Securing container

s – a serious concern!

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■ ■ Over a relatively brief period, the container industry has experienced remarkable growth. Ship size has increased dramatically to keep pace with demand, and this has led to greater numbers of containers carried on deck.

Inevitably, these developments have created new problems in the form of visibility from the bridge, ship stability and the strength of decks and hatch covers. Securing cargo effectively has become a particularly serious concern.

PHOTO: ISTOCK

Motion of the vessel

Ships are affected by movement in six degrees of freedom: rolling, pitching, heaving, swaying, surging and yawing. Of these, rolling, pitching and heaving generate the greatest forces in heavy weather.

This may also indicate that the aft sections of larger container vessels are subject to abnormal dynamic load conditions generated by slamming. This may cause containers to "jump" out of their automatic locks. Container locks are type and batch-approved by the Classification Societies.

Major acceleration occurs fore and aft at high levels. The transverse acceleration increases by increased metacentric heights GM. Correct stowing of containers keeps the stability of the ship within appropriate limits; not too low but not too high either. In container ships with wide beams or in partly loaded ships, the GM may be large, perhaps even exceeding 4-5 m, which will lead to severe rolling in heavy seas and bad weather.

Forces on containers during transportation

Cargo transportation often involves different modes of transport, by road, rail and/or sea. Often, combined cargo transport units like containers will set out by road, continue by sea and perhaps conclude as rail freight. Cargo transported by combined means must be stowed and secured so as to withstand the forces involved in all the modes of transport used.

In adverse weather, outboard and partially exposed container stacks may be exposed to wind. The degree of force depends on the velocity and direction of the wind, and the profile of the stacks affected. The higher the stacks, the greater the surface area and consequently force generated.

When container ships are exposed to heavy weather, accidents often involve overturned container stacks in the aft stacks. This is despite acceleration at the fore end being greater than in the aft.

Aft stack problems

One reason for the problems with aft stacks can be that, due to the required line of sight from the bridge, stack stowage height aft of the superstructure is greater than it is to the fore.

Another reason may be that large, wide container ships can suffer stern slamming when there are following or quartering seas. This can drastically raise forces on the securing equipment in the aft container stacks. The intensity of acceleration and forces during sea transports is affected by different types of seas. Sheltered waters,

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shallow seas and deep oceans cause different levels of acceleration.

Early avoidance essential

To avoid excessive acceleration and forces, course and speed may have to be adjusted to ease the ship's motion in heavy seas. Early avoidance of adverse weather and sea conditions is always recommended. Taking into account the actual stability conditions, it may also be necessary to ballast or de-ballast the ship, thus improving its behaviour and avoiding excessive acceleration.

Factors for consideration:

- Weather and sea conditions.
- Excessive transverse metacentric height values.
- Incorrectly stowed containers.
- Overloaded (under-declared) containers.
- Excessive container weight.
- Deteriorated securing equipment.
- Defective container structure.
- Cargo securing arrangements.
- Loss of equipment and containers over board, lashing by stevedores, positioning of securing equipment.

Other relevant factors:

- Non-standard securing equipment.
- Improperly maintained securing equipment.
- Inadequate supply of correct securing equipment.
- Overloading of securing equipment.

Cargo handling procedures

During a recent stack overload investigation by MAIB (Marine Accident Investigation Branch, UK) in February 2007, it became apparent that the loading terminal operations staff regularly exchanged containers on an approximate like-for-like basis, if particular units were not available for loading when required. Further enquiries confirmed that the practice of exchanging containers like-for-like in order to avoid delays is commonplace throughout the industry.

This practice was exemplified when a container planned for stowage in one particular bay ended up several rows away. One container was replaced by a heavier one. Both these containers held the same cargo but there was a difference of 400 kg between them. There was no evidence to suggest that the chief officer was advised of this exchange until the final stowage plan was received at the conclusion of operations. This often occurs just minutes before departure, giving no time for correction. A contributing factor to cargo loss is stevedores' failure to deliver a satisfactory lashing arrangement i.e. locking twist-locks and unilocks.

Another problem occurs when re-lashing stacks in worsening weather and increasing winds to reinforce the lashing. This can actually make the situation worse since the collapsed posts are then even more overloaded.

Compared with the claims recently studied by the Club, it shows that the loading plans supplied by the planner may be incorrect. The result is a number of fully laden containers above empty ones, causing these to collapse under the excess weight.

The nature of the container trade is such that vessels are discharged and loaded very quickly. The benchmark for a container terminal is the number of containers its cranes can handle per hour. A system should be established ensuring that any changes are fully communicated to ships' crews.

Cargo Securing Manuals

These manuals provide guidance on securing devices and arrangements, stowage and securing of non-standardised cargo, plus stowage and securing of containers. Details of the acceleration forces acting on containers and lashings in varying conditions with worked examples are often also included.

Some container vessels post local lashing diagrams on deck adjacent to the loading bays to assist the crew in identifying the correct lashing requirements. Details of the acceleration forces acting on containers and lashings in varying conditions with worked examples may therefore be valuable when loading, say, non-standards units.

