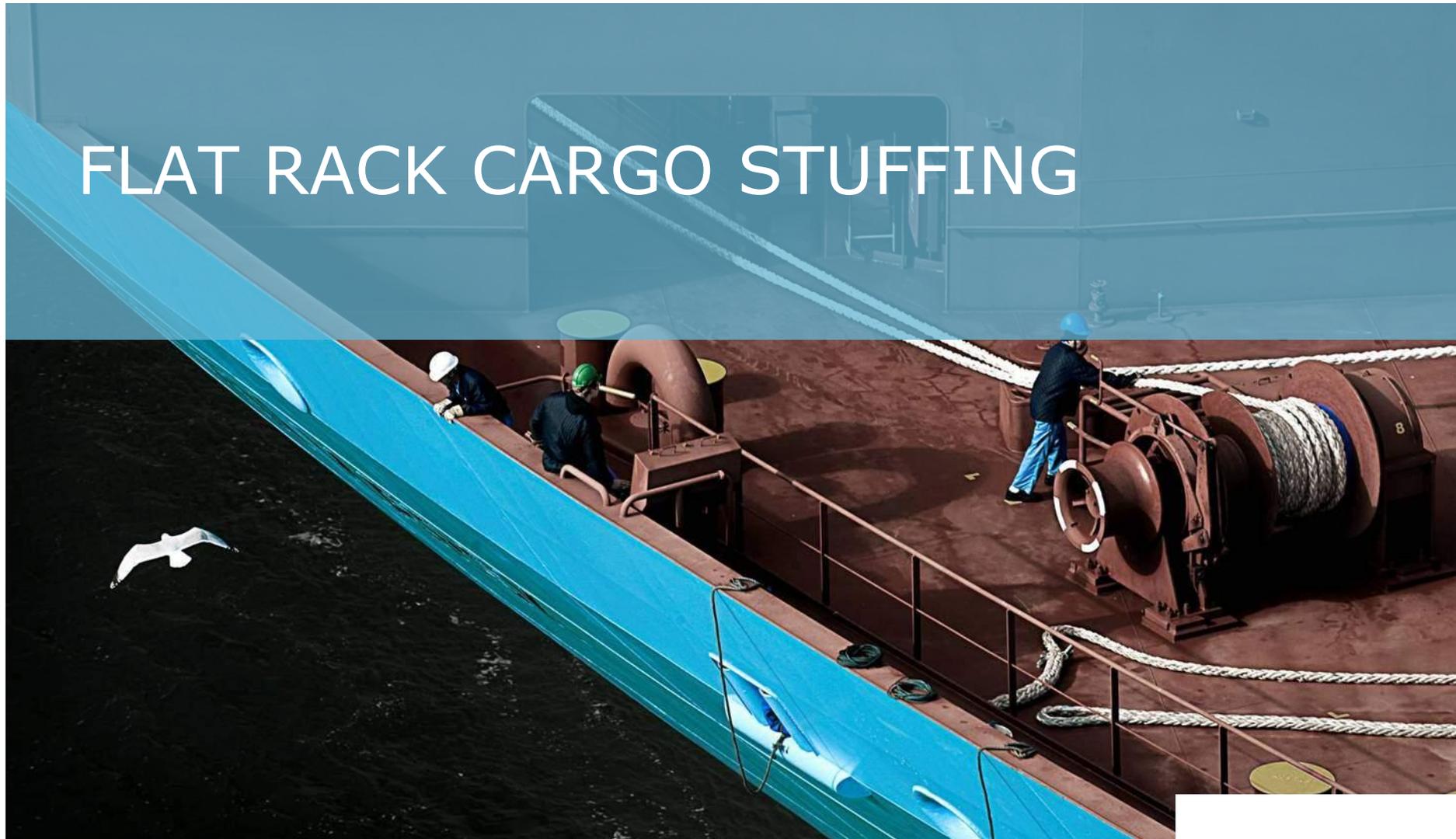


# SAFE TRANSPORTATION – CLAIMS PREVENTION

## FLAT RACK CARGO STUFFING



# Flat Rack Stuffing by



**MAERSK**  
LINE

+



**Kapitän**  
**H.-J. Möller**  
**und Partner**

# Why safe stuffing?



We want to keep your cargo upright



and undamaged!



Safe stuffings are essential to achieve this aim.

# FLAT RACK STUFFING

Why stuffing guidelines & rules?



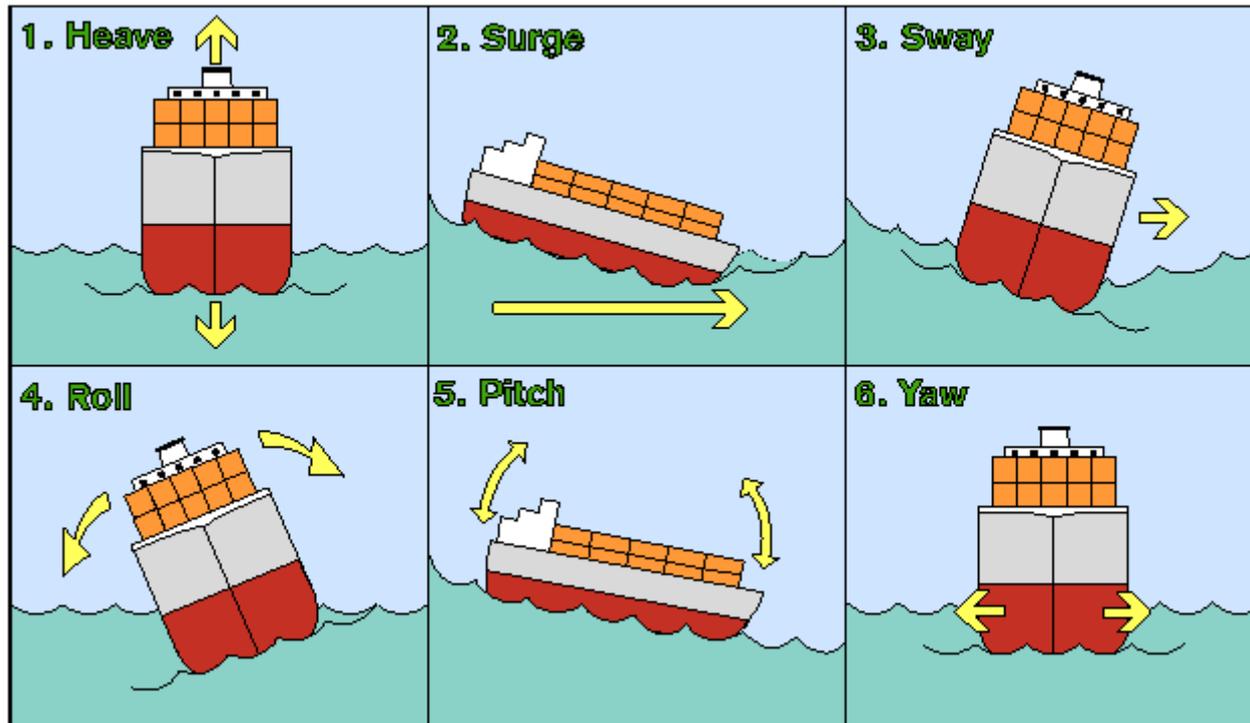
That is what you must consider may happen during ocean transport

