



Japan-ASEAN Cooperation



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AFFA

Project Transportation Management

PART III



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Cargo Transportation

Objective

The objective of this part is to for the student to be prepared for the arrival of goods at destination. The freight forwarder must ensure and know what are the facilities and equipment available to handle the cargo it is about to receive. And also what are the **preventive measures** in the event that the goods are not deliverable.



Cargo Transportation

PORT OF DISCHARGE

- Space/warehouse for storage if required;
- Do note that most ports/terminals have very high storage charges
- Mode of transportation to/from site;
- Survey of route decided;
- Obstacles; procedures to temporarily remove such obstacles;



Cargo Transportation

In less developed location;

- strength of bridges along the whole route, if road is used;
- likewise if rail is the mean for transportation; passing stations may be too small to handle such cargo;
- if barge is used; suitability of jetty etc;
- availability of equipment required at the site of discharge.



Cargo Transportation

Precautionary Measures and Safety Factors

- to **understand what precautionary measures** to take in handling cargo transportation across borders;
- to understand **various safety factors** in handling the various aspects of the operations;
- do remember, **an over-sight on some simple practice can cause unnecessary delays** and hence costs to the whole operation.

Cargo Transportation

With so many wheels, what are the chances that some tyres will explode during the operation?



Cargo Transportation

How many

tires are there?

Remember such trailers
are not used every day.

**Hence their tires tend
to suffer fatigue**



Courtesy: bridgat.com

Cargo Transportation

Especially if
the route
is **over very
rough terrain.**



Courtesy: demooffhighway.com

Cargo Transportation

Hence, **spare tires must be available** for road transportation as unnecessary delay may be caused by punctures



Courtesy: automotivepotents.com



Cargo Transportation

If the **consignment requires covered space**

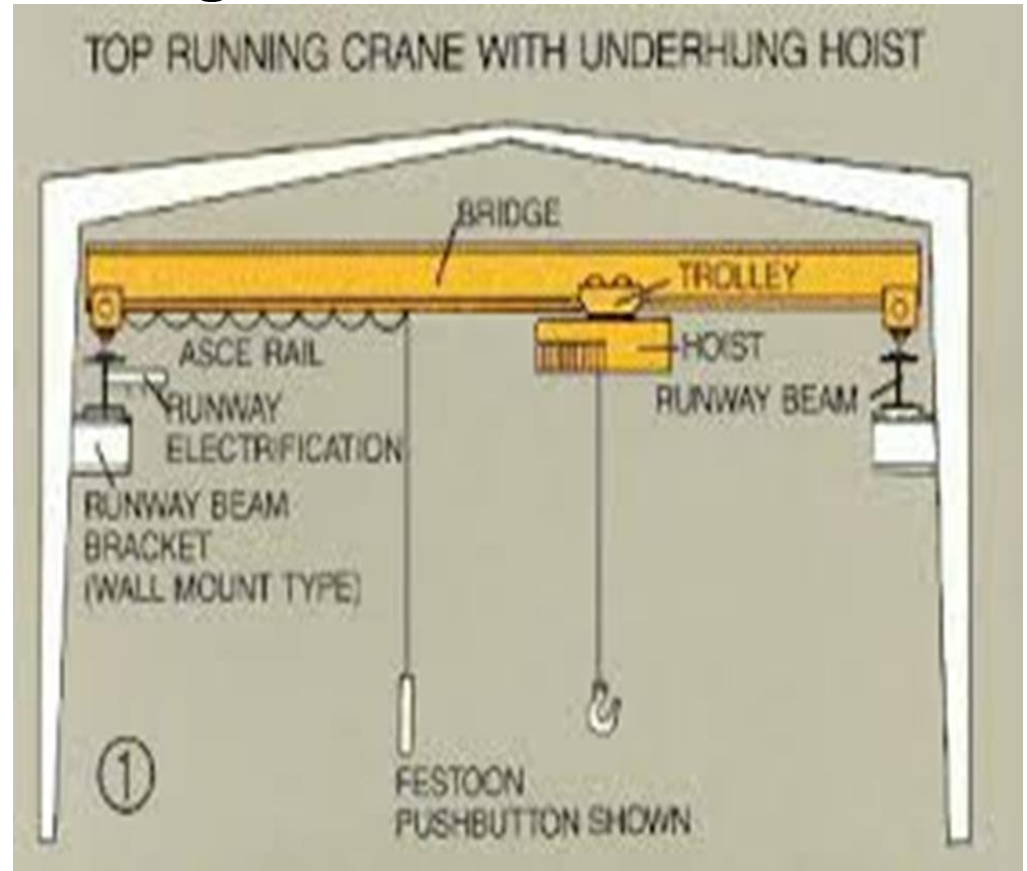
and there are **numerous heavy lift units;**