Container securing arrangements

Securing equipment will vary depending on the type of ship, but is likely to include:

- Twist locks
- Lashing bars
- Turnbuckles, stacking cones (single and double)
- Lashing D-rings, shoes for base twistlocks, bridge fittings
- Buttresses

In addition it should be remembered that the container frame itself is an integral part of the securing system. The cargo will remain secure only if the frame is in good condition and if the forces acting on it remain within safe limits. A common belief is that the securing system will not be overloaded if the total stack weight is kept within prescribed limits. This is not necessarily the case, particularly when containers are loaded on deck.

It is important to recognise that the total stack weight limit is merely the weight which can be safely supported by the deck or hatch cover, as applicable. The calculations are based on the ship being upright in calm conditions (i.e. in port) and take account of the static weight of the stack due to gravity.

The figures also take into consideration the anticipated dynamic stack loads acting on the deck or hatch covers in adverse weather due to the various ship motions described earlier. However, stack weight limits ***are not*** a guarantee that the dynamic loads acting on the container securing system will remain within safety margins in heavy weather.

It is relatively easy to load cargo so that each stack does not exceed its total permissible weight. It is far more difficult to optimise the stack in terms of weight distribution, port rotation and estimated forces, ensuring at all times that the safe working load of the securing equipment is not exceeded.

Consult the manual for guidance!

It is therefore vital that the Cargo/Container Securing Manual be consulted for guidance. The manual illustrates typical safe stack weight distributions and total safe stack weights, based on the design limits of the ship's securing system.

A vessel's container stowage and securing arrangement can be easily undermined if substandard and/or incorrect components are used. Keeping securing equipment in good order, both fixed and portable, requires considerable time and effort.

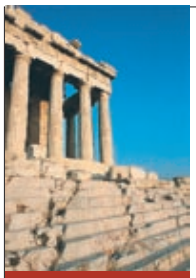
Whatever regulations, standards or codes of practice are issued, the integrity of a vessel's

container stowage and securing arrangement can only be ensured by regular inspection of the securing equipment.

Securing and cargo planning operations

- ☑ Cargo planners must have appropriate marine experience or undergo training to ensure that ship safety considerations are fully understood.
- ☑ Installed cargo planning software must recognise and alert planners to the consequences of variable data e.g. GM, non-standard container specifications.
- ☑ Containers must be stowed and secured according to the instructions in the ship's Cargo Securing Manual
- ☑ The resulting effect on container stack weight, height and lashing arrangement of changes in the vessel's GM must be readily available and clearly displayed to ships' crews.
- ☑ Effective communication and procedures should exist between all parties involved in the planning and delivery of containers
- ☑ Ships' crew must be provided with sufficient time to verify/approve proposed cargo plans.
- ☑ Ships' crew must be provided with sufficient time to rest before and during cargo operations
- ☑ Lessons learned from problems identified during container planning operations should be reviewed and appropriate corrective measures put in place.

The booklet *"Securing of Cargo"*, produced by The Swedish Club, describes the theory and practice of securing cargo and is distributed free of charge to members. More information can be found on the Loss Prevention section on our website – www.swedishclub.com



News from Piraeus

Renewing and renewable

■■ One of the most popular archbishops in Greek history, Christodoulos, died at his home on Monday January 28th. He has been mourned by millions of people worldwide. World leaders have sent their sincere condolences. Christodoulos strengthened a church which has been seen as distant from its followers. The fact is, over 90% of the native population has been baptised into the Greek Orthodox Church. The government declared four days of mourning culminating in a funeral in Athens with full state honours.

As Christodoulos attended a Catholic high school, he had experienced both sides and felt open to dialogue between the Orthodox and Catholic churches. Pope John Paul II's visit to Athens in 2001 and Archbishop Christodoulos' visit to Pope Benedict XVI in Rome in 2006 were significant steps in this cause. The last time a Pope visited Greece was 1,300 years ago.

One of Christodoulos' most outspoken public campaigns was his effort to stop the government from dropping the religious entry from state identity cards. Although he gathered 3 million signatures, over a quarter of the population, the campaign failed.

The new Archbishop, Ieronymos of Thebes, was elected on 7th February. He is expected to establish smoother relations with the state and Ecumenical Patriarchate.

No man is renewable but the energy we consume needs to be. Greece's energy regulators are pinning their hopes on wind power to meet the ambitious EU target. The EU directive says that 20% of generated electricity should come from renewable sources by 2010. Currently, there is only 12%. Wind power in Greece is definitely on the move, but bureaucracy is slowing it down. Six years ago, 36 permits were needed before a wind farm was allowed to start turning. This has now been improved to just six permits. Naturally, wind is only part of the picture. In a country of abundant sunshine, solar power should already be contributing more than it does. The problem is that Greece's energy production from other non-clean sources is on the increase. Thus, greenhouse gas emission levels are increasing at a time when they should be diminishing. Another serious issue and more obviously apparent is the struggle to properly manage all solid waste.

There is no renewable shipping, but renewal of the Greek fleet is still very strong. Although a lot of vintage tonnage is still trading today, especially tonnage operated by Greeks, the average age of the Greek fleet is decreasing. The freight market is still healthy, although there was recently a dip in the dry cargo sector.

We are looking forward to a positive future.

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