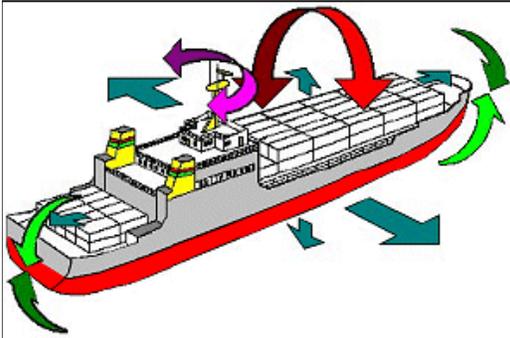


IMPORTANCE OF BLOCKING, AND BRACING IN MULTIMODAL TRANSPORT.

It is very common, in a surveyor's profession, to come across situations where damage to multimodal containerized cargo is attributed to poor stuffing / poor securing of the cargo in the container. Surveys of transport practice have revealed that almost seventy percent of all packed containers, swap-bodies, road and rail vehicles or other cargo transport units reveal shortcomings in packing and load securing which could result in damage.

Cargo placed in containers must be secured to withstand the most stringent transportation modes to which it will be subjected during multimodal shipment. Containerized cargo/equipment can be moved through anyone or any combination of highway, rail, and ocean modes. Therefore, it must be secured to withstand the most severe load conditions to which it will be exposed.

Examples of stress experienced in a sea passage



Ship movements at sea

Voyages are made in a variety of weather conditions which are likely to exert a combination of forces upon the ship and its cargo over a prolonged period. Such forces may arise from pitching, rolling, heaving, surging, yawing or swaying or a combination of any two or more.

Packing and securing of cargo into/onto a container should be carried out with this in mind. It should never be assumed that the weather will be calm and the sea smooth or

that securing methods used for land transport will always be adequate at sea.

Example of stresses experienced in rail and road transport

Road transport operations may generate short-term longitudinal forces upon the cargo and the CTU. They may also cause vibrations that may vary considerably due to different suspension systems, different road surface conditions and different driving habits



0.5g Sideways acceleration in road transport corresponds to a 30degree tilt.

It is a shipper's responsibility to ensure that cargo is secured to withstand stresses exerted on the container (CTU) and the cargo within in any combination of these situations. The shipper's main responsibility is ensuring that the cargo stuffed inside a container arrives undamaged. Lumber, pallets, and banding material are used to keep the load from shifting when stuffing containers.

The basic principle of container stuffing is simple to follow and adapt:

- Distribute the weight of the cargo evenly over the floor of the container.
- Place heavy cargo on the bottom of the container and lighter cargo on top.
- Block and brace the cargo to prevent movement in any direction.
- Fill in the voids between the cargo and the container sides.
- Ensure all supplies containing liquid are packaged in appropriate containers.
- Use block stowage to protect bagged cargo from shifting.
- Keep the center of gravity of the cargo as near as possible to the center of the container. If this is not possible, mark the center of gravity on the container and notify the carrier.
- Never exceed the weight limitations of the container.
- Close and seal container doors carefully. Put serial numbered seals on the container to detect pilferage and tampering.
- It is ideal that the shipper /consolidator places one copy of the packing list inside and one out side the container door
- Weigh container before shipment at the origin and record the weight. Mis-declaration of container weights can cause serious accidents on board ships.
- Observe procedure for hazardous cargo, and affix HAZ stickers as per IMDG code.

The proper use of dunnage is an integral and essential part of the process of stowing cargo. Many cargo claims arise from improper securing or lack of sufficient or suitable dunnage and blocking and bracing. Therefore, the general principles of proper securing of loads and materials should be understood by all responsible for containerizing the cargo.

Dunnage in a container denotes materials not consisting as part of the container. These materials are frequently by-products or scrap used in filling voids, blocking and bracing, or otherwise to protect and secure the contents.

It is not possible to lay down hard and fast rules which will apply to the containerizing of all cargo. However, use of the principles outlined here can help those who are responsible for this function. Sufficient dunnage to protect the cargo being carried is of first importance. It is of equal importance to have suitable and proper dunnage employed to protect the cargo and container.

TYPES OF MATERIAL USED FOR DUNNAGE, BLOCKING AND BRACING

LUMBER. Lumber should be properly seasoned. It should be selected specifically for the blocking and bracing of cargo in containers. It must be clean, dry, and free from dry rot, knotholes, infestation, and splits which will affect its strength or interfere with proper nailing. The use of green or wet lumber should always be avoided. Such lumber quickly loses most of its strength. Green or wet lumber may contain 30 to 50 percent moisture depending upon the species, location of growth, and storage area. Shrinkage of green lumber in drying loosens the nails, defying its very purpose. The movement of the container during transportation often causes nails to work out. This results in a reduction of cargo security in the container and eventual breakdown of the holding system. The load is then free to move in the container causing cargo and equipment damage, not to mention the loss of time and expense in securing the load. Green and wet lumber will emit a heavy concentration of moisture which may cause water or sweat damage, molding, or cargo staining. Dry lumber (at approximate moisture content 15 to 25 percent) is an excellent securing material. It is much lighter than wet or green lumber. This is very important when weight limitations are to be considered. Dry lumber also has a much longer service life. Copper chromate arsenate preserved wood is not to be used on lumber requiring preservatives or for general blocking and bracing lumber. The most common sizes of lumber used as dunnage in containers are (nominal dimensions) 1" x 4", 1" x 6", 2" x 4", 2" x 6", and 4" x 4". Lumber may be used as filler for decking, blocking, bracing, and constructing partitions.

PLYWOOD. Plywood is extremely functional for container partitions, dividers, and auxiliary decking. It should be clean and dry. Plywood is not easily affected by changes in moisture content. This is an important consideration especially when high moisture levels may be present.

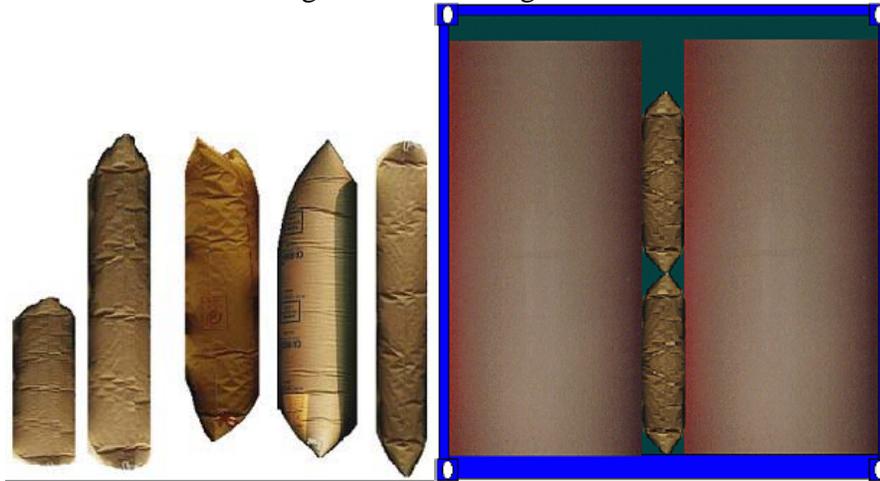
Plywood is available in a number of grades and thickness. For use as dunnage, the less expensive grades or combination of grades is recommended. Plywood is generally available in panel widths of 48 and 72 inches and in panel lengths ranging from 72 inches to 96 inches. Other sizes are also available on special order. Panels 48 inches wide by 96 inches long (4 feet by 8 feet) and 48 inches wide by 72 inches long (4 feet by 6 feet) are most commonly available.

STRAPPING. Heavy-duty steel strapping (banding), tempered for maximum tensile strength and ductility and outstanding ability to absorb impact shocks without breaking, is one of the most versatile tools for securing cargo in dry-cargo containers. It has been used successfully for years to secure heavy and light cargo for rail and truck movement. The application of steel strapping goes beyond securing cargo for transport. It is used for unitizing all shapes and sizes of cargo as well as palletizing heavy awkward items. When properly used, steel banding will create a block or solid unit of cargo.

As previously mentioned, if a container supplier cannot position a container with a needed built-in tie down system, heavy-duty steel banding can be used in conjunction with anchor plates. These anchor plates can be placed and secured at strategic locations in

the container at the discretion of those responsible for loading, blocking, and bracing the cargo in the containers. In addition to steel banding, nylon strapping is available and satisfactory in many instances.

INFLATABLE AIR BAGS. Inflatable air bags are available in paper or rubber and may be reusable or disposable. Inflatable are used for light and medium duty bracing. Inflatable are not used to prevent cargo from moving when subjected to impacts such as those resulting from rail car couplings. Inflatable are mostly intended to be void filler which offers added protection to containerized cargo. If the cargo facing the inflatable dunnage is of such a nature that it may cause perforations, use cushioned puncture resistant material between the cargo and the dunnage.



FIBERBOARD. Fiberboard is available in sheets, rolls, and pre-scored structural shapes for light-duty bracing applications. It functions as a divider, deck, or partition. When using fiberboard or similar materials, the strength and resistance to moisture must be satisfied. When loaded containers are transported over long distances, temperature changes occur, particularly during the winter. This results in the condensation of water vapor. The fiberboard delaminates, losing its structural stability. Corrugated fiberboard also has poor resiliency. Once it is compressed, the material does not expand to its prior shape and thus creates a void. As a result, cargo blocking, bracing, and protection no longer exist.

MISCELLANEOUS DUNNAGE MATERIAL. The above list of dunnage materials is not all inclusive. There are many additional devices and dunnage systems available to hold and secure cargo from movement while in transit. Some of these systems are designed for specific kinds of cargoes while others apply to cargo in general. Dunnage bags filled with polystyrene pieces can be used to absorb shock and secure products against impact and shifting. Laminated strapped bulkheads have been successfully used in securing drum cargo and \ other freight in rail cars, trailers, and dry-cargo containers. Used motor vehicle tires, metal frames, pallets, \ various plastic products and nets have been successfully used as dunnage.

When obtaining blocking and bracing dunnage for the loading operations, It Is recommended that you first see what is available at your plant or loading facility. Often, the material necessary to properly secure the cargo in the container is readily available as waste material or by products.

NAILS/NAILING. Nails must be adequate in size and number when wood blocking bracing and anchor plates are used to secure the cargo in the container. When the floor of the container is used the nails should penetrate minimum two third of the floor thickness. Nails must not be too long/ large and should be used in staggered pattern; this will avoid splitting the lumber. The floor boards in a general-purpose dry-freight container on the average are 1 1/8 inches thick. The size of lumber used for bracing and securing the load will determine the length of the nail to be used.

SOME IDEAL STOWAGE EXAMPLES



Granite Slabs on A frames



Void spaces between cargo cartons filled with air bags



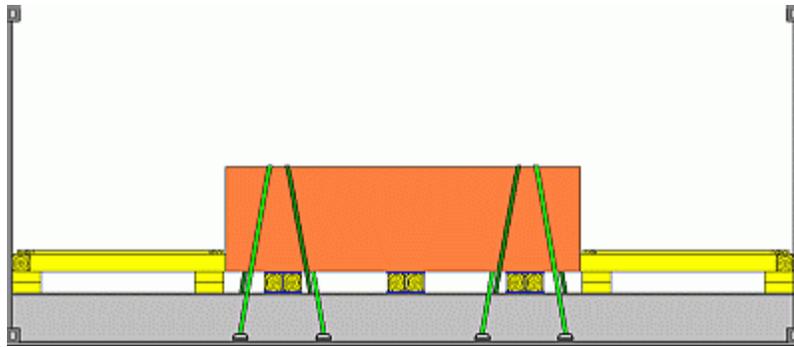
Good compact stow



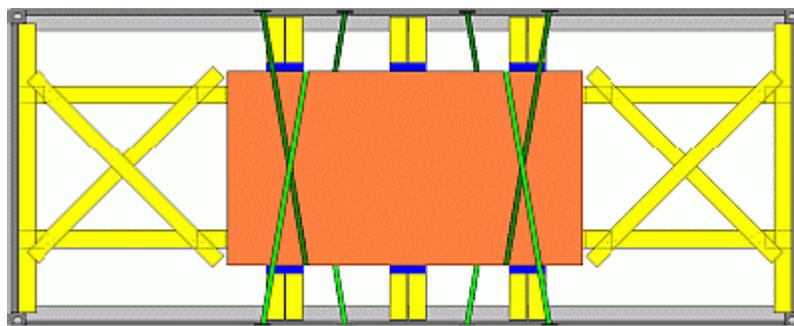
Improvised securing against a corner post and the left door leaf



Cargo braced along ends of an end walled container



Lengthwise bracing of a slab in the container – side view



Lengthwise bracing of a slab in the container plan view

Compiled by Milind Tambe

For more information and assistance contact

Troupe7 Consultants Pvt. Ltd.

Mail: info@troupe7.com

Tel: +91- 9920299203

Web: www.troupe7.com

Credits:

