Taking hold(s) of boxes

by Paillette Palaiologou, *Vice President Hellenic, Black Sea and Adriatic, Bureau Veritas Marine & Offshore*

The COVID-19 pandemic has disrupted supply chains in many ways. One of the most striking consequences has been the large number of containers sitting on land, waiting to be transported to their final destinations. The industry has been keen to explore new means to resolve this major backlog, including transporting 'boxes' onboard vessels other than container ships. It is creating an attractive opportunity for bulk carrier operators, as the conversion required to allow for the carriage of containers is relatively quick and easy to achieve once safety issues have been addressed. Operators of small- or medium-sized bulk carriers are most likely to consider catching the wave. While it is expected to offer attractive rates for a few years to come, most see it as a sideline to their core business rather than a permanent change. As such, bulk carriers will typically carry containers on ballast runs instead of being dedicated to the new trade.

Bulk carriers are not specifically designed for carrying unitised freight, lacking the cellular structure of container ships. That is why the structural integrity of the vessel and the potential fire risk of the containerised cargo must be considered, not to mention ensuring the safety of crew and stevedores.

From a regulatory standpoint, the International Maritime Organization's Code of Safe Practice for Cargo Stowage and Securing (CSS Code) for ships that are equipped with a Cargo Securing Manual provides a key reference point in its Annex 1 "Safe stowage and securing of containers on deck of ships which are not specially designed and fitted for the purpose of carrying containers," alongside the calculation methods for forces acting on cargo units and the efficiency of securing arrangements.

The safety of crew and stevedores is highly regulated for cargo handling on container ships. Still, the rules are not necessarily as proscriptive for bulk carriers carrying containers, as this is a new trading pattern. To assist operators with this and other safety, regulatory, and operational requirements, Bureau Veritas (BV) released its ***Guidance for Studying and Preparing a Bulk Carrier for the Carriage of Containers*** in September 2021. The guidance, published in a question-and-answer format, was developed by technical experts based in BV's Piraeus Office in collaboration with the technical directorate in Paris.

Vessel selection and carrying capacity

Bulk carriers with a box-like midship cross-section are potentially more suited to carrying containers, although other bulk carrier sizes are not necessarily excluded. However, operators must consider some crucial characteristics to help them make the most efficient choices as they review their fleet and select which bulker(s) will be involved in container transportation.

Capesize bulk carriers that carry coal or ore are usually exempt from the requirement of having a fixed fire-fighting system in their cargo holds, meaning they are unlikely to receive flag approval for carrying loaded containers in these holds. Moreover, most of them are not equipped with the appropriate stability file for the carriage of cargo on deck & hatch covers, and the side rolling hatch covers represent a less attractive choice for deck loading.

Folding hatch covers typically provide better access to cargo holds than side rolling covers. In some cases, the loading of containers in holds will be limited by the hatchway opening projection; its length will define the number of container bays inside the holds.

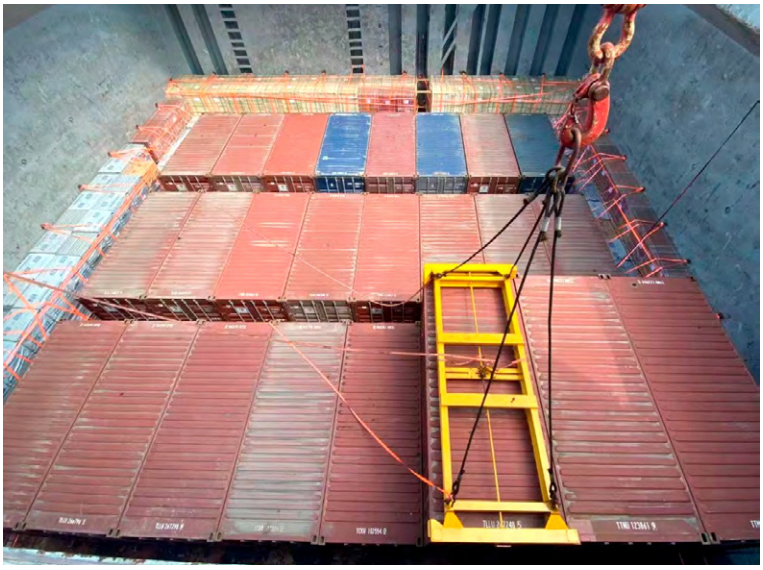
In cases when containers are placed all over the length of the cargo hold with the assistance of lifting gear, then the clear length of the flat inner bottom in respect of container length and needed space for stevedores will define the number of bays inside the holds. Ideally, two bays of forty-foot containers is the optimum goal, but this can be challenging to achieve. For twenty-foot containers, three bays is a realistic arrangement.

