restriction may apply. We will also send a letter to the owners of these vessels explaining the regulation and any actions that will need to be taken.

Chapter III, regulation 32 – immersion suits

Under this regulation, all existing and new bulk carriers, without exception, must carry an immersion suit for every person on board the ship. Existing ships (that is, those built before July 1, 2006) must achieve compliance with this not later than the first safety equipment survey on or after July 1, 2006.

IACS and the IMO are developing interpretations of this regulation which, similarly to the requirements for lifejackets, requires the additional provision of immersion suits at any watch or work stations located remotely from the immersion suits' normal place of stowage.

When the detail has been finalised we will issue guidance to all owners of affected Lloyd's Register classed ships.

As part of our commitment to delivering a high level of service we aim to provide you with timely technical and regulatory information. To this end we make Lloyd's Register Technical Association (LRTA) papers available to you in line with the LRTA's aim of "the advancement and dissemination of technical knowledge among its members and, where appropriate, the wider industry".

Recent papers, available from your local office or account manager, include:

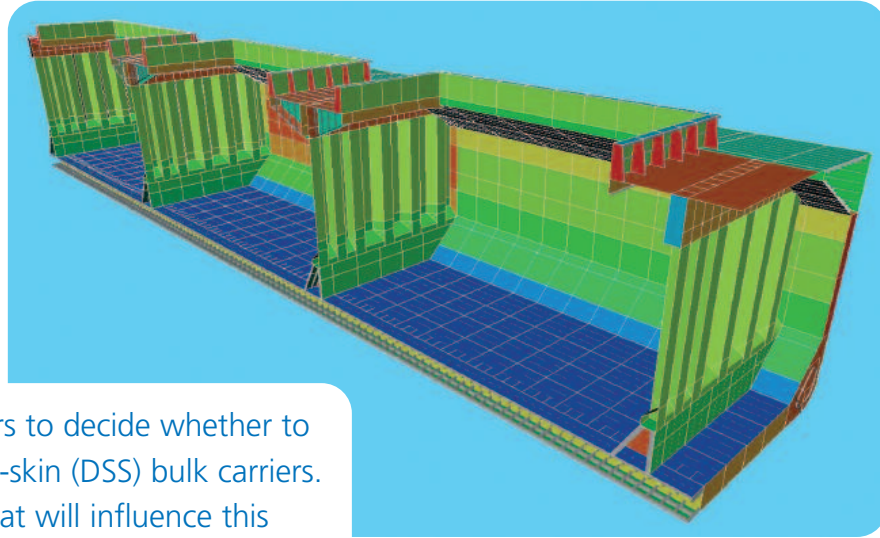
The Survey of Existing Bulk Carriers – includes practical guidance on the latest class and statutory requirements applicable to bulk carriers, in addition to guidance on the survey and repair of bulk carriers.

Load Lines Conventions – including the full text of both the 1966 Convention and the 1988 Protocol, this paper acts as a standalone reference document for either convention, also highlighting the differences and discussing their consequences.

For further information contact

Konstantin Petrov, External Relations Manager, Lloyd's Register
E: konstantin.petrov@lr.org
T: +44 (0)20 7423 2541
F: +44 (0)20 7423 2213

Double-side-skin bulk carriers



A DSS bulk carrier modelled in Lloyd's Register's ShipRight SDA.

IMO has left it up to owners to decide whether to build single- or double-side-skin (DSS) bulk carriers. Some of the main issues that will influence this choice are summarised below.

Background

As a result of industry and regulatory concern since the 1990s, particularly with regard to unacceptable losses of bulk carriers at sea, the industry has continually introduced enhanced newbuilding standards – most recently through SOLAS chapter XII.

During the revision of chapter XII over the last few years, there has been debate concerning the merits – or otherwise – of DSS bulk carriers. This issue was also considered as part of the formal safety assessments submitted to the IMO concerning bulk carrier safety and which initially led to the mandating of DSS. However, following submissions to the IMO by Greece, this decision was overturned and the choice of structural configuration left to the discretion of the owner. The revised chapter was re-drafted to contain requirements for both single and DSS configurations.



DSS bulk carrier *Avra*, delivered to Lloyd's Register class in 2004.

The debate

Generally, those in favour of DSS highlight the following benefits:

- hold cleaning is easier and the potential for reduced port time is created (quotes of up to 10% have been mooted for coal cargoes)
- the hold-side structure is protected from mechanical damage by bulldozers, hydraulic hammers and so on
- inspection is easier and access to the side structure is safer
- there is improved resistance against low-energy collisions.

