

Bulk Carrier Update



Company presentation: **Fairsky Shipping and Trading S.A.**

- n Status of IACS rule development
- n Terminal perspective of bulk carrier design
- n Dry bulk market – what next?

Introducing Bulk Carrier Update

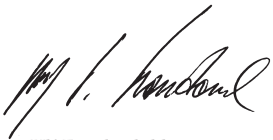
As I write this editorial, the bulk carrier market is booming with record rates for the owners and operators – according to a recent article in *Tradewinds**, spot fixtures were concluded at some \$ 90,000 per day for a 170,000 tonner from the Atlantic to the Far East. We are experiencing a market situation we have not seen for many years – if ever. How long this will last is anybody's guess.

DNV is a classification society and as such we are not a player in the market when it comes to operating vessels, but we do our best to ensure safe and sound operations in co-operation with our customers. Out of the entire world fleet of ships which totals some 600 million grt, some 35% are bulk carriers in one shape or another. To effectively communicate with this important shipping segment, I am proud to introduce to you *Bulk Carrier Update*, which we intend to publish three to four times a year.

In *Bulk Carrier Update* we will present articles covering class matters, cargo handling, terminal issues, operational matters, market forecasts, customers and other items. Our sincere intention is that our readers will find our news and information of value, whether they represent shipowners, yards, terminals, brokers or other segments within the bulk carrier industry.

There have been too many incidents involving bulk carriers over time – after all this is a vulnerable ship type, subject to stress and requiring keen attention to design maintenance and operations. I believe that the countermeasures initiated by IMO and IACS as well as other parties will prove successful in the long run.

I trust you will find many topics of interest in this first issue of *Bulk Carrier Update* and please do not hesitate to contact me if you have suggestions for future improvement to our new publication.



Ulf Freudendahl
DNV Business Director, Bulk Carriers
(Ulf.Freudendahl@dnv.com)



*Tradewinds
17 October 2003, page 5
"Profits pile up on cape still at yard"

Roger Holt, Secretary General, Intercargo:

The Promotion of Incentives for

When the subject of 'incentives' is raised, there is often confusion as to what is being proposed.

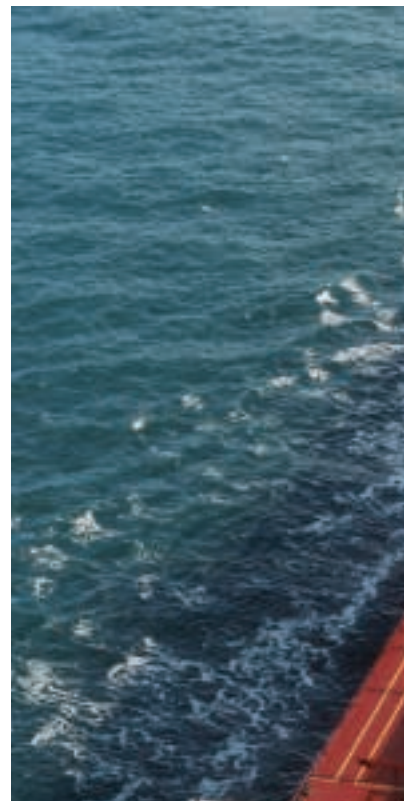
Quality owners and operators do not expect that they will achieve higher freight rates simply because they are doing their jobs efficiently. However, they have a perfect right to expect that they will not be required to compete against the substandard – under any circumstances.

Too frequently we hear of the freight rate being used to make the trade, such that inferior tonnage is deliberately selected for charter to secure the required margin. It is the Intercargo contention that all stakeholders in the 'chain of responsibility' should be encouraged to play their part in the quality process and act responsibly.

We are pleased to note that there are developments under way which have started the naming and shaming of charterers who habitually fix substandard ships.

Incentive schemes are set up with the clear intent of rewarding quality tonnage. The number of opportunities for such rewards are few and far between but over time we expect that they will become more numerous.

One of the most obvious examples is where a port or harbour authority is prepared to provide an incentive on the payment of fees or dues to encourage quality ships. There are a number of schemes of this type but the



Quality Bulk Carrier Owners and Operators



Roger Holt, Secretary General, Intercargo

most well known is the Green Award Foundation which is based in Rotterdam.

The Green Award Foundation was set up in 1994 and the main objective was

to promote the safe and environmentally friendly behaviour of ships and their crews/management. The two main tasks of the Foundation are to have the scheme internationally accepted by committed incentive providers and to certify owners/managers and their ships. The Foundation is open to oil tankers (crude + product) and dry bulk carriers with a DWT > 20,000mt. 47 ports grant an incentive on fees or dues (typically 6%) to ships with Green Award certificates. A few dry bulk ports have followed the example of the tanker ports but there is still much to be done to encourage further commitment. There are encouraging signs and the first bulk port to participate was Ghent.

Another incentive initiative is the QUALSHIP 21

scheme offered by the United States Coast Guard. In this case, the incentive is that those ships meeting the QUALSHIP criteria are inspected less frequently when trading to the United States. This means that there is no loss of time due to the inspection and no potential for detention as a result of infringements.

Intercargo supports incentive schemes which promote a clean maritime environment and a safety conscious culture through a clear focus on good quality practices and operations. We regard these efforts at incentivisation as being a clear demonstration of self-regulation which deserves the support of all industry stakeholders.

Roger Holt, Secretary General, Intercargo

FACTS

INTERCARGO – INTERNATIONAL ASSOCIATION OF DRY CARGO SHIPOWNERS

Since 1980, it has represented the interests of owners, operators and managers of dry cargo shipping. Intercargo works closely with other international associations to promote a safe, high quality, efficient and profitable industry.

To learn more visit:

<http://www.intercargo.org>

GREEN AWARDS

The Green Award Flag can be awarded to vessels which are extra safe and extra clean. A Green Award ship meets high, but manageable technical and managerial requirements. So far Green Award is only available for crude-oil and products tankers and bulk carriers above 20,000 ton DWT.

To learn more visit:

<http://www.greenaward.org>

QUALSHIP 21 – QUALITY SHIPPING FOR THE 21ST CENTURY

In its effort to eliminate substandard vessels, the US Coast Guard (USCG) focuses on improved methods to identify poor-quality vessels and to enforce compliance with international and US standards. Their intention is to reward high quality ships and to provide incentives to encourage quality operations. This initiative is called Qualship 21.

To learn more visit:

<http://www.uscg.mil/hq/g-m/pscweb/qualship.htm>



Fairsky Shipping and Trading S.A.: No detentions through preventive maintenance and training

Fairsky in Athens is a global operator of 13 bulk carriers – five of the vessels to DNV class. Fairsky has some 400 crew members, there are 25 employees at its headquarters and the average age of the fleet is only eight and a half years. The vessels have an excellent Port State Control record, with almost no deficiencies and no detentions at all, and we asked the company president Liveris S. Stergiou how Fairsky can maintain such a healthy record.



Mary F is a 43,910 ton bulk carrier delivered in 1996.



Technical Manager Pavlos G. Perakis, Assistant General Manager Tonia Kallona and President Liveris S. Stergiou.



Fairsky headquarter crew.

“We try to keep our ships in good shape by the way we operate them. We ensure that our crews are up to our company standard by continuous training with regard to safety, security operational and technical matters. Training is conducted either onboard by visiting the vessels on a regular basis or by training seminars in the office here or in Odessa. It is important for us that all crew members operate within our guidelines,” says Stergiou. “But, equally important,” he adds, “is that our managers, including myself, have been with the company for a long time.” He has been with the group for 31 years, and the technical manager, Pavlos G. Perakis, has been some 24 years along with most the company’s senior staff.

“Secondly,” adds Stergiou, “we place great importance on the human factor on board. When we purchased six vessels from Sovcomflot, we also got Ukrainian crew members for the first time. We have trained them to our company standards and this experience has been very good for us. We trusted them and now they trust us.

“Thirdly, we do our best to apply preventive maintenance. We know for a fact, for instance, which engine parts will need to be replaced at which time, and we ship parts around the world to where our ships are. Also we visit every vessel

every three to six months in order to find out what the crew and vessel really need.”

When asked about the current flamboyant bulk carrier market with steeply climbing rates, Stergiou points to the little crystal ball on his conference table. “It is like looking into the ball to predict how it goes. The rates are high right now, but just a look at past history shows that rates can also nosedive fast. We are happy to enjoy the market as long as it lasts, but there are after all newbuildings coming out and the growth in the world economy is plus minus zero.”

Finally, we discussed the relations between Fairsky and DNV and Stergiou points to the long business relationship: “We have a long tradition of working with DNV – we have been dealing with the DNV office in Piraeus ever since I can remember. Actually this is since 1979,” he adds. “If you cannot trust your business partners, there will be no business. With some 40% of the Fairsky ships to DNV class, there must be some trust in the relationship.”

Magne.A.Roe@dnv.com

Bulk trade and ship security

July 1st 2004 will in many ways mark a watershed in international merchant shipping. On this day, less than eight months ahead, more than 35,000 merchant ships and an estimated 20,000 port facilities worldwide must have obtained certificates stating that their operations are in accordance with the International Ship and Port Facility Security Code (the ISPS Code).



The basic concept of the ISPS Code is very simple: You should not have anything onboard (crew, passengers or cargo) that you are not aware of; and the ship should be able to fend off low and middle level piracy. Part B of the Code gives guidance on how to achieve these goals, as do Notices to Mariners from Flag Authorities and IMO Circulars.

For the Port Facilities, the Code is likewise simple: You should not allow anything (cargo, ship stores, crews or workforce) that you cannot account for (and which may jeopardise the security of the terminal and the ships berthed there). As for ships, part B of the ISPS Code gives guidance on how to implement the Code in Port Facilities.

For ships, Flag Authorities may delegate the issuance of the International Ship Security Certificate (ISSC) to Recognised Security Organisations (RSO), while the security of the terminal is the sole responsibility of the Terminal Operator and the Government for the Port.

For both Ships and Port Facilities, time is now critical, as adequate time for implementation is essential.

Authorities in a number of countries have already made their intentions clear. One prominent example is the US Coast Guard. Representatives from USCG have on several occasions made it clear that ships calling into US ports will be "checked to the letter" to verify that security arrangements outlined in the Ship Security Plan and the ISPS are complied with. Thus it is not enough to produce the ISSC, it also has to be well implemented onboard. Thorough port state control, not only to verify that the certificate is onboard, must be expected. Failure to comply in practice may lead to detention or the ship being expelled from a port.

The IMO, through the Maritime Safety Committee (MSC), is preparing a Circular on ISPS Port State Control. It is expected that this Circular will be very much in line with the views advocated by USCG. What makes the ISPS certificate so different from ISM, is that any port authority can carry out inspections of the onboard implementation of the ISPS code and then decide measures to be taken if the ship does not meet requirements, even if the ship is carrying a valid certificate.

From P&I clubs, we have monitored statements saying that without a valid ISPS certificate, the insurances will not be valid. So the valid and trusted ISPS certificate will truly be a "ticket to trade".

The bulk segment and especially the bulk port facilities are among the most security vulnerable segments of international shipping. Both reality and imagined scenarios have shown that contraband may be hidden in dry bulk cargo with some success. As examples, let me outline one threat area of concern:

- The scenario is the scuttling of one or more large iron ore carriers in one of the three major waterways: Panama, Suez or St. Lawrence, or in major ports for world trade.

Thus for global trade to be able to function in an efficient and secure way, it is important that the maritime trading community addresses the security threats that have developed. In order to achieve this goal, the security problems in the port facilities around the world must be solved. Likewise, bulk ships must implement and maintain security procedures that will effectively protect the ships, crews and cargo. And time is running out.

Finn.Erik.Dahl@dnv.com

Double side skin (DSS) bulk carriers – Status of IACS rule development

Two new unified requirements relating to the strength of double side skin (DSS) bulk carriers are now being developed by working groups in IACS. This work is being carried out in response to the agreement with MSC76 which states that there is a need to develop uniform international standards for double side skin construction, preferably in collaboration with IACS.

The philosophy of the requirements will be based on North Atlantic wave conditions, ultimate limit state check (yield and buckling), fatigue check (ship's life), and corrosion (net scantlings and corrosion additions).

The loading conditions will cover standard loading conditions defined in URS25 and flooded conditions defined in UR S17, S18, and S20 as applicable. The design loads will be related to hull girder strength, local structures (plating and stiffeners), global strength (3D Finite Element Analysis) and fatigue analysis.

DSS local scantlings URSXX (Local scantlings of Double Side Skin Structure of Bulk Carriers)

The Working Party of Strength, WP/S, is working on this task and in short their work related to double side skin bulk carriers can be summarised as follows:

1. UR for local scantlings of the double side skin. This is under development and a draft proposal, URSXX, is now under testing among the IACS members and is scheduled to be completed by WP/S within November 2003. This proposal will also contain fatigue requirements relating to the side longitudinals.

2. Amendment of UR S18, S20 and S17 to comply for DSS BCs. These tasks have been the subject of initial discussion within WP/S. The scope of the amendments is presently under some discussion in the IACS General Policy Group (GPG), and subject to their decision the amendments will be completed by WP/S.

3. Revision of UR S11 to incorporate an Ultimate Limit State, ULS, requirement for hull girder. Also the general buckling requirements of UR S11 are to be amended. These are urgent tasks for WP/S to process in parallel with items 1 above. Note the amendment of UR S11 will have direct implications for UR S17.

4. URs for remaining local cargo hold structures of DSS BCs. These are on the WP/S task list (completion dates to be decided).

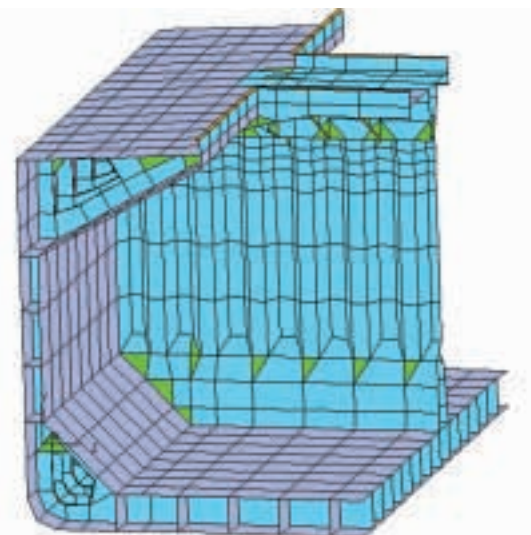
DSS Global strength Analysis (UR SYY)

This task is being carried out by the Ad Hoc Group for Direct Strength Analysis, AHD/DSA.