# FLAT RACK STUFFING

## CARGO LASHING / BLOCKING

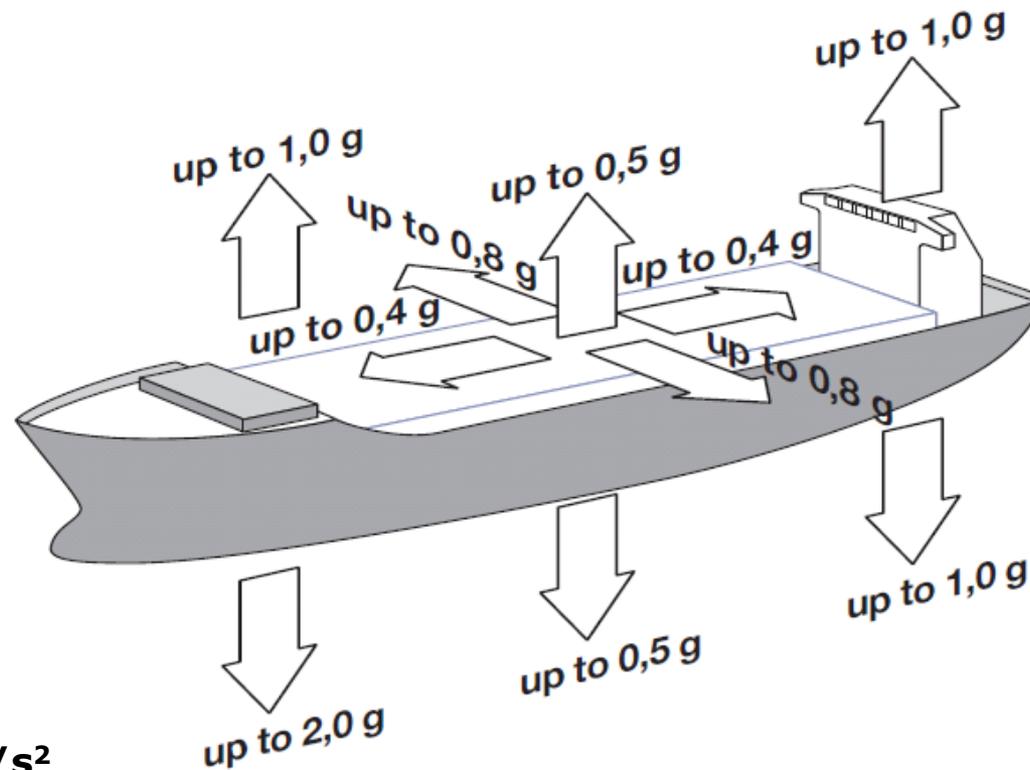
Vessel movements that have to be taken into consideration

### SHIP MOVEMENT



# FLAT RACK STUFFING

And the effected forces during sailing...



**1g = 9,81m/s<sup>2</sup>**

# FLAT RACK STUFFING

... resulting in possible accelerations

	<b>Forwards</b>	<b>Backwards</b>	<b>Sideways</b>	<b>Vertical</b>
Baltic Sea	0,3g	0,3g	0,5 g	up to 1,5g
North Sea	0,3g	0,3g	0,7g	up to 1,7g
Unrestricted	0,4g	0,4g	0,8g	up to 1,8g

$$1g = 9,81m/s^2$$

...and for pre-transport / oncarriage by road or rail

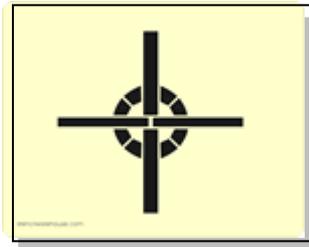
	<b>Forwards</b>	<b>Backwards</b>	<b>Sideways</b>
Road	1,0 g	0,5 g	0,5 g
RAILWAY			
Wagons subject to shunting	4,0 g	4,0 g	0,5 g
Combined transport	1,0 g	1,0 g	0,5 g

# FLAT RACK STUFFING

## What is a Center of Gravity ?

Center of Gravity is the mean location of all the mass in a system.

The international mark for a center of gravity should be obviously at every piece of cargo, especially on boxes and cases.

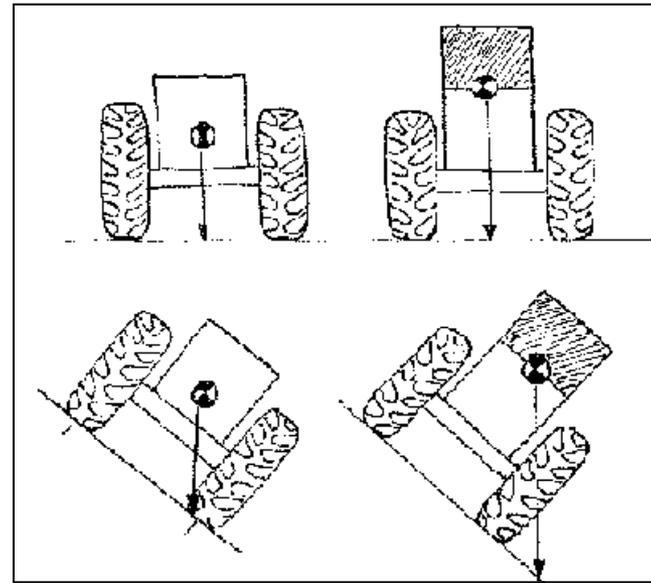


# FLAT RACK STUFFING

## Why is a Center of Gravity so essential ?

This little image shows, how the Center of gravity influences the stability of a cargo.

The drawings on the right side illustrate that even a little bit higher located center results in guiding outside which tilts cargo and might cause a turn over.....



# FLAT RACK STUFFING

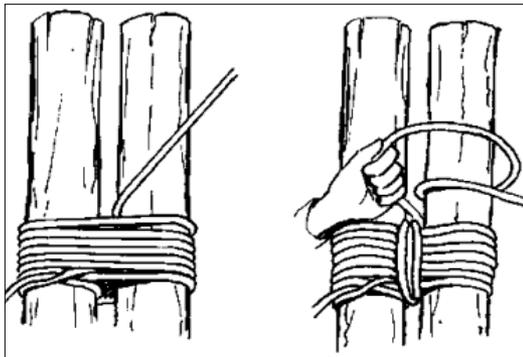
...and that can happen, if Center of Gravity is wrongly indicated!



# FLAT RACK STUFFING

## What is LASHING ?

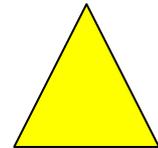
Lashing is an arrangement of rope / wire / chain used to secure two or more items together in a somewhat rigid manner.



# FLAT RACK STUFFING



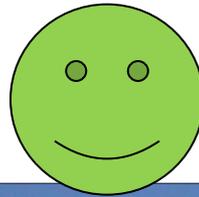
**LASHING ?**



**YES,**

**BUT RIGHT**

# FLAT RACK STUFFING



## HEAD LASHING

Minimize the risk of horizontal sliding



## EDGE PROTECTORS

Minimize the risk of belt damages.

# FLAT RACK STUFFING

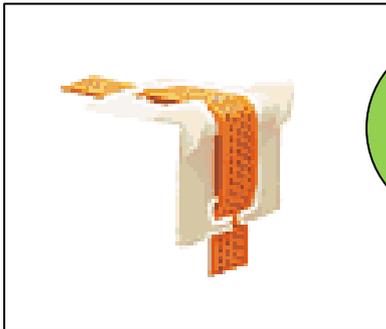
## LASHING - MATERIAL



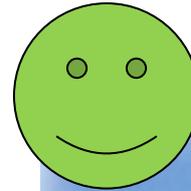
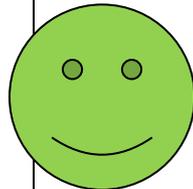
**NEVER**

# FLAT RACK STUFFING

**Always  
Use  
The Right  
Equipment**



**EDGE  
PROTECTOR**



**RATCHET**

# FLAT RACK STUFFING

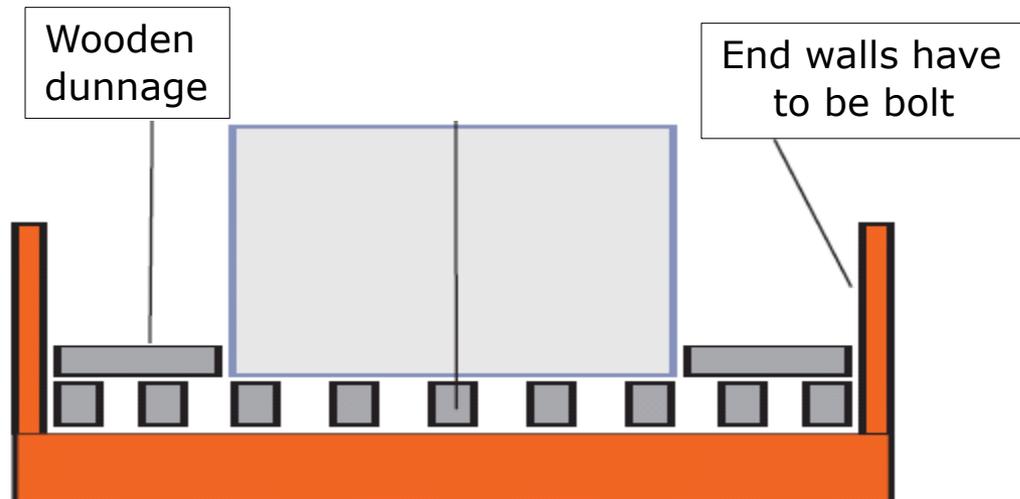


....will result in mimized lashing forces. Add nil dunnage, nil blocking =  
**NIL SAFETY**

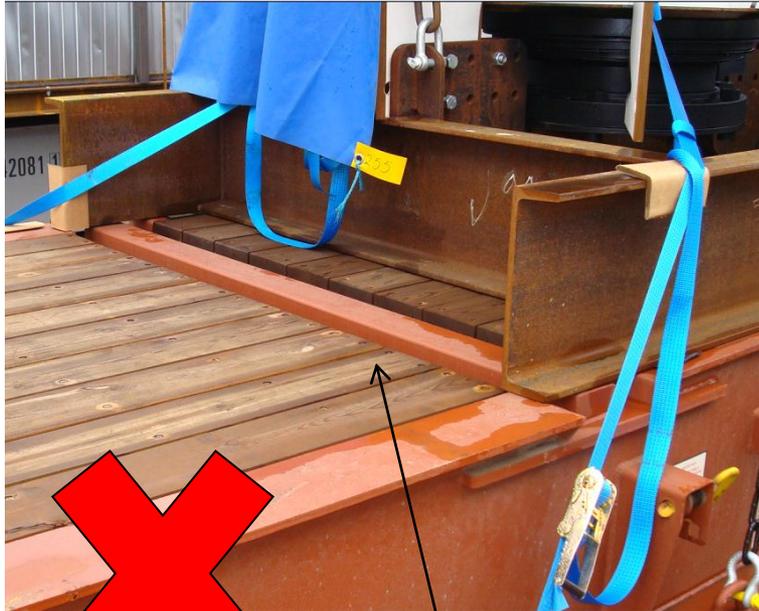
# FLAT RACK STUFFING

## What is BLOCKING ?

Blocking is an arrangement of wooden dunnage to avoid horizontal movements.



# FLAT RACK STUFFING



Nil  
Blocking



# FLAT RACK STUFFING

## BLOCKING



# FLAT RACK STUFFING

## What is JACKING ?

Jacking is an arrangement of mostly wooden dunnage to underpin fixed axles / stanchions used to lighten the tire - pressure of vehicles.



# FLAT RACK STUFFING



**BEST  
CASE**

> Jacking

> Blocking

> Lashing



Loading and securing of vehicle on 40' Flat Rack container

# FLAT RACK STUFFING



IMPROPER  
STUFFING...

# FLAT RACK STUFFING



RESULTS IN....



# FLAT RACK STUFFING



## **EQUIPMENT DAMAGE !**

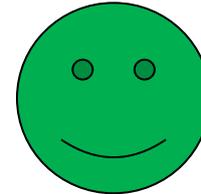
Not to oversee:

**BIG RISK**  
For  
**VESSEL, CREW**  
&  
**TERMINAL  
OPERATOR**

# FLAT RACK STUFFING



**THE BEST: how it should be!**



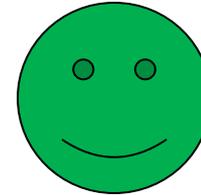
Cross lashing

Blocking

Heavy cargo stuffed on dunnage for weight pressure spreading

Tie down lashing

# FLAT RACK STUFFING



Detailed view of how proper additional spreader can be stuffed safety.

# FLAT RACK STUFFING

## SPECIALS; CASES



What is inside ?

Every cargo has to be lashed  
DIRECTLY.  
Lashing points have to be  
OUTSIDE.

The request is a **PACKING CERTIFICATE** from shippers

# FLAT RACK STUFFING



Examples for  
Lashing points



**OTHERWISE.....**

# FLAT RACK STUFFING

result of improper securing of cargo inside of box



**..THIS MIGHT  
HAPPEN !**

# FLAT RACK STUFFING



**BEST CASE !**

Openings in the case  
make direct cargo lashing  
available.

# FLAT RACK STUFFING

Last point.....

All the shown measurements can't be successful,  
if various prevention tasks will no be fulfilled,  
such as:

- > detailed planning
- > right equipment election
- > contacting experts for support

# FLAT RACK STUFFING

Prevention Tasks before stuffing a container by CTU packing rules

- Valid CSC placard    yes/no    date of validity
- Check of corner castings, structure
- Check of roof, sidewalls, former damages
- Check of doors, locks, endwalls
- Check of floor, clean, nails, holes, traces of contamination
- Check of lashing points, nos, condition
- Check of lashing equipment
- Check of cargo weight distribution & therefore correct stowage position



# FLAT RACK STUFFING

??? Questions ???

Please feel free & contact



[GEROPSCLM@maersk.com](mailto:GEROPSCLM@maersk.com)

Tel +49 471 14 286 623

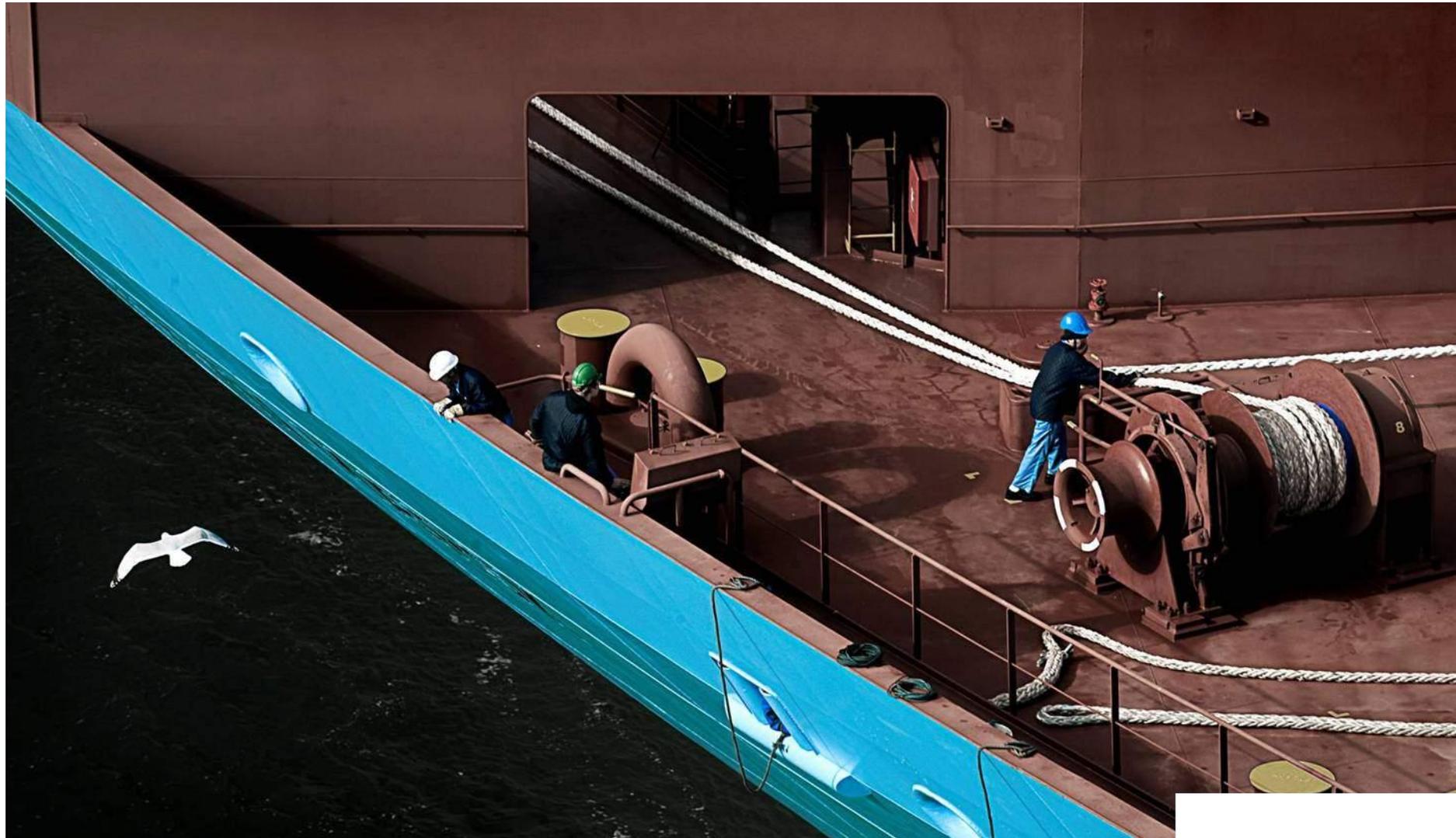


**Kapitän  
H.-J. Möller  
und Partner**

[office@moeller-expert.com](mailto:office@moeller-expert.com)

Tel +49 471 946 090

# YOUR CARGO IN SAFE HANDS



# SAFE TRANSPORTATION – CLAIMS PREVENTION

# THANK YOU !



# Coil Cargo Handling (고객용)

Heavy and sometimes  
damaging cargoes



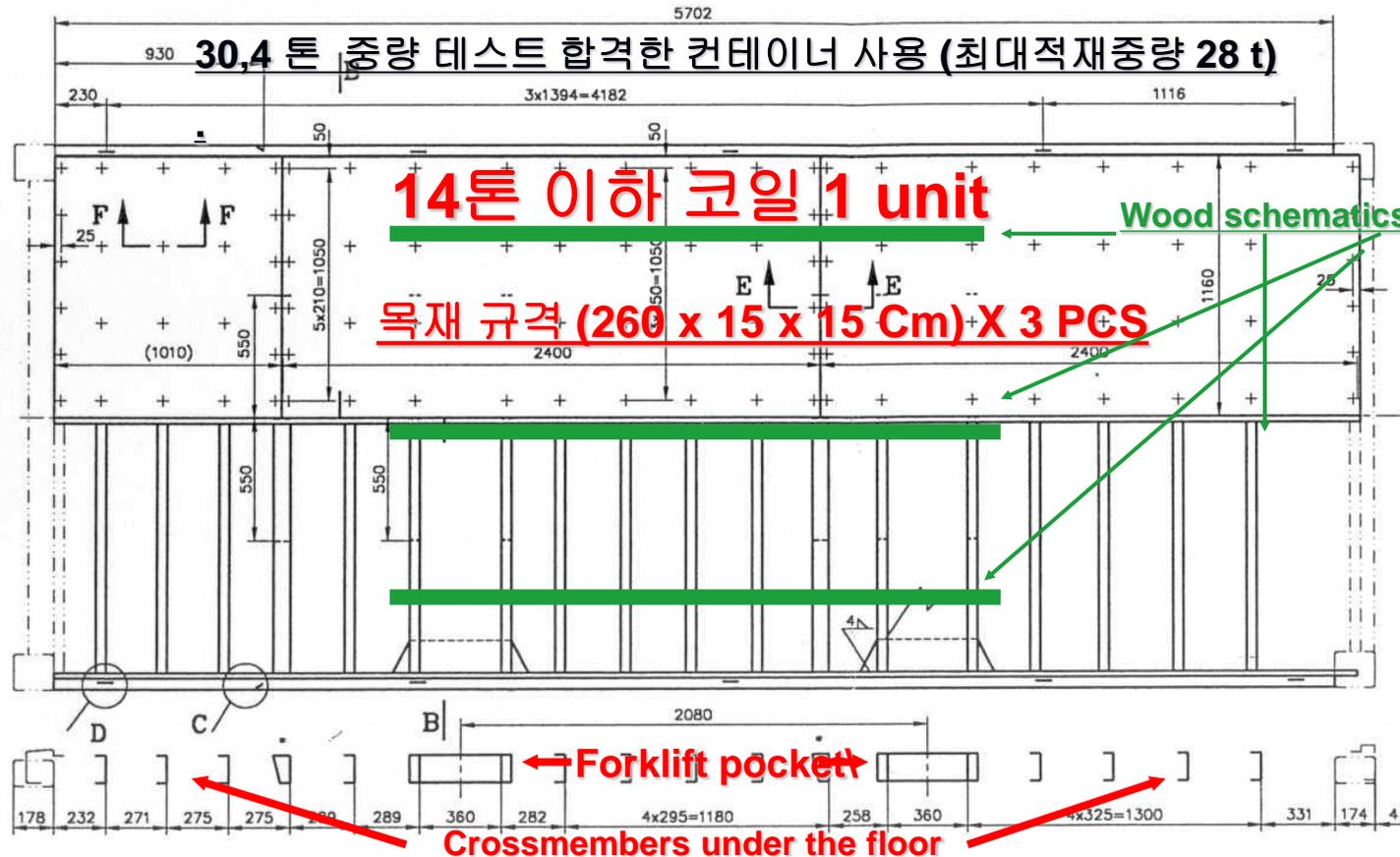
# Coil Damage Live Examples



# 20ft GP/DC 컨테이너 바닥 도면 (14톤이하 x 코일 1 unit)

**Note's:**

무게가 바닥에 고루 분산될 수 있도록, 최소 3개의 목재를 사용해서 코일이 바닥에 직접 닿지 않도록 주의



(Recommendations only, this due the large variety of stones involved)

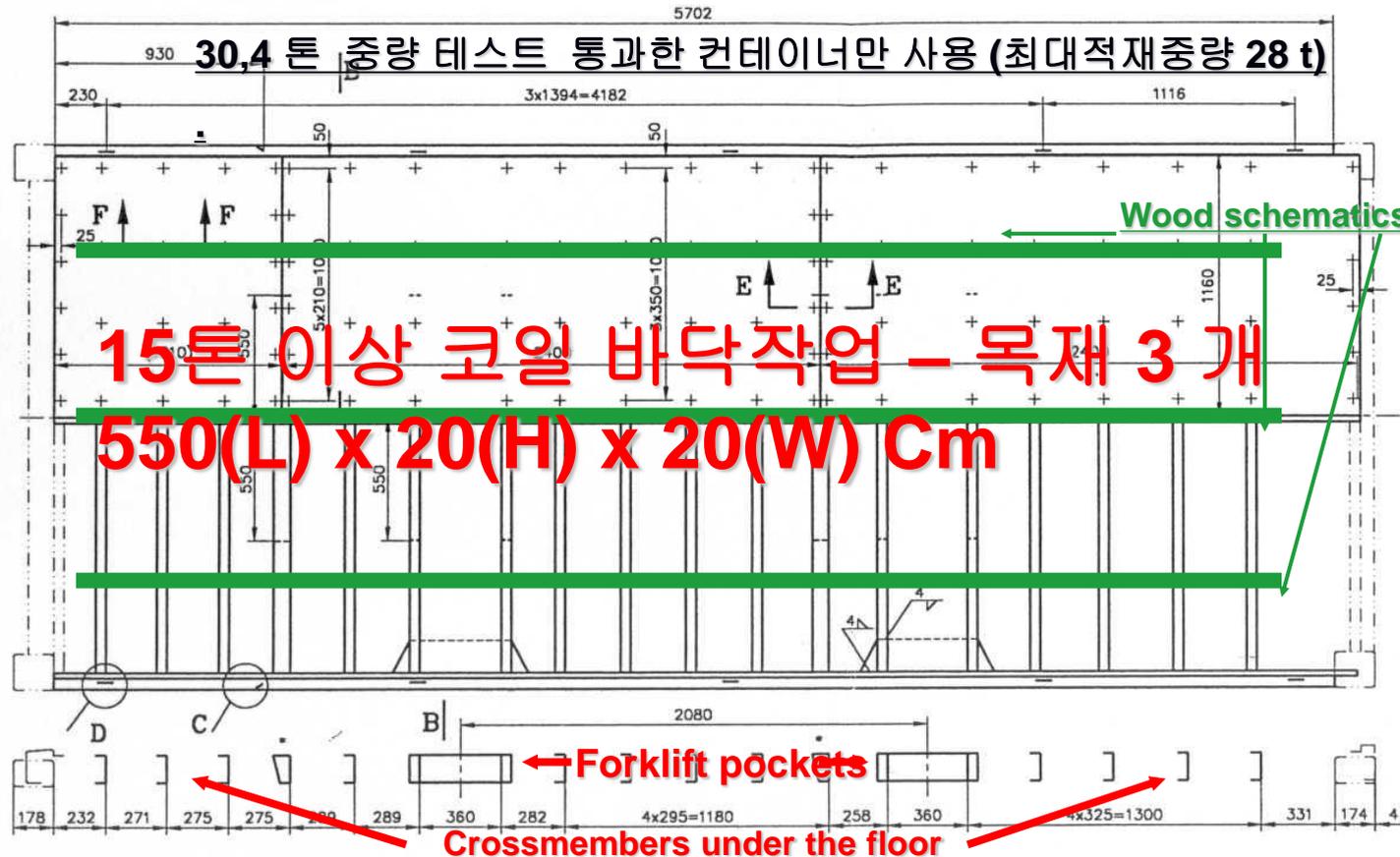
**Heavy cargo** 일 경우 무게가 전체바닥에 고르게 분산될 수 있어야 함



# 20ft GP/DC 컨테이너 바닥 도면 ( 코일 2 units -총 중량 15톤 이상)

Note's: @

무게가 바닥에 고루 분산될 수 있도록, 최소 3개의 목재를 사용해서 코일이 바닥에 직접 닿지 않도록 주의



2

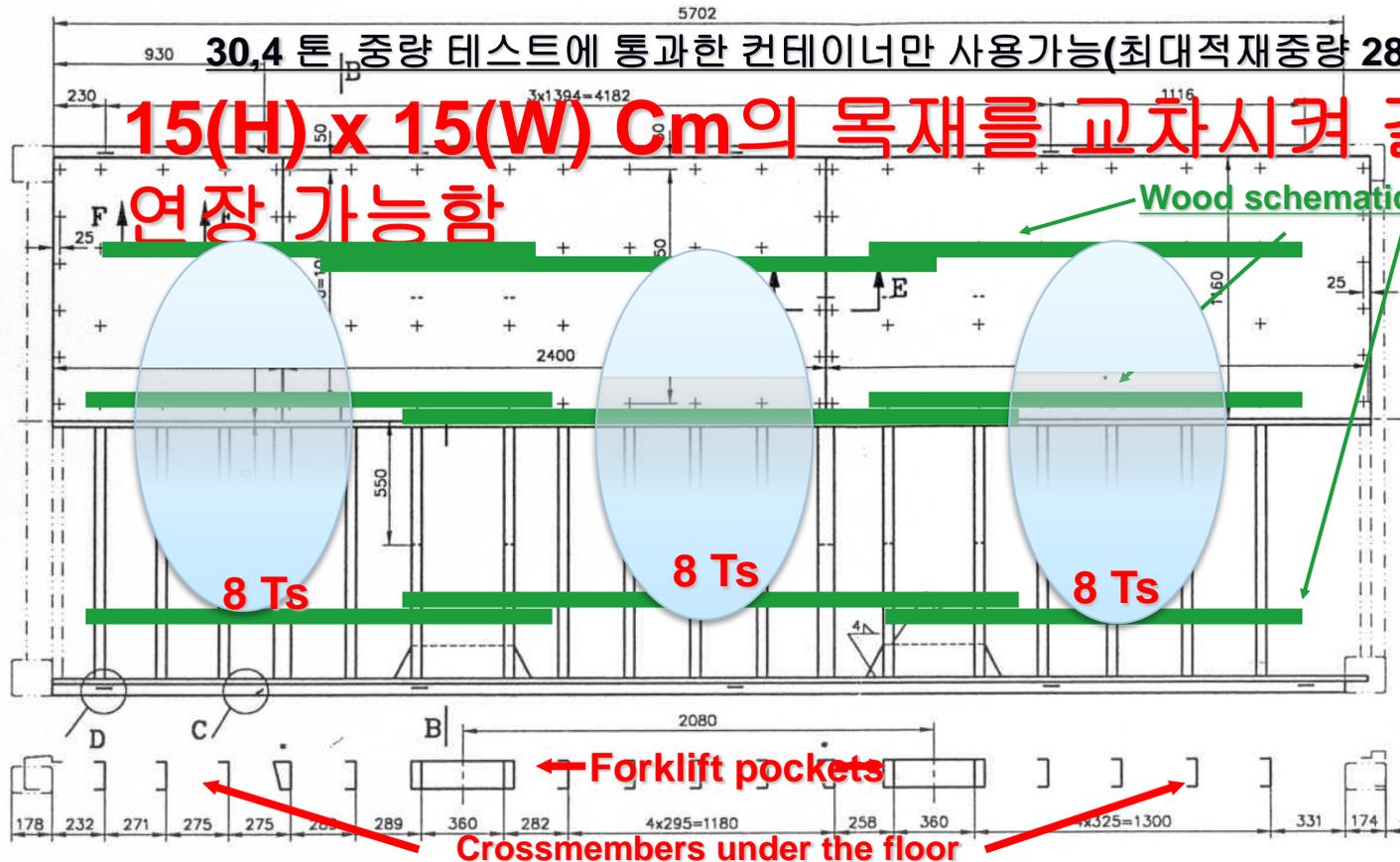
(Recommendations only, this due the large variety of coils involved)

## 20ft GP/DC 컨테이너 바닥 도면 ( 코일 3 units)

**Note's:**

무게가 바닥에 고루 분산될 수 있도록, 최소 3개의 목재를 사용해서 코일이 바닥에 직접 닿지 않도록 주의

**15(H) x 15(W) Cm의 목재를 교차시켜 길이 연장 가능함**



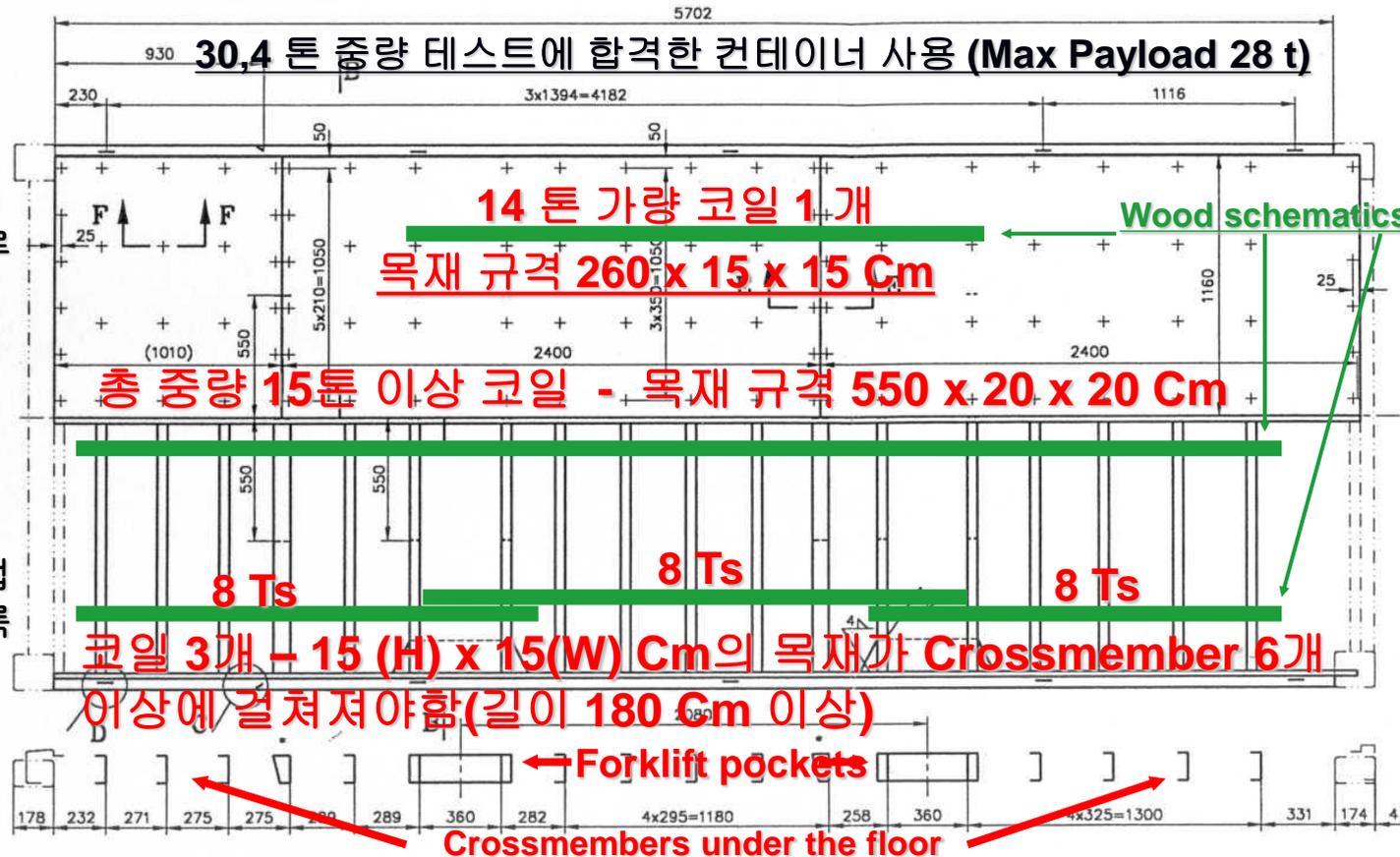
3

(Recommendations only, this due the large variety of coils involved)

# 바닥 도면 작업 요약

**Note's:**

무게가 바닥에 고루 분산될 수 있도록, 최소 3개의 목재를 사용해서 코일이 바닥에 직접 닿지 않도록 주의



- 1
- 2
- 3

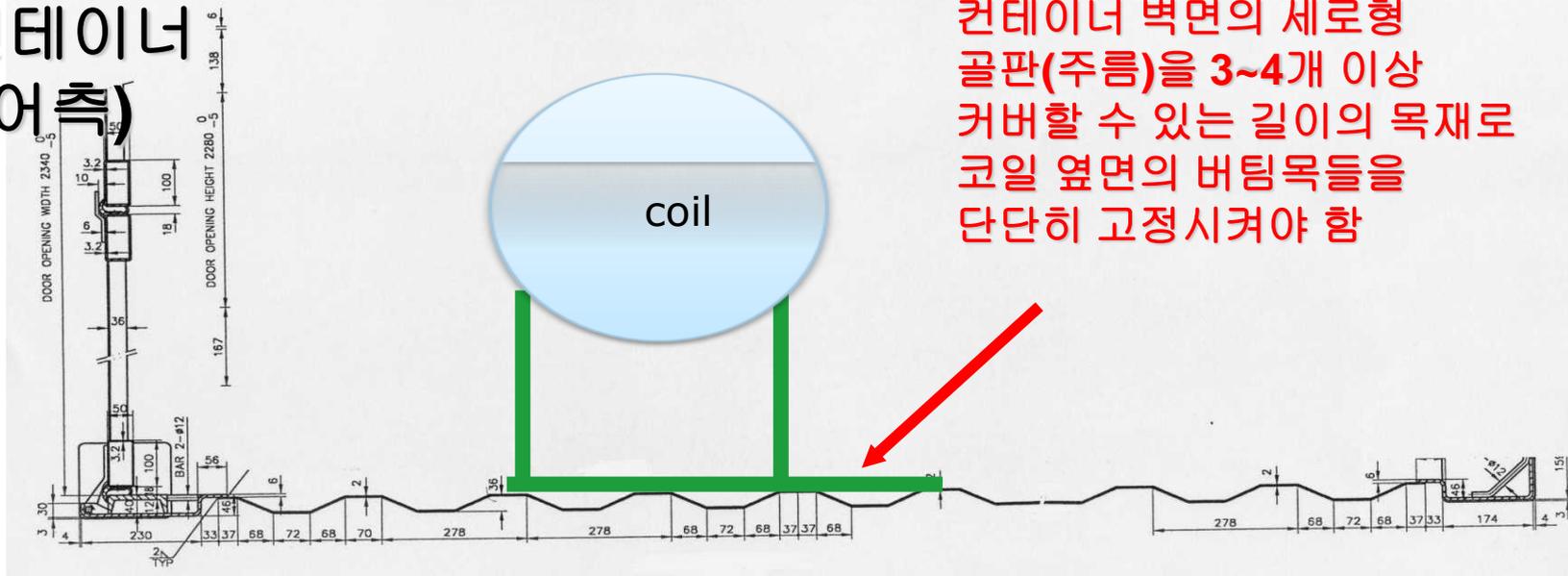
**Weights to be divided over the full floor area**



하중(weight)의 고른 분산을 위해, 목재를 길이로  
걸치는 작업을 하는 모습

## 컨테이너 벽면 작업의 조감도(Bird view) – 코일 개수에 상관없이 필수 사항임

(컨테이너  
도어측)



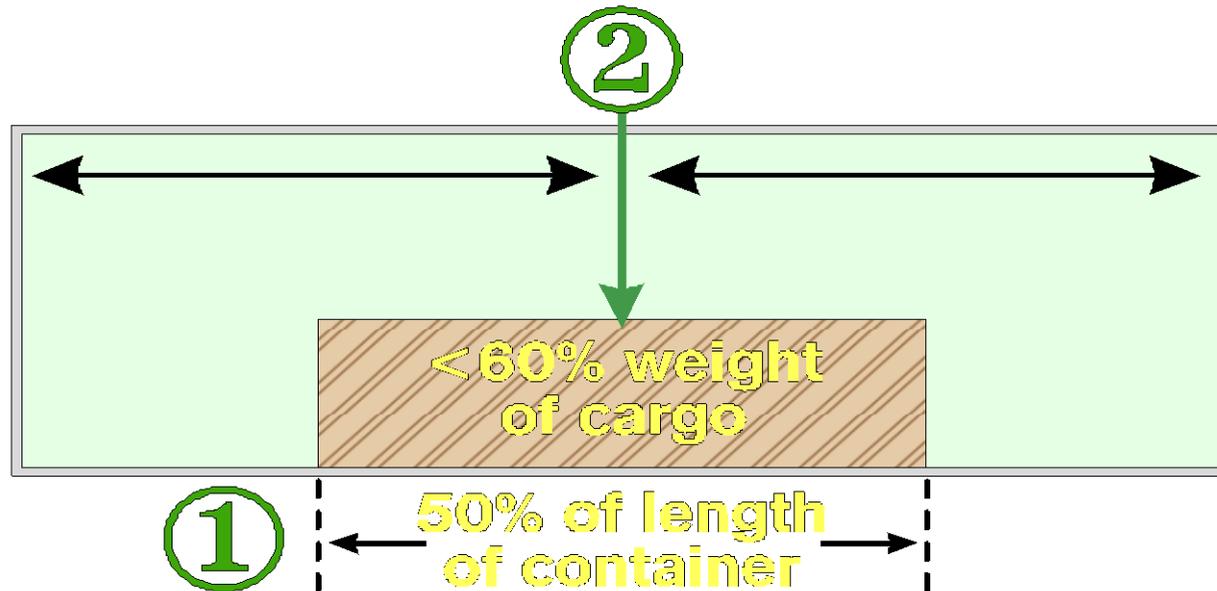
컨테이너 벽면의 압력을 분산할 수 있도록, 벽면에 목재 지지대로 작업을 한 모습

# 컨테이너 옆면 표본 작업 예시

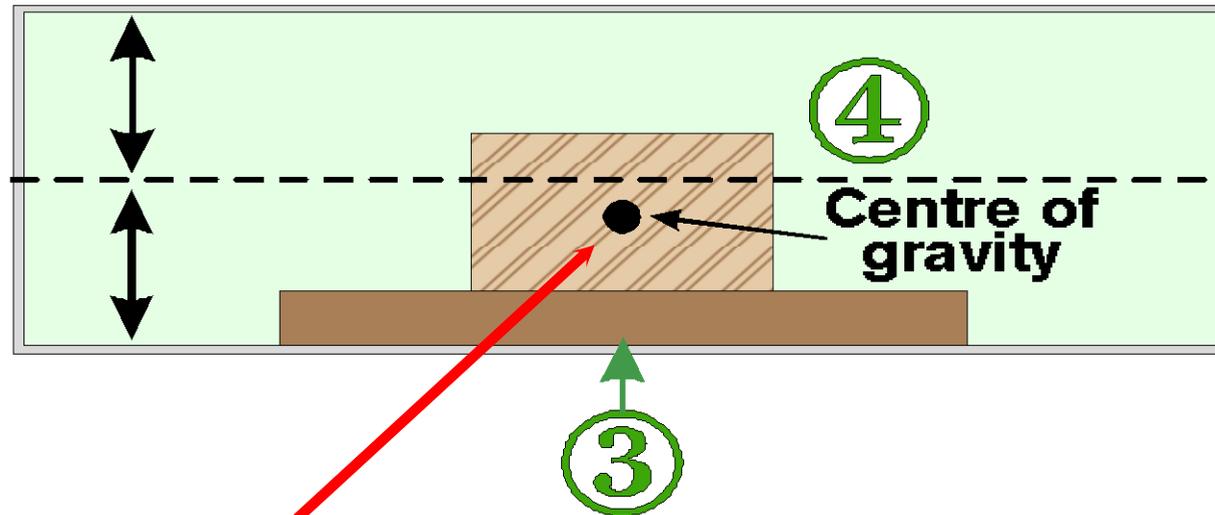


컨테이너 옆면의 골판 주름 3개 이상의 주름을 덮을 수 있는 길이의 목재를 사용하여 **bracing** 작업을 함

# WEIGHT DISTRIBUTION



## WEIGHT DISTRIBUTION



코일의 무게 중심점이 항상 컨테이너 높이의  
50% 이하에 위치하도록 한다

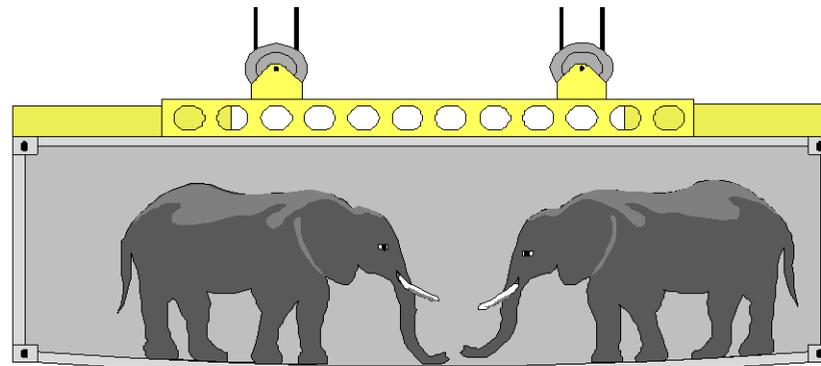
**중량 : 20ft payload- 22t, 40ft-28t**

**Note:**  
Modern 20ft GP's  
are gross 30.48 ts

Tare mass  $\cong$  2t  
Payload  $\cong$  22t



Tare mass  $\cong$  2.5t  
Payload  $\cong$  28t



**PAYLOAD MUST NOT BE EXCEEDED!!**

# 무게가 한 시점에 집중되면 안됨

Size of these layers is depending on the cargo weight

하중이 길이로 고르게 분산되어야 합니다. 그렇지 않으면 다음 사진의 결과가 초래됩니다.

**Serious crossmember damages**



**Who pays for repairs??**

**Serious Floorboard damages**