On the other hand, detractors point out that:

- the newbuild price is higher than for a single-side-skin vessel of the same size
- there is a loss of hold volume, a heavier steelweight and a reduced deadweight compared with a single-side-skin vessel of the same size
- the structure is prone to corrosion and maintenance of the DSS space is more difficult with regard to smaller vessels.

Many of the technical issues have been addressed through recent regulation and the choice now largely falls to commercial considerations and the preferences of individual operators, which can depend on the particular trades and vessel sizes involved.

Technical requirements

IACS unified requirements

Many IACS unified requirements (UR) for ship strength (S) have been introduced or revised to address concerns over bulk carrier design. One of the more significant of these is UR S25, which was introduced following industry concerns about the robustness of bulk carriers, with particular reference to operational flexibility and loading and ballasting conditions. UR S25 improved transparency with regard to the cargo carrying capabilities of bulk carriers by assigning harmonised notations and applying corresponding unified design loading conditions across IACS member societies. Its application typically increased the steelweight of a design by approximately 3%, and it became mandatory for bulk carriers of at least 150 m in length contracted on or after July 1, 2003.

UR DESCRIPTION

S11	Longitudinal strength standard
S12	Side structures in single-side-skin bulk carriers
S17	Longitudinal strength of hull girder in flooded condition for single-side-skin bulk carriers
S18	Evaluation of scantlings of corrugated transverse watertight bulkheads in bulk carriers considering hold flooding
S20	Evaluation of allowable hold loading for bulk carriers considering hold flooding
S21	Evaluation of scantlings of hatch covers of bulk carrier cargo holds
S25	Harmonised notations and corresponding design loading conditions for bulk carriers
S26	Strength and securing of small hatches on the exposed foredeck
S27	Strength requirements for foredeck fittings and equipment
S28	Requirements for the fitting of a forecastle for bulk carriers, ore carriers and combination carriers

Table 1: A summary of the main URs.

SOLAS

The new SOLAS chapter XII now includes provisions for DSS bulk carriers, notably:

Regulation 4 – damage stability: the requirements applicable to bulk carriers regarding survivability with any one cargo hold flooded have been modified to include requirements for DSS bulk carriers of 150 m or more in length.

Regulation 5 – structural strength of bulk carriers: in line with regulation 4, this ensures that bulk carriers of 150 m or more in length have sufficient structural strength to survive the flooding of any hold and has now been updated to include DSS bulk carriers.

Regulation 6 – structural and other requirements for bulk carriers: containing requirements referring to other structural issues, such as watertight bulkheads, this regulation now makes provision for new DSS bulk carriers of 150 m or more in length. It requires that:

- stiffening of the DSS is not placed inside the cargo hold space
- the distance between the outer and inner shell is not less than 1,000 mm

- a means of access is provided in line with SOLAS regulation II-1/3-6
- the minimum width of clear passage is not less than 600 mm
- clearance between the inner surfaces of frames is not less than 600 mm for transverse framing and 800 mm for longitudinal framing (reduced to 600 mm outside parallel mid-body)
- the DSS space and dedicated seawater ballast tanks are coated in accordance with SOLAS regulation II-1/3-2 (standards for ballast spaces) and performance standards for coatings – coating standards acceptable to the flag administration are to be used until such time as the IMO develops and adopts a standard.
- the lower end of transverse webs and the outer end of the double-bottom floor, where high shear forces are experienced, especially in wide spacing designs – the lower end of the web frame is particularly vulnerable due to the access manhole
- hopper knuckles on bulk carriers – these have been around for a long time and construction monitoring techniques have improved over the years, but the upper hopper knuckle is a new area and, as for the lower knuckle, close tolerances need to be applied during construction.

Looking forward

Although many of the technical issues with regard to both single- and double-side-skin bulk carriers have been resolved, there are still some refinements and interpretations to be made. It is expected that these will be resolved soon, allowing designs to be finalised and more accurate comparisons to be made. Ultimately, however, in the absence of a mandate from IMO, it will be market and commercial considerations that truly determine the popularity of DSS bulk carriers.