The objective is to develop unified requirements containing detailed criteria for the direct strength analysis of DSS bulk carriers' cargo hold structures, based on Finite Element calculations. This includes a load model that is suitable for structural analyses based on cargo hold models and the associated checking criteria. Among the items covered are:

Finite element modelling and analysis (Cargo hold analysis)

- Scope of the analysis



- Standardised structural analysis procedures
- Criteria for modelling
- Net thickness philosophy and corrosion additions

Loads & loading conditions to be applied in the FEM analysis

- Design sea state
- Standardised design waves
- Local and global dynamic loads
- Consistent load combinations
- Application of UR S25
- Still water bending moments

Strength checks

- Yielding criteria
- Buckling criteria
- Ultimate strength criteria

The requirements will be applicable to the cargo holds and ballast tanks in the cargo area. The proposals regarding URSYY are now being tested by the IACS members using a selection of DSS bulk carriers.

Roald.Vaarheim@dnv.com

Richard Peckham, Executive Director, DBTG:

Bulk carrier design – The terminals' perspective

"Surely the only desire of the dry bulk terminal operator is to cause as much damage to a bulk carrier as possible! To do this he employs a formidable arsenal of *"weapons of mass destruction"* (as stated at a recent conference in London) comprising high speed loaders, heavyweight grab unloaders not to mention bulldozers and other devices in the hold."

So why are terminal operators interested in bulk carrier design. What are their concerns? Are they valid? Are they reasonable? And could their so-called safety concerns have an impact on the traditional operational relationship between ship and shore?



"We think the efficiency of cargo discharge will increase by implementing double side skins," says Richard Peckham, Executive Director of the International Dry Bulk Terminals Contact Group.

A recent issue of DNV's Classification News introduced the aims and focus of the International Dry Bulk Terminals Contact Group (DBTG) and its observations on the double side skin debate*. The introduction above, as well as the following article, have been prepared for this issue of DNV's "Bulk Carrier Update" by Richard Peckham, the DBTG's Executive Director.

Co-operation not confrontation

Bulk carrier design is one of the key issues affecting safe and efficient operation of any dry bulk terminal. For different reasons prevailing design raises concerns for both owners and terminals at the cargo handling interface. And these conflicting concerns are a source of potential discord at a moment when ship and terminal personnel should be operating safely and efficiently, in harmony.

For the shipowner, as well as the classification society, the main focus is seaworthiness and structural security of the vessel while the terminal operator must be concerned about the safety of his personnel as well as the fabric and equipment of the facility itself.

What is clear, of course, is that bulk terminals and bulk carriers are completely interdependent. They share many mutual concerns in terms of safety and efficiency at the inter-

face and there appears to be a growing acknowledgement that adversarial attitudes must be consigned to the past.

There is a need to improve mutual knowledge and appreciation of problems and priorities and a need to improve communication between key ship and shore personnel. To do this co-operation, not confrontation, is the key; enhanced safety of life both the goal and the reward.

The DBTG was formally established at end 1998/early 1999 and its early efforts were concentrated upon gaining a voice for the terminals, where none previously existed, in the dry bulk industry chain. Since its formation it has been consistent in two messages:

- The challenges faced at the ship/shore interface must be addressed by all industry elements working together – not to different agendas – to achieve safe, efficient and practical solutions.
- The safety of terminals and their personnel is as important as the safety of ships and seafarers.

The latter is true not only from the moral standpoint. By nature the general operating and cargo handling environment can be dirty and "hostile". As might be expected terminals

FACTS

- The Dry Bulk Terminals Contact Group (DBTG) is part of the International Bulk Terminals Association (IBTA).
- DBTG consists of more than 30 companies operating about 80 terminals in 16 countries. They handle some 800 million tonnes of cargo per year (total dry bulk trade world-wide is 1.6 billion tonnes per year).
- The BLU Code is a code of practice for the safe loading and unloading of bulk carriers. It is one of several safety measures covering structural and operational aspects of bulk carriers issued by the IMO. It was adopted by the Assembly at its 20th session in November 1997 by resolution A.862(20).

* Classification News 2/2003, www.dnv.com/publications/classification-news/class-news-2003-02 – "The Missing Link will have its say"

are subject to increasingly stringent requirements from national health and safety bodies and in many regions these bodies are the “competent authority” at the ship shore interface, especially in terms of cargo handling “risk”.

This will be referred to again below.

Safety and efficiency

Looking at the design of the traditional single skin bulk carrier, areas such as hatch coamings, tank tops, web frames and side shell are of concern to both shipowners/Masters and the terminal operator ... but for different reasons.

What shipowners see as vulnerable areas subject to persistent damage are seen by terminal operators – especially at discharge – as vulnerable design impediments affecting safe and efficient handling.

DBTG has addressed its concerns in a series of submissions to the International Maritime Organisation, the coordinators of the Formal Safety Assessment on Bulk Carriers as well as to the Joint Shipping Industry/IACS Working Group on bulk carrier design.

An essential observation is that IMO’s Code of Practice for the Safe Loading and Unloading of Bulk Carriers (the BLU Code) states that ships should be suited to their operational environment. But this is not always the case and while this might be seen as a matter of design it is also a matter of ship/cargo compatibility.

Handling ease and safety have rarely been a factor in bulk carrier design – until now – even though the prevailing handling techniques and speeds at the vast majority of terminals worldwide pre-date the entire trading fleet. At the same time not all cargoes are free flowing and easy to handle and the matter of ship/cargo compatibility is also a matter requiring greater understanding on the part of charterers and brokers.

Here a new complication arises in the form of the EU Directive on Safe Loading and Unloading of Bulk Carriers that comes into force in March next year (2004). This piece of legislation makes the recommendations of the



BLU Code mandatory in EU member states but also contains a requirement for a terminal to check the suitability of a vessel to its facilities before it arrives.

Such a requirement implies considerable liability and while it remains to be seen how consistently it will be interpreted and enforced throughout the EU, there are suggestions that terminals at least may need to use available vetting tools such as Equasis, RightShip and so on prior to accepting a nomination.

Design concerns and preferences

So, looking at design specifics, a terminal operator hopes that arriving vessels are of optimum configuration for safe and efficient handling.

General Access

Ladders and platforms should be well designed to ensure safe and easy access to holds and preferably located at regular intervals (some terminals are now asking ships to notify hold access/lad-

der configuration details in advance).

Ladders should be positioned strategically to reduce/eliminate collision damage risk and to dramatically reduce/eliminate the retention of cargo, especially non-free flowing material.

Conditions on-board are frequently slippery underfoot due to the spillage of oil, fuel, cargo etc. Design should therefore accommodate the strategic positioning of guard rail devices and stanchions, especially on hatch covers and around hatch openings.

Installed on-board lighting should be adequate for all operational needs. In many instances shipboard lighting is cursory and has to be supplemented by the ship or the terminal in the interest of safety.

Loading

The ballasting/deballasting capacity of a vessel is critical for the control of hull stresses, to meet various draught restrictions and so on at both load and discharge terminals.

Such capacity has been of particular concern at loading terminals where ship capabilities lag far behind the capability of terminals to meet commercially agreed loading rates.

DBTG poses the question as to whether bulk carrier design should provide a minimum ballasting performance set against well established and future anticipated loading rates?

Loading Accuracy

Overloading of cargo holds occurs from time to time. Loading terminals are rarely equipped to remove surplus cargo. Overloading is understood to reduce the margin of strength that a vessel may have at sea.

Clearly there are a number of issues here, not least the importance of interface procedures.

On the design side, DBTG asks if it is desirable for vessels to have an additional margin of strength to limit the negative impact of overloading, for whatever reason. At the same time DBTG sees this as an interface matter.

Using modern technology it should be possible for terminal and bulk carrier operators to develop a standard, integrated system for measurement and communication to monitor and control loading volumes precisely. Here DBTG is more than willing to explore initiatives with industry partners such as DNV.

Discharging Conventional Holds

By "conventional" we understand single skin, exposed web frames, corrugated bulkheads, exposed ladders, etc. Indeed bulk carrier hold configuration is an area of great concern.

For the unloading terminal, the conventional hold presents many obstacles to primary discharge equipment (both grabs and Continuous Ship Unloaders) as well as secondary equipment, such as front loading shovels, bulldozers, vibrating equipment and so on.

As mentioned, not all cargo is free flowing and conventional hold configuration conspires to trap cargo in awkward and dangerous locations.

Cleaning these holds is a difficult

and dangerous job and terminals state that these tasks are subject to the increasingly stringent requirements of national health and safety bodies. And remember that in many areas they are the "competent authority" at the cargo handling interface.

Discharge of this residual material risks damage to equipment, injury to workers, impacts on vessels' waiting times and associated costs and requires the use of unpopular vibrating equipment and similar devices.

It used to be true to say that "what goes in must come out". However, this will not be the same in the future as more terminals advise ships and shippers that residual 'hung' cargo will have to remain in the ship.

Determined by concerns over health and safety, as well as over vessel structure, this is reality already; not some vague hypothesis.

Double Side Skin Holds

In the earlier mentioned issue of Classification News, DBTG expressed its support for the new IMO requirements for double hull newbuildings. Holds with a secondary internal skin covering web frames, brackets and other impediments such as horizontal stringers would serve to overcome, from the discharge terminals viewpoint, many of the problems presented by conventional holds.

It was with some alarm, then, that DBTG has learned that efforts are to be made to reverse IMO's recent decisions.

On the face of it such a "campaign" would seem to completely disregard the evidence of extensive research – including an extended and comprehensive FSA – since the early 1990s on bulk carrier casualties and losses resulting from structural failure. Indeed DBTG asks if such a move is motivated more by commercial concerns over residual values and feared restriction of market opportunities for single skin vessels than by matters of safety?

Prior to the IMO decision, statistics from DBTG terminals indicated that the average daily discharge rate for coal from a double side skinned vessel was

fully 10 per cent higher than all other ships with conventional hold configuration. Furthermore, with fewer hold impediments, the amount of damage per tonne discharged from one particular ship was six times lower than the average for all other ships.

These apparent discharge rate and damage reduction advantages were confirmed by an operator of double side skin ships at a DBTG meeting earlier this year. Of further benefits, he pointed to charterer preference and an increased annual voyage potential.

All this seems to suggest significant cost benefits over life for the owner/operator of a double-skinned ship. Combined with perceived advantages for the discharge terminal operator, this points to a win scenario for all concerned.

Interface Guidelines

Much of the above addresses bulk carrier design but, as evidenced, design and operation frequently intertwine.

In this regard DBTG has worked positively on interface matters at IMO. At the recent meeting of the DSC Sub Committee it was agreed that its draft Guidelines for Terminal Representatives at the Ship/Shore Interface should provide the foundation for the further development of a Bulk Loading and Unloading Manual. This is due for completion in September of next year (2004).

Briefly the DBTG format sets practical guidelines alongside the requirements of the BLU Code. As such it will provide a template for harmonisation of procedures between terminals as well as a basis for standard industry training.

Also, it is possible that the document could assist in the essential training requirements for any proposed "Bulk Carrier Endorsement" certification for shipboard personnel.

Now there's a progressive thought – ship and shoreside personnel studying interface matters together!

Richard Peckham, Executive Director, DBTG

First article:

Challenges on steel coil loading

There seems to be some confusion on how to calculate or estimate the possible cargo intake with respect to coil loading. When looking into the literature or talking to operators you will get varying answers, and the methods applied are often based on general assumptions and experience rather than the physical characteristics of steel coil loading.

In May this year, an article by Capt. J Isbester was published in *Seaways*. This article highlighted a number of unanswered questions with respect to steel coil loading. In a series of articles, we will look more closely into the matter of steel coil loading and give answers to these questions from a DNV point of view.

When discussing the matter of steel coil loading, we need to look at three separate strength matters (as in all types of loading) – longitudinal strength, double bottom strength and local strength of inner bottom.

Longitudinal strength

For vessels where flooding calculations are required according to IACS UR S17, the coil loading will give rise to very large global bending moments. This is due to the fact that, since the coils occupy a relatively small portion of the cargo hold volume, there is more space left for the water, thus giving a very large combined mass in the hold. It is imperative that the loading computer can handle this type of calculations automatically and in addition the loading manual should include load cases with coil loading.

Double bottom strength

The double bottom strength is governed by the cargo hold loading diagrams (for newer ships also incorporated in the loading computer, ref. UR S1A.2.2 a & b) and reflects the strength of the double bottom structure (i.e. bending of the bottom structure between the bulkheads). These

local load diagrams should correspond to the allowable tank top load (t/m^2), hence at full draft the allowable mass according to the load diagrams should give the allowable tank top loading. There is no special consideration with respect to coil loading.

Local inner bottom strength

The crossing point of the coils and the dunnage will give rise to a point/patch load on the double bottom structure, see figures 1 and 2. This loading is very different from the uniform loading and will give rise to higher stresses in the tanktop plating as well as in the inner bottom longitudinal. This is similar to the effect experienced with wheel loading on RoRo decks. The local inner bottom strength is often a limiting factor for coil loading.



Figure 1 – Dunnages create patch loads on the tank top

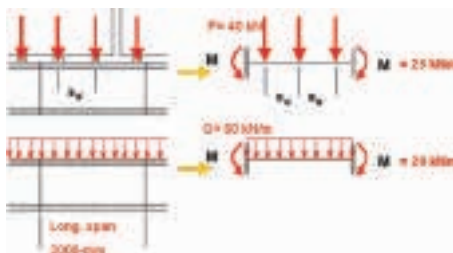


Figure 2 – Both longitudinals are loaded with 120 kN (about 12t). The coil loading (point loads) will give rise to a bending moment increase of approximately 20%.

Due to this, alternative arrangements have been proposed to avoid exerting load on the inner bottom. One such arrangement is to position dunnage directly on top of the floors. On these dunnages, steel billets are placed in the longitudinal direction

(provided these are long enough to span between the floors) and on top of these coils of any length may be positioned. The steel billets will act as a “loading platform” for the coils and carry the load directly to the floors. Hence no force will be exerted on the inner bottom plating and longitudinals between the floors.

So then what determines the allowable coil loading with respect to local inner bottom strength?

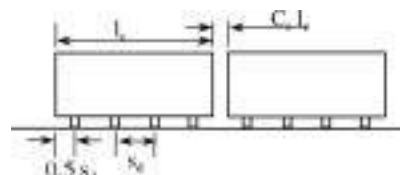
This is a combination of the coil weight, coil length, number of tiers, number of dunnages per coil and the arrangement of the inner bottom structure.

For many years, class has based the approval of steel coil loading on the Japanese standard (the 166th Committee of the Shipbuilding Research Association of Japan, March 1977).

Recently, some class societies have adjusted this procedure to fit their rule format and included it into their rules. Below you will find a brief description of the DNV calculation procedure.

The following assumptions have been made:

- Longitudinal stiffening is assumed with the coils stowed with the axis in the longitudinal direction.
- The distance between two adjacent steel coils is a fraction (C_s) of the steel coil length, 0.2 in general, however $C_s l_c$ is not to be taken as larger than 0.3m, see figure 3.
- The dunnage is placed equidistantly within one coil at a distance s_d , see figure 3.
- The distance between the end of the steel coil and the nearest dunnage is half of the distance between two adjacent dunnages.



$$s_d = l_c / n_d$$

n_d = number of dunnages

Figure 3: Coil loading assumptions

The thickness of the inner bottom plating (longitudinally stiffened) is not to be less than:

$$t = \sqrt{\frac{K \cdot Q}{f_1} \left((1.65 \cdot \beta - 2.3) k_a - 6 \cdot \beta + 12.2 \right) + t_c}$$

This is a formula that calculates the required plate thickness based on the patch loads caused by the dunnage.

The factor K accounts for dynamic load and safety factor, t_c is the corrosion addition and f_1 is the material factor.

The rest of the expression included the aspect ratio of the plate field, k_a , and the position of the outmost dunnage in relation to the plate field length, β .

The most important parameter in this formula is the Q, which is the total force from the steel coil onto one plate field (bound by the floors and the inner bottom longitudinals) as shown in Figure 4.

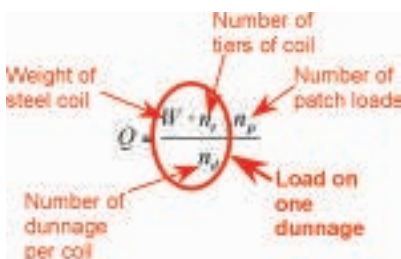


Figure 4

This introduces the concept of patch loads, n_p , which are the number of load points on a plate field or longitudinal, as illustrated in greater detail in figure 5.

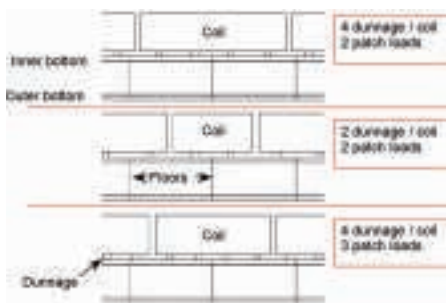


Figure 5 Patch loads



Left: Tanktop after coil loading.



Right: Example of coil loading.

The number of patch loads can be calculated by looking at the actual arrangement or by computing the most conservative dunnage positions that match the assumptions given above.

Inner bottom longitudinals

For a given number of patch loads and the assumptions concerning spacing of coils and dunnage, we can compute the bending moment of the longitudinals based on simple beam theory.

Based on the bending moment and the allowable stress, the required section modulus of the longitudinal can be calculated.

The allowable stress takes into account the effects of hull girder bending and double bottom bending.

As long as the inner bottom plating and longitudinals fulfil the requirements above, the total mass in hold is according to the hold loading diagrams and the hull girder moments and shear forces are within allowable limits (including flooding) the steel coils can be carried.

Now that we have been through the theoretical parts of this topic, we will take a closer look at the questions put forward by Capt. Isbester.

Question 1

Can the tonnage specified for steel coils in the ship's loading manual be exceeded in any circumstances (for example if sufficient specified dunnage is used)?

Yes, in special cases. The loading condition in the manual is for a given coil size,

usually 15t x 2tiers, coil length 1.5m and 3 dunnage per coil. Since this is a "standard" size of coil, it is not certain that this coil is the maximum coil that can be carried. Hence DNV recommends that a table of allowable coil sizes and weights is included in the loading manual, see figure 7. (These diagrams will be discussed further in the next issue of Bulk Carrier Update.) These can quite easily be set up for ships in operation and should preferably be included in the specification for newbuildings. It should also be noted that this "standard" size coil is somewhat outdated, the widely shipped coil weighs 25t and has a length of around 1.2m.

Question 2

What dunnage is most effective in distributing the load from a cargo of coils uniformly over the tanktop?

It is not so much the type of dunnage used (steel or wood, neither will have any significant load spread) but rather the number of dunnages that sets the limit for the coil loading. The more dunnage applied, the more the loading will resemble a uniform loading.

In the next issue we will look further into the rest of Capt. Isbester's questions and give some further information about the guidance DNV can give to ship operators with respect to coil loading.

To be continued in next issue.

Anders.Gustafson.Swerke@dnv.com

Figure 7 – Illustration of coil table

RESULT										
W = Weight of steel coil (t) Lc = Length of steel coil (m) n _d = number of dunnages										
Summary	n _d = 2					n _d = 3				
	Lc									
W	1,00	1,10	1,20	1,25	1,30	1,00	1,10	1,20	1,25	1,30
15,0	NOT OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
16,0	NOT OK	NOT OK	OK	OK	OK	OK	OK	OK	OK	OK
17,0	NOT OK	NOT OK	NOT OK	NOT OK	NOT OK	OK	OK	OK	OK	OK
18,0	NOT OK	NOT OK	NOT OK	NOT OK	NOT OK	NOT OK	OK	OK	OK	OK
19,0	NOT OK	NOT OK	NOT OK	NOT OK	NOT OK	NOT OK	NOT OK	OK	OK	OK
20,0	NOT OK	NOT OK	NOT OK	NOT OK	NOT OK	NOT OK	NOT OK	NOT OK	NOT OK	NOT OK

Fantastic autumn market in dry bulk – what next?

There has not been much summer quietness in the dry bulk market this year and the autumn has shown record increases in rates. After rather modest fluctuations at high levels over the summer, September and especially October have seen amazingly strong developments.

During September and the first three weeks of October alone, the Baltic Dry Index almost doubled and was up 98%, ending 3.3 times higher than one year ago.

Compared with one year ago, the Capesize index was 3.9 times higher, the Panamax index 3.2 times higher, and the Handy-max index 2.3 times higher.

A confluence of factors has brought about this unexpectedly strong development, coinciding with a nice window offered through a modest influx of new tonnage as a convenient setting. Strong economies in Asia are a must for a decent dry bulk market, as Asia accounts for as much as 60% of dry bulk import demand, followed by Europe with 30%. In addition to China, several other Asian economies are also doing quite well, even pulling sluggish Japan to much stronger growth than expected just a few months ago. The USA and Europe have not yet escaped from their economic double-dips and the economic indicators are so far not very convincing.

The Chinese steel industry is by far the key driver in the dry bulk market, with crude steel output up 26% in September compared with last year and iron ore imports up 34% over the first eight months of the year. The trade in thermal coal has been boosted by the shut-down of nuclear plants in Japan and drought in Europe, with lack of water for cooling nuclear plants, the start-up of new coal-fired power plants in several countries, the never ending problems in the Middle East and comparatively high oil prices. Drought in Europe has also given a considerable lift to long-haul grain shipments. Besides, trades in most minor bulk commodities show quite positive developments, largely thanks to the strong Asian economies. Fluctuating volumes of congestion in exporting as well as importing ports have also added to tonnage demand, but this element is hard to quantify in detail. Altogether, Fearnresearch estimates a growth in dry bulk tonne-miles of

around 6% in 2003 and close to 3% in 2004, whereas the growth in 2002 is estimated at only 1.2%.

The graph illustrates a fairly strong link between freight rate levels and order for bulk carrier newbuildings and a clear counter-cyclical volume development in demolition sales. Fortunately for owners of bulk carriers, in the past few years more newbuilding interest has been focused on tankers and container vessels, thus taking away some steam in bulk carrier ordering even when dry bulk rates have been rather strong. The annual deliveries of new bulk carriers will thus be comparatively small for some years. After bulk carrier deliveries of 21.0 million dwt in 2001, the volume dropped to 14.0 mdwt in 2002 and is estimated to be just 11.7 mdwt in 2003. Next year, we expect deliveries of some 17.3 mdwt and in 2005 about 15.5 mdwt.

Significant rate corrections must be expected as the high spot and time charter rates may simply make some existing long-haul trades impossible and delay the start up of new ones. Here, one must also expect some profit taking among shipowners. Some side effects of the present bulk market are that combined carriers have switched to dry bulk trading and we also see more bulk cargoes shipped in containers. This is particularly true for comparatively high-value commodities and in container back-haul trades, such as forest products from West Coast North America to the Far East instead of returning empty containers. This will in itself not increase the demand for container vessels, but it will increase their earnings. In general, however, high bulk rates will enhance the containerisation of bulk cargoes in front-haul trades too.

The present order book for bulk carriers corresponds to 14.2% of the dwt of the existing fleet and Fearnleys now forecasts a fleet growth of 2.7% this year, 4.3% next year, and 2.6% in 2005. At the beginning

of October, the existing bulk carrier fleet totalled 5,634 vessels of 301.6 mdwt and 592 vessels of 42.9 mdwt were on order. Smaller vessels dominate among the older vintages and as many as 911 vessels of 27.0 mdwt were built before 1979 and a further 922 vessels of 41.9 mdwt were built in 1979–83.

When it comes to building bulk carriers, it appears that just six countries in the Far East held as much as 97% of the order book for such vessels at mid-year, measured in compensated gross tons, which is a reference of labour and capital input. Japan was predominant with as much as 61% of the world total, followed by China 20%, S.Korea 9%, Taiwan 4%, and the Philippines 3%. S.Korea has a much larger total order book than Japan, but only a remarkably small share of its order book, some 3.5%, relates to bulk carriers, as against bulk carrier shares of 35% in Japan and 31% in China.

New contracts will mainly have to be delivered from 2006 onwards. Recently, a Capesize newbuilding resale with short delivery obtained a price that was 20% higher than the contracting price.

From the buyer's point of view, this price differential appears quite attractive in today's exceptionally good market and in view of the apparent momentum on the demand side, with seemingly limited downside risk – even if late October spot rates are reduced by 50%.

Jarle Hammer, 21 Oct 2003



DNV (Det Norske Veritas) is an independent, autonomous Foundation working to safeguard life, property and the environment.

DNV comprises 300 offices in 100 countries, with 5,700 employees.

Bulk Carrier Update is a newsletter published by Det Norske Veritas, Business Area Maritime Industries.

It is distributed to DNV customers and stations worldwide.

Please direct any enquiries to your nearest DNV station, or Bulk Carrier Update e-mail: bulkcarrier@dnv.com

Editorial committee:
Ulf Freudendahl
Magne A. Røe
Lisbeth Aamodt

DNV
Head Office Norway
NO-1322 Høvik, Norway
Tel: +47 67 57 99 00
Fax: +47 67 57 99 11

Updated list of all regional offices at DNV's web site: www.dnv.com