The number of containers that can be loaded depends on the vessel's cargo hold and hatch geometries, main deck obstacles (hatch railways – for side rolling hatch covers), and on the scantlings of the inner bottom, deck and hatch covers.

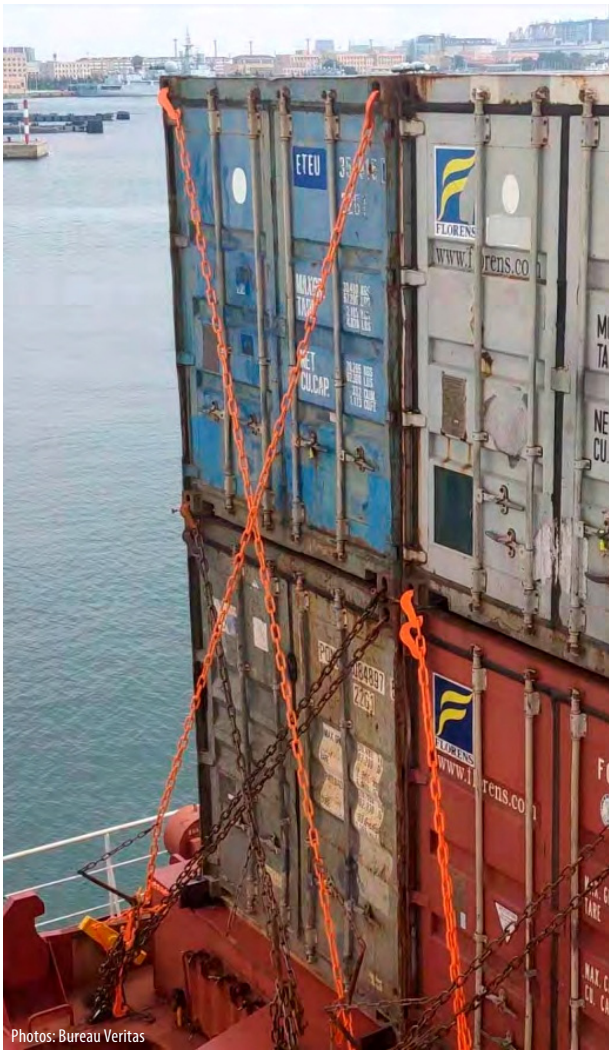
Finally, navigation bridge visibility must be included in the deck & hatch cover loading equation. Based on BV experience with around ten operators, stacks of four to six tiers may be possible in cargo holds, stacks of three tiers on deck, and stacks of two tiers on hatch covers.

Ensuring safe container stowage is a complex undertaking due to the many parameters that need to be accounted for and the numerous options available for the final arrangement. Intact and damage stability requirements must be considered, along with local strength, stack weight, stack vertical centre of gravity, loading condition metacentric height (GM), and loading condition hull girder stresses.

Containers are much lighter than typical bulk cargoes, and a loaded vessel will have a draught somewhere between the light and heavy ballast conditions (ballast water will most likely be needed). It is unlikely to pose







Photos: Bureau Veritas

a significant risk to vessel stability but will result in a GM value and, therefore, a higher potential for roll motion. For vessels carrying containers on deck, windage area due to the deck stowed containers must be factored into intact stability calculations.

Lashing

Containers can be stowed as a 'block' of lashed cargo without retrofitting special container securing fittings or as more conventional stacks of containers. In the first case, containers must be lashed in a way that ensures they behave as a solid piece of cargo with no relative motion between container stacks. Placing material such as wooden dunnage between containers and the ship's structure can be used to establish uniform load distribution in line with the allowable capacity. This option will result in smaller stack weights due to various limitations, such as the strength of lower containers.

In the second case, container bottom pockets and pad eyes can be installed to increase container weight carrying capacity and, consequently, stack weight. The maximum stack weight depends, firstly, on the containers' strength and lashing and, secondly, the strength of the supporting structure. Our NR625 **Structural Rules for Container Ships** and **VeriSTAR LASHING** software are cut out for assessing the stack weight and associated lashing. BV can assist with these calculations that will be the first input to further design and explore the integration of the stacking arrangement onboard.

BV has simulated various scenarios for different bulkers, showing that a stack of four to six containers is possible inside cargo holds by applying internal lashing to the bottom second and bottom third tiers, with twist locks fitted at every level.

Class review and assistance

BV works closely with operators to facilitate the new trade. Our guidance aims to ensure that modern analytical tools and techniques support safe and efficient operations. We are involved in the necessary reviews, assisting operators with assessing and preparing their bulkers to transport containers.

We have already performed many feasibility studies, and we are in close contact with shipowners and their technical partners, contributing to preliminary investigations and guiding them to overcome technical issues. Our in-depth experience with bulk carriers and container ships is crucial as we explore this new vista together. ■

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