then considering a **warehouse with over-head cranes** may be an option to consider:

- it may be cheaper with such facility on the final cost;
- though **rates for such warehouses may be higher;**
- it keeps the cargo away from the elements

Cargo Transportation

In which case; an understanding of the over-head crane may be useful:



Courtesy:dc457.4shared.com

Cargo Transportation

Warehouse with **over-head cranes**



Courtesy: powerhouse.com



Cargo Transportation

With **containerization** keeps increasing its market share in international trade; certain **destinations well served by this mode of transportation** may prove to be very competitive Especially with **the imbalance of container** flow from

- i. **Europe to the Far East; and**
- ii. **North America to the Far East**

The innovative approach by the lines in handling even the over-sized; over-weight and over-height units may make this a possible option.



Cargo Transportation

“In 2012, containerized trade ton–miles increased by 3.0 per cent, compared with 8.8 per cent in 2011. Between 2000 and 2012, the average distance travelled by containerized trade dropped by 1.2 per cent, with the drop in long-haul Asia–Europe and trans-Pacific trade being offset by rapid growth in shorter-distance intra-Asian flows. **The continued rise in the longer-haul North–South trade volumes is however likely to increase the average container haul** (Crowe, 2012).”

Maritime Review Report 2013



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Cargo Transportation

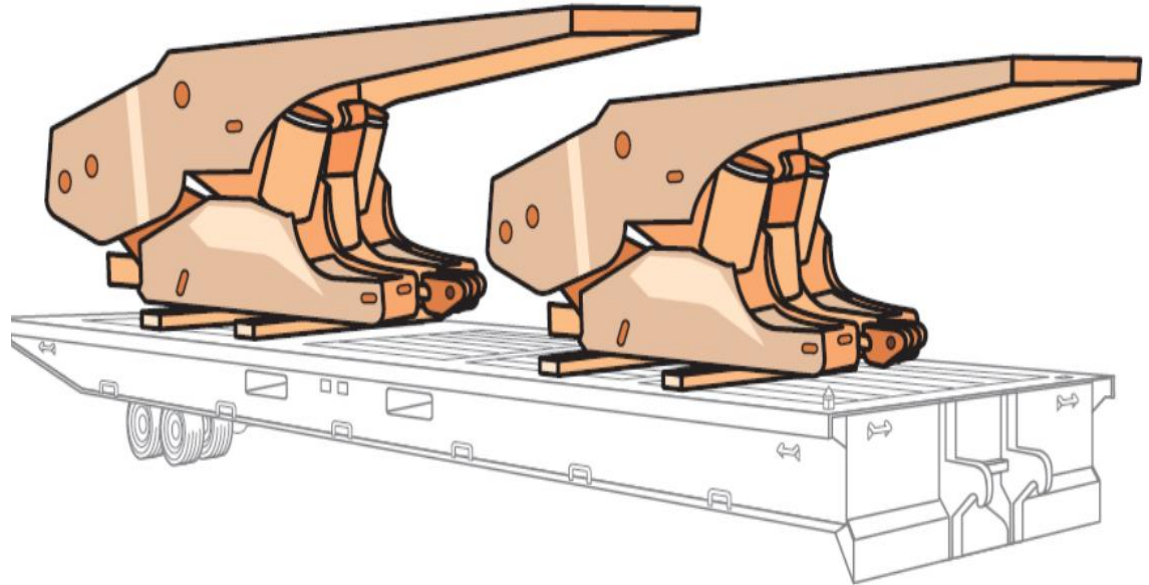
With **container hauling over 80% of traded merchandise volume**, and the issue of imbalance trade in certain sectors, lines are trying to increase the traffic whenever the means are available.