Other technical issues

The introduction of the inner-side skin raises some areas where structural detail needs to be carefully considered, such as:

- the scarphing arrangements at the ends of the cargo holds – it is important to ensure good stress transition but this is not a new issue as similar attention to detail is required for topside and hopper tanks in single-skin vessels

Alex Johnston, Global Technology Leader – Hull Structures and Ian Harrison, Business Manager – Bulk Carriers will be presenting a paper on the 'Pros and cons of double-side-skin bulk carriers' at the Royal Institute of Naval Architects conference on Bulk Carrier Operation and Design in London on October 18-19, 2005, which is being sponsored by Lloyd's Register. See www.rina.org.uk/events for more information.

For further information contact

Ian Harrison, Business Manager – Bulk Carriers, Lloyd's Register
 E: ian.harrison@lr.org
 T: +44 (0)20 7423 1491
 F: +44 (0)20 7423 2213

Paris MOU Mandatory Expanded Inspections still required annually

Bulk carriers face potential delays if port state control authorities are not notified in advance that a mandatory expanded inspection is due.

Mandatory Expanded Inspections (MEI), as implemented by Paris MOU, were introduced by legislation following European Union Directive 2001/106/EC, which was passed in the wake of the *Erika* and *Prestige* disasters. Still applicable today, the Directive states that all 'high-risk' ships must have a MEI carried out by a member of the Paris MOU region every 12 months.

The following vessels are identified by the Directive as being high risk:

- bulk carriers over 12 years old
- oil tankers of at least 3,000 grt and over 15 years old
- gas and chemical tankers over 10 years old
- passenger ships over 15 years old (excluding those covered by the EU Ferry Directive).

If your vessel is viewed as high risk, as defined above, and it is more than 12 months since an MEI was carried out in the Paris MOU region then you must report that your vessel is due for an MEI to the port authority where your vessel is next calling. This information must be provided three days before the expected time of arrival, or before leaving the previous port if the voyage is expected to take less than three days.

A failure to report the information is being treated by some administrations as an offence. If the vessel is then identified to be due for a MEI then a mandatory inspection will take place. This carries with it a risk of delay due to the involved nature of the inspection. There is also the possibility that the vessel may be subject to a port state control (PSC) detention if the vessel does not comply with international conventions.

You should be advised that some PSC authorities have instructed their PSC officers to raise a deficiency against section 10

of the ISM Code (Maintenance of the Ship and Equipment) during the PSC inspection in the event of any judged non-compliance. This deficiency will be an ISM non-conformity, which should be addressed by the ship's master or the shipowner, normally within three months.

Further details of MEIs can be obtained from the Paris MOU website: www.parismou.org.

If you are an owner or operator and require further assistance, please get in touch with us at the earliest opportunity and we will be happy to assist.

We have published a pocket checklist to help you comply with international regulations. Entitled *Reducing the risk of port state control detentions*, the checklist has been compiled following a thorough analysis of our port state control (PSC) database and focuses on the deficiencies that resulted in PSC detentions. Conveniently organised by distinct ship area, the checklist identifies the top 50 most common causes of ship detention.

The checklist forms part of our ongoing drive to help improve the quality and performance of ships in operation and should be used in conjunction with our in-depth *PSC Maintenance Guide Checklist*. Both publications are available from our web site at: http://www.lr.org/market_sector/marine/portstatecontrol.htm



For further information contact

Jim Barclay, Port State Control Specialist, Lloyd's Register

E: jim.barclay@lr.org

T: +44 (0)20 7423 2463

F: +44 (0)20 7648 0788

Efnav looks ahead



Greek shipmanager Efnav takes delivery of a high-specification, commercially forward-looking bulk carrier from STX

Since the sinking of the *Derbyshire* and the subsequent enquiries into the loss of the ship, the industry has focused its efforts on improving bulk carrier safety, primarily through industry associations, the International Maritime Organization and the International Association of Classification Societies (IACS). Key amendments to the Safety of Life at Sea Convention and several IACS Unified Requirements (UR) governing ship strength (S) have since come into force.

Among these are UR S21, S25, S26, S27 and S30. Respectively, these address the scantlings of

hatchcovers and hatch coamings; harmonised notations and design loading conditions for bulk carriers; the strength and securing of small hatch openings on the foredeck; strength requirements for foredeck fittings and equipment; and cargo hatch securing arrangements for existing bulk carriers built before UR S21 came into force.

Quality owners have fully embraced the spirit of the new requirements, recognising that the safety of their ships and their crews are paramount. One such owner is the Greece-based shipmanager Efnav Co Ltd (Efnav), which adopted UR S25 for its series of four panamax bulk carriers before the requirement came into force for ships contracted on or after July 1, 2003. The first of these ships, the 75,349 dwt *Danae*, was recently delivered by STX Shipbuilding Co Ltd (STX) in Korea, along with its sister ship, *Spitha*. The yard is due to deliver a further two ships – *Avax* and *Anastasia* – to Efnav in early 2006.

The owner also took steps to make the ship's design environmentally friendly by specifying protected bunker tanks, in line with discussions ongoing at the International Maritime Organization and likely future legislation. Efnav also sought Lloyd's Register's Ballast Water Management Plan (BWMP) Descriptive Note to help ensure the safety of the vessel during ballast water exchange whilst at sea.

"Our organisation, through its principals, has had a presence in the dry cargo market for more

than 40 years," says Pantelis Chondros, Efnav's Technical Manager, "and our strategy has always been to operate technically-sound and well-maintained vessels to meet our commercial objectives of offering the highest level of trading efficiency and uninterrupted service to our charterers. *Danae* and her sisters, being built to the highest specification standards, fall precisely within this strategy."

Chondros also points out that in addition to enhancing safety, well-formulated regulations and requirements can also provide owners and operators with commercial benefits.

"Apart from the benefit of gaining an undoubtedly more robust and environmentally-friendly vessel, our principals also saw commercial merit in specifying UR S25 compliance and protected bunker tanks. UR S25 provides for a more flexible ship in terms of loading conditions and sequences, increasing our operational efficiency. Protected bunker tanks will protect us and our charterers from the financial liability associated with a bunker spill in the event of a grounding or other incident. We also had an eye on future legislation and believe that some ports in future may require that all visiting vessels have protected bunker tanks," he says.

Efnav intends trading *Danae* and its sister ships globally, carrying mainly grain, coal and iron ore, as well as other cargoes normally carried by panamax bulk carriers.

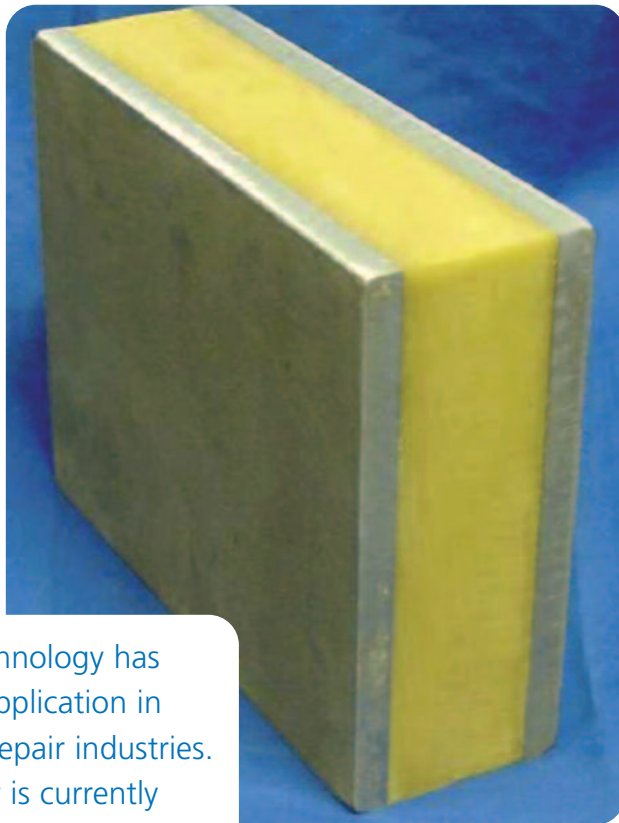
PRINCIPAL PARTICULARS

Ship name	<i>Danae</i>
Ship type	Bulk carrier
Delivery date	March 12, 2005
Owner/manager	Efnav Co Ltd
Class	Lloyd's Register
Shipyard	STX Chinhae
LOA	225 metres
Length (BP)	216.20 metres
Breadth (MLD)	32.24 metres
Depth (MLD)	19.70 metres
Design draught	12.20 metres
Scantling draught	14.15 metres
Dwt	75,349
Gt	41,059

For further information contact

Ian Harrison, Business Manager – Bulk Carriers, Lloyd's Register
 E: ian.harrison@lr.org
 T: +44 (0)20 7423 1491
 F: +44 (0)20 7423 2213

Lloyd's Register develops Rules for sandwich plate system technology



Sandwich plate system technology has great potential for wider application in the shipbuilding and ship repair industries. As a result, Lloyd's Register is currently developing Rules for this material to help set standards for its use within the maritime industry.

What is the Sandwich Plate System?

The Sandwich Plate System (SPS) is a technology created by Intelligent Engineering in which two metal plates are bonded to a compact elastomer core. The elastomer provides continuous support to the plates and stops local plate buckling, eliminating the need for stiffeners. The approval programme for the core elastomer was developed as a result of collaboration between Lloyd's Register and Intelligent Engineering. Lloyd's Register issued the approval certificate for the elastomer having witnessed tests to verify its properties. These were carried out at Elastogran GmbH in Germany, where the elastomer is manufactured.

SPS consists of two metal plates bonded to a compact elastomer core.

The in-plane and flexural stiffness and strength of SPS can be tailored to the particular static and dynamic structural requirements of an application by selecting the thicknesses of the sandwich elements (core and plating).

The metal faceplates are generally steel, although other metals and sheet materials may be used, and the elastomer cores are a specific class of polyurethanes, which provides the material with greater resistance to point and high loads – that is, the SPS panels behave elastically over a larger range of loads than conventional steel panels. The injection process of a typical SPS section takes only a few minutes to complete.

SPS can be used in new construction and also for the permanent repair and strengthening of structures using SPS overlay. This method allows the existing steel surface to be used as one plate of the sandwich; it is then overlaid with elastomer and a new steel top plate. Design details have been developed for a wide range of configurations to help minimise the design and approval time.

SPS overlay application

Overlay application is carried out in four simple steps. First, the corroded surface is cleaned by blasting. Then, perimeter bars are welded above primary elements to create a suitable size of cavity for the injection of the elastomer. The height of the perimeter bar is dictated by the thickness of the core. Afterwards, the top plate is laid on top of the perimeter bars and welded to them – this becomes the new wearing surface. The process is then completed by the injection of the elastomer.

The benefits of SPS overlay

SPS has a number of inherent properties that make it an attractive option for bulk carrier tank top reinstatement. The main advantages of the SPS overlay concept are an increased impact resistance and increased efficiency in unloading due to the flat surface. The energy absorption capacity of SPS under impact loads is superior to conventional steel construction.

More important may be that the core material redistributes the applied load over a larger area than conventional single steel plate construction. Because of this, sharp bending of the plate at the site of load application is reduced,

SPS overlay is a faster alternative to traditional crop and renew repair methods.



thus delaying the point at which failure strain of the plate material is reached. Similarly, sharp bending of the outer skin is also reduced at the web frame supports of the sandwich panel, again delaying failure strain at those points. Moreover, the distance between the supporting web frames in SPS will often be greater than is usual for a conventional stiffened plate structure. This means that the area participating in energy absorption will be larger for SPS than for stiffened plate panels.

The conventional crop and renew method involves the removal of attachments from the other side of the steel plating and, typically, this will include pipes. As overlay application uses the existing tank top as one side of the sandwich, SPS overlay is the much faster method. Hence, bulk carrier tank top reinstatement can often be undertaken close to the ship's regular trading routes and is a viable alternative to the traditional repair methods.

Provisional Rules for the application of sandwich panel construction to ship structures

It is envisaged that SPS will be used in the creation of main structural components, such as ship's decks and side-shell plating, and in the manufacture of individual components, such as funnel casings. It is likely also to be used in conjunction with conventional steel construction.

We have developed a set of Rules for the application of sandwich panel construction to ship structures in collaboration with Intelligent Engineering.

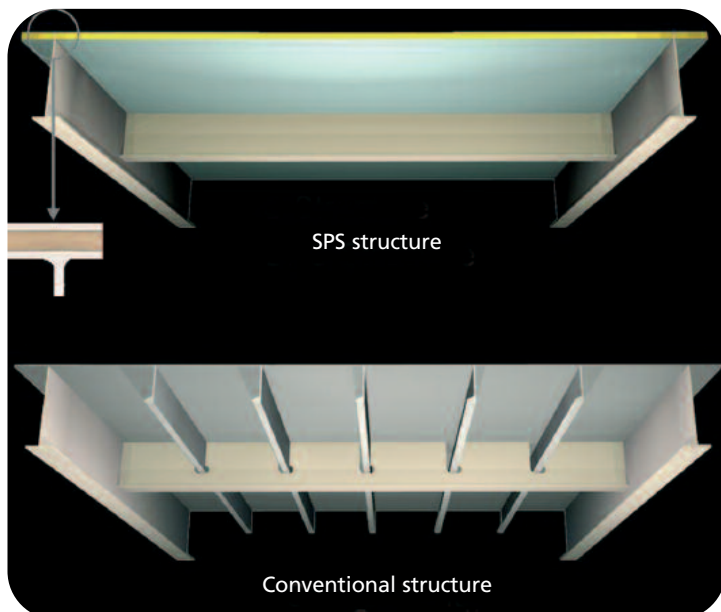
Providing a framework for the classification of ship structures constructed from SPS, these Rules have been formulated as an overlay set of requirements to complement existing classification Rules.

A new set of class notations will be introduced under the new Rules to identify the application of SPS. The Rules are structured to cover the following main areas:

- construction procedures, including typical design details unique to SPS design and welding requirements
- scantling determination for primary supporting structures, including requirements for the primary stiffening of the sandwich panel (these are anticipated to be similar to those for conventional steel construction)
- framing arrangement and methods of scantling determination for the steel top, bottom plate and core (both for new construction and overlay application)
- buckling of SPS panels.

We are in the process of setting up a technical sub-committee, comprised of members drawn from across the marine industry, to provide an independent technical review of the new Rules.

Comparison of SPS with a conventional stiffened metal plate structure.



Pictures courtesy of Intelligent Engineering (www.ie-sps.com)

For further information contact

Hasan Ocakli, Senior Project Engineer – Research and Development, Lloyd's Register

E: hasan.ocakli@lr.org

T: +44 (0)20 7423 2350

F: +44 (0)20 7423 2061

Classification news

Lloyd's Register's *Classification News* delivers up-to-date information on issues requiring urgent and immediate dissemination to the marine industry. Recent inspection and statutory alerts we have issued include:

- changes to MARPOL 73/78 Annex I Regulation 13G and 13H and related requirements – revised flowcharts
- Paris MOU announces concentrated inspection campaign on radio equipment
- MARPOL Annex VI, Regulations for the Prevention of Air Pollution from Ships, to require documents onboard from entry into force on May 19, 2005
- Indian Ocean MOU announces new concentrated inspection campaign on firefighting appliances
- compliance with MARPOL Annex VI – draft port state control inspection guidelines
- US requires response plan for non-tank vessels.

Classification News is available free of charge. These issues, together with the archive of alerts, may be viewed electronically at www.cdlive.lr.org

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For further information on our marine services relating to the bulk carrier sector, please contact Ian Harrison, Business Manager – Bulk Carriers:
T: +44 (0)20 7423 1491
F: +44 (0)20 7423 2213
E: ian.harrison@lr.org

Managing Editor:
Andrew Mackie
Marine Business Development
T: +44 (0)20 7423 2305
F: +44 (0)20 7423 2069
E: andrew.mackie@lr.org

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Care is taken to ensure that the information in *Bulk Carrier Focus* is accurate and up-to-date. However, Lloyd's Register accepts no responsibility for inaccuracies in, or changes to such information.

Horizons

Horizons is our quarterly technical publication for the marine industry. Topics recently covered include:

- a guide to shaft alignment
- noise and vibration technical investigations
- developments in ice navigation and winterisation
- Lloyd's Register's software development programme.

Horizons includes regular features on:

- legislative developments
- the latest in ship technology
- recent deliveries to Lloyd's Register class
- forthcoming exhibitions and technical papers.

Horizons can be downloaded from our web sites (www.lr.org and www.cdlive.lr.org). If you would like to receive a hard copy, please contact:

David Alltoft
Lloyd's Register
71 Fenchurch Street
London EC3M 4BS, UK

T: +44 (0)20 7423 2726
F: +44 (0)20 7423 2213
E: david.alltoft@lr.org



Lloyd's Register EMEA
T: +44 (0)20 7709 9166
F: +44 (0)20 7423 2057
E: emea@lr.org

71 Fenchurch Street
London EC3M 4BS, UK

www.lr.org

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Lloyd's Register Asia
T: +852 2287 9333
F: +852 2526 2921
E: asia@lr.org

Suite 3501 China Merchants Tower
Shun Tak Centre
168–200 Connaught Road Central
Hong Kong, SAR of PRC

Lloyd's Register Americas, Inc.
T: +1 (1)281 675 3100
F: +1 (1)281 675 3139
E: americas@lr.org

1401 Enclave Parkway, Suite 200
Houston, Texas, 77077, USA

**Lloyd's
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