Containerships have been carrying over-sized, over-height and the over-weight units by innovating the handling process.

Hence, some lines have created the necessary platforms to carry such cargoes'

Cargo Transportation

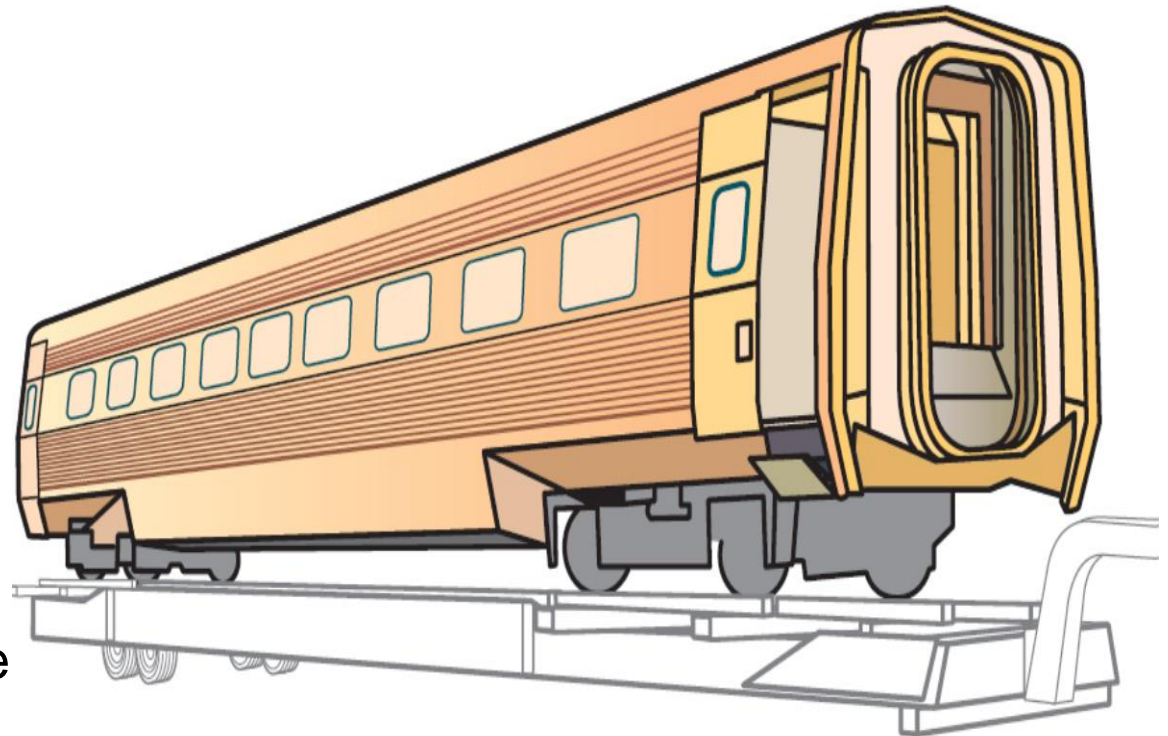
Mining Equipment



Courtesy: w.Wihelmsen

Cargo Transportation

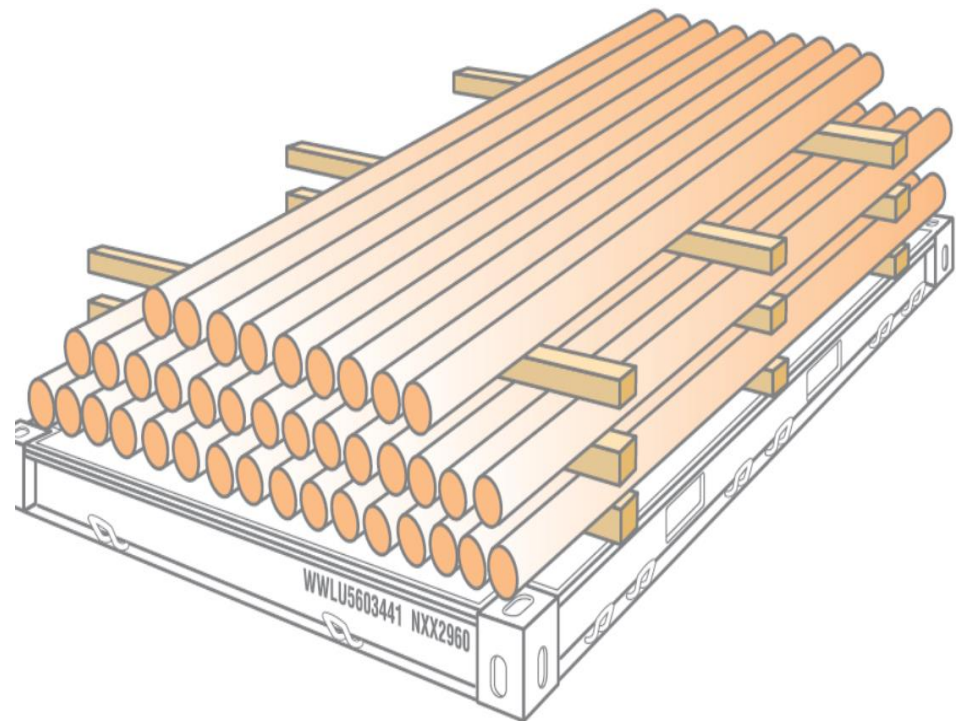
Railway Equipment and Component



Courtesy: w.Wihelmse

Cargo Transportation

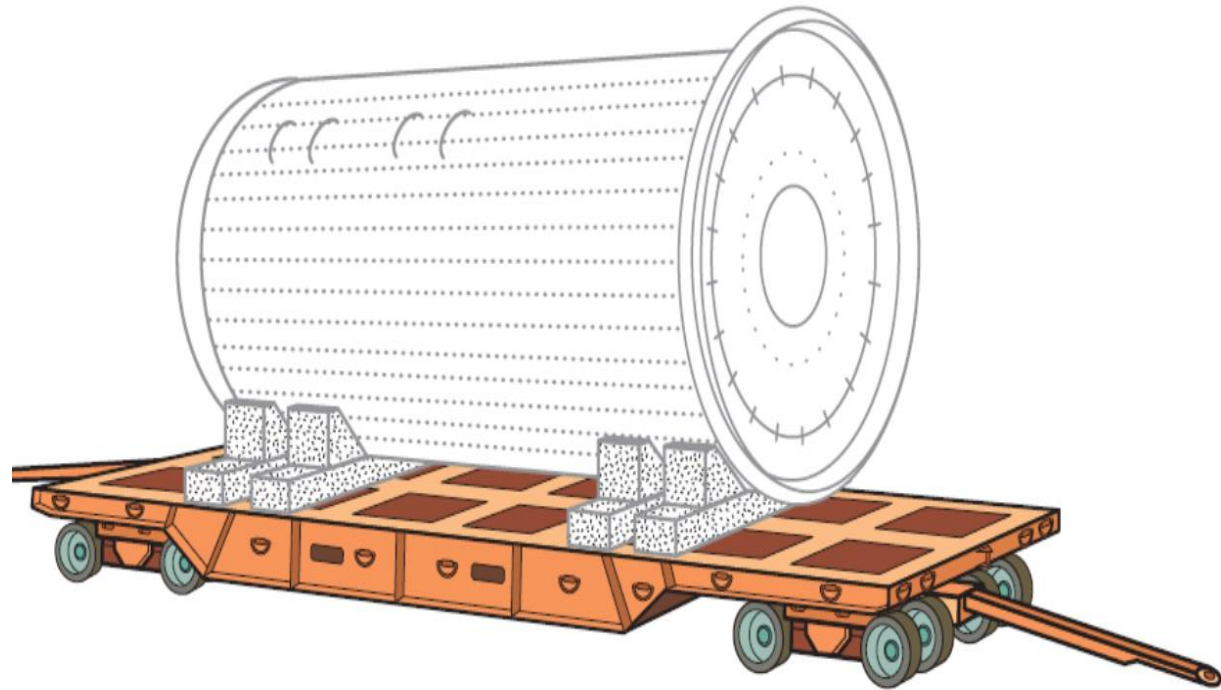
Even Heavy Steel Products



Courtesy: w. Wihelmsen

Cargo Transportation

Industrial Equipment



Courtesy: w.Wihelmsen



Cargo Transportation

Pre-Stuffing

Prior to stuffing, a number of **checks** should be done.

Industry Guidance for Shippers and Container Stuffers be made on a container **both internally and externally** to ensure that it is **structurally sound**, and safe to work in and around.

Dated and digital photographs of the interior and exterior of the container should be taken.

Cargo Transportation

Out of gauge Cargo (OOG) : Cargo that generally extends over and above the standard measurement of a General Purpose container.. OOG cargo is normally carried in **Open Top containers (OT), Flat Racks (FR), Platforms (PL)** due to the nature and size of the cargo.



20' Open Top Container – 20'OT - Mainly used for cargo that **cannot be easily loaded through the door** and needs to be loaded from the top. The cargo could also be in gauge. This type of container is also used for loading cargoes that are over height. Used for the carriage of cargoes like machinery, glass etc [Courtesy: Hapag-Lloyd AG]

Cargo Transportation

40' Open Top Container – 40'OT – Mainly used for cargo that cannot be easily loaded through the door and needs to be loaded from the top.. The cargo could also be in gauge.. This type of container is also used for loading cargoes that are over high.. Used for the carriage of cargoes like machinery etc



Courtesy: Hapag-Lloyd AG

Cargo Transportation

20' Flat Rack Container – 20' FR – Mainly used for cargo that is over-width and/or over-height. Big machinery, vehicles on tracks, big reels etc can be loaded on this type of container.. The cargo could also be in gauge, but is heavy and requires a forklift to load it. In certain types of flat racks, the **ends can also be folded** – known as **Collapsible Flat Racks**..



Courtesy: Hapag-Lloyd AG

Cargo Transportation

40' Flat Rack Container – 40' FR – Mainly used for cargo that is over-width and/or over-height. Big machinery, vehicles on tracks, big reels etc can be loaded on this type of container.. The cargo could also be in-gauge, but is heavy and requires a forklift to load it.. In certain types of flat racks, the **ends can also be folded – known as Collapsible Flat Racks..**



Courtesy: Hapag-Lloyd AG

Cargo Transportation

Over-sized Cargo loaded on deck of containership



Courtesy: maritimejournal.com

Cargo Transportation

Transporting Yacht by Containership



Courtesy: handyshippingguide.com

Cargo Transportation

Over-sized Machines on board Containership



Courtesy: shipoverseas.com



Cargo Transportation

Shipping by Containers

With over 80% of all merchandise goods being shipped in containers or by containerships even on deck;

Organizing project cargo via containers or containerships can prove to be much cheaper especially on view of lesser number of specialist ships in the market.

Given the imbalance of container flow in many of the shipping routes competitive freight rates may be available



Cargo Transportation

In fact with the **quay cranes becoming ever larger in capacity and height**; shipping containers may find **the lifting charges much more competitive than using mobile shore cranes**;

Many new quay cranes are designed **to lift multiple 20 ft containers** thus increasing their lifting capacity to **nearly one hundred tons**; as shown in the next slide, the super-size Post-Panamax cranes at the Port of Khalifa are designed for such purpose

Cargo Transportation

The new Super-size
Post-Panamax
Quay cranes for
the Port of Khalifa
being unloaded CBU

Courtesy: Port of Khalifa





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Cargo Transportation

Each ship-to-shore quay crane

weights 1,932 tons and
126.5 meters high.

The outreach of one STS crane is 65 meters,
which is about 22 containers and
may lift up to a total of 90 tons.



Cargo Transportation

In shipping by containers, the following points should be noted;

-especially with regard to the **stuffing of containers**;

- **check list and specific procedures** to follow;

with regard to **proper loading, lashing of such cargo**;

With project cargo which tend to have **a mixture of sizes**;

a proper approach **to ensure safety of workers and cargo** is important



Cargo Transportation

Mechanical stresses

Cargo securing **must withstand all stresses** resulting from sea and land transport, as well as container handling.

Cargo securing cannot be improved or altered after the container has been closed.

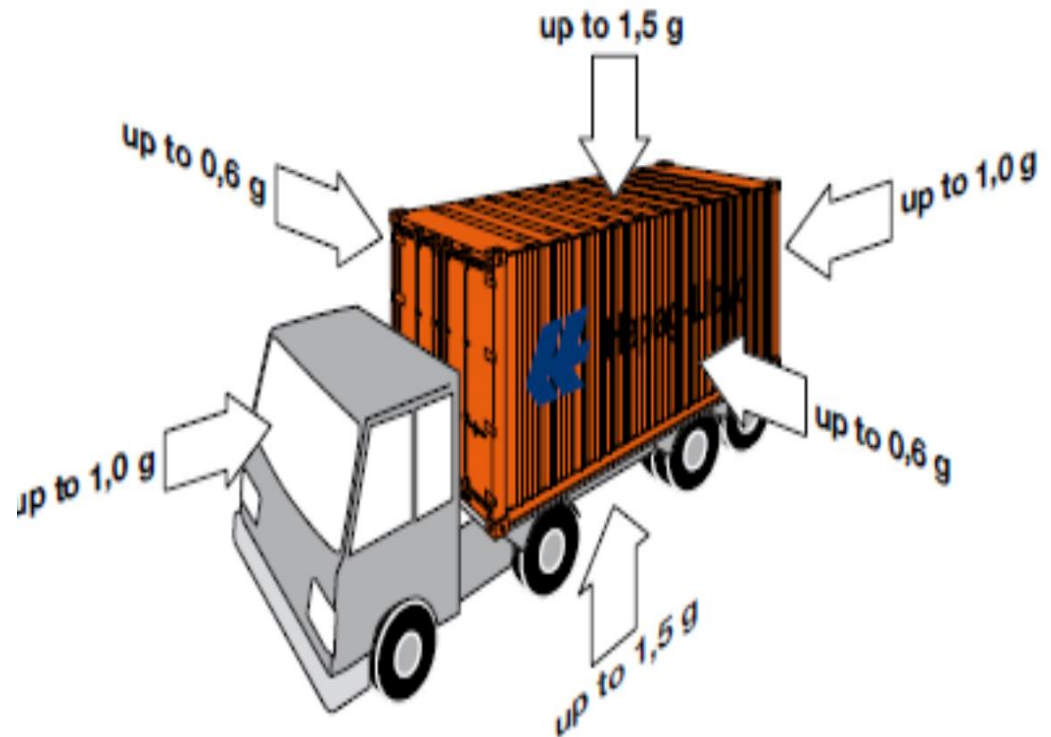
Basically, we differentiate between **2 types of mechanical stress.**

Static forces are caused by stacking and standing cargo on the floor of the container; **dynamic stress by its movement**

The stacking pressure depends on the dimensions, weight, shape and height of the cargo involved.

Cargo Transportation

**Stress on container
While being carried by
A truck**



Courtesy: Hapag-Lloyd AG



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Cargo Transportation

Dynamic forces occur during loading, land or sea transport and handling operations.

Acceleration and jolts occur during loading, braking [**deceleration**] shunting, handling, lifting and setting down, and in curves.

Even at sea, acceleration is caused by rolling, pitching and vertical movements.



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Cargo Transportation

Vibrations are caused by, for instance, the ship's engine, gears and propeller, the truck suspension and road and rail surfaces in a wide range of frequencies and amplitudes.

The letter “g” indicates gravitational acceleration ($g=9.81\text{m/s}^2$).

The acceleration may be higher than indicated during short impacts or vibrations



Cargo Transportation

Climatic stresses

Goods are very **frequently subject to climatic stresses** while being transported.

These occur even **during storage**, and while containers are **being packed**.

Climatic stresses are caused by changing climatic conditions during transport by road, inland waterway vessel or rail, and particularly when they are protected against external influences, **condensation** may occur inside.



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Cargo Transportation

The **relative humidity in the container** is influenced by the **moisture** that is brought into it **on loading**, and any **subsequent change in temperature**, when vessel sails through its journey



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Sources of moisture are the **enclosed air in the container**, the cargo itself, **its packaging or the stowage material**.

Some cargoes emit a considerable amount of water over a longer period, while most **packaging, stowage material and some cargoes absorb moisture**.

Moist air condenses if the ambient temperature falls below the dew point, the condensate forming first on the cargo packaging, container wall or roof.



Cargo Transportation

The **condensate then** drips from the roof on to the cargo, causing damage the cargo such as rust, marks, staining, mould, discoloration, sticking together of wet cartons, peeling off of labels or collapsing of stacks.

The temperature inside a container depends on the outside temperature and the stowage position of the box on board the ship.



Cargo Transportation

The container can be warmed by direct solar radiation on deck or heated fuel tanks next to the hatch.

The air temperature within the container below the roof can deviate from the ambient air by 20–30°C.

Temperatures of up to 60°C are thus possible. The internal temperature can also increase as a result of the spontaneous heating of the cargo.



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Cargo Transportation

Biological stresses

High temperatures, moisture or poor ventilation in the container can lead to cargo or packaging **being attacked by insects, fungi, mould, bacteria or micro-organisms.**

The cargo should, therefore, be packed with the greatest possible care.



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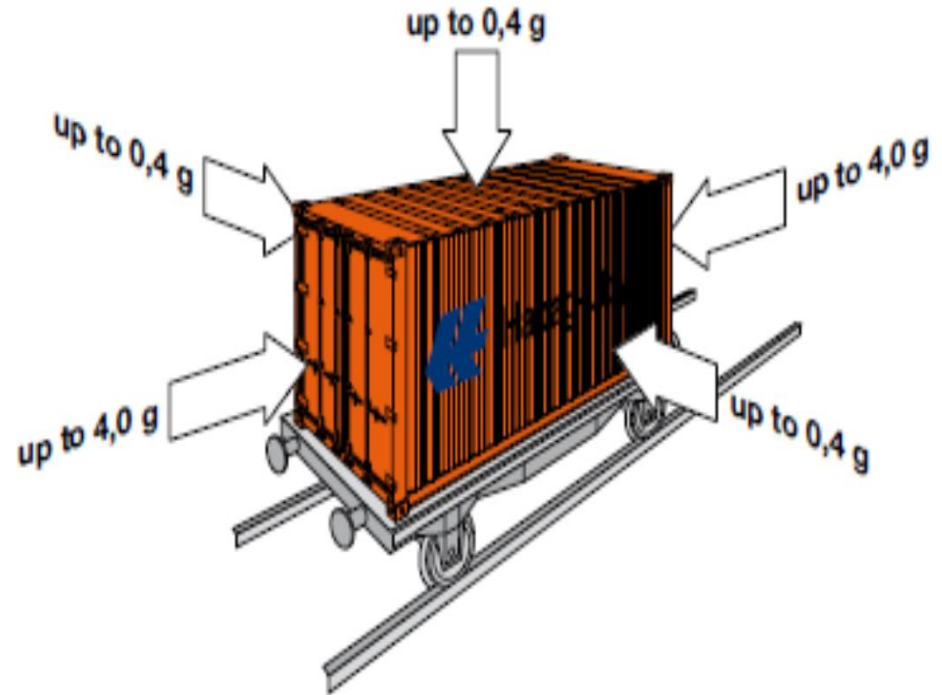
Cargo Transportation

Some countries **regulate the fumigation of packaging and dunnage by law.**

The customer may then **requires a certificate** confirming that the timber used is free of insects stowed in the container.

Cargo Transportation

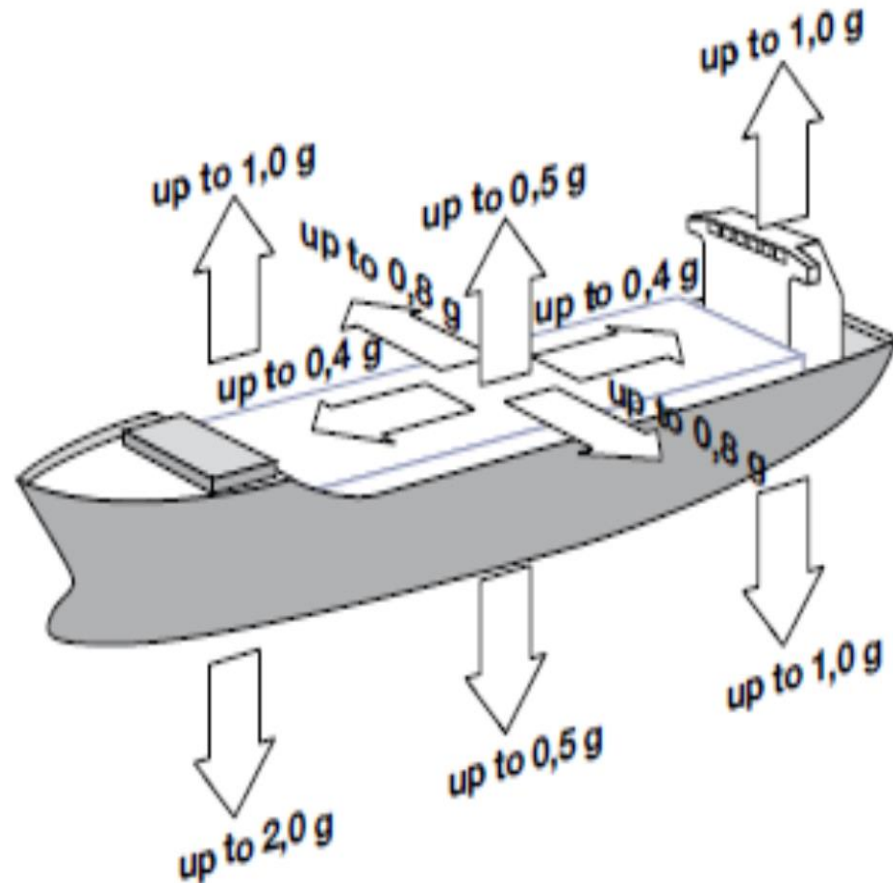
Stress on container
While being hauled
on board a moving
train



Courtesy: Hapad-Lloyd AG

Cargo Transportation

**Container under
Stress on board
A ship**



Courtesy: Hapag-Lloyd AG



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Cargo Transportation

Chemical stresses

Chemical stresses **depend on the type of cargo, temperature, moisture and movement of the ship.**

Some chemical products tend to heat spontaneously.

Hazardous goods must be transported in accordance with the hazardous goods regulations.

One basis is **the IMDG Code**, published by the International Maritime Organization.

Cargo Transportation

Sweating container



Condensation water on roof, dry bag already completely soaked

Courtesy: Hapag-Lloyd AG



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Cargo Transportation

In Conclusion:

We have discussed the points to consider for arrival of goods and also the precautionary measures in cargo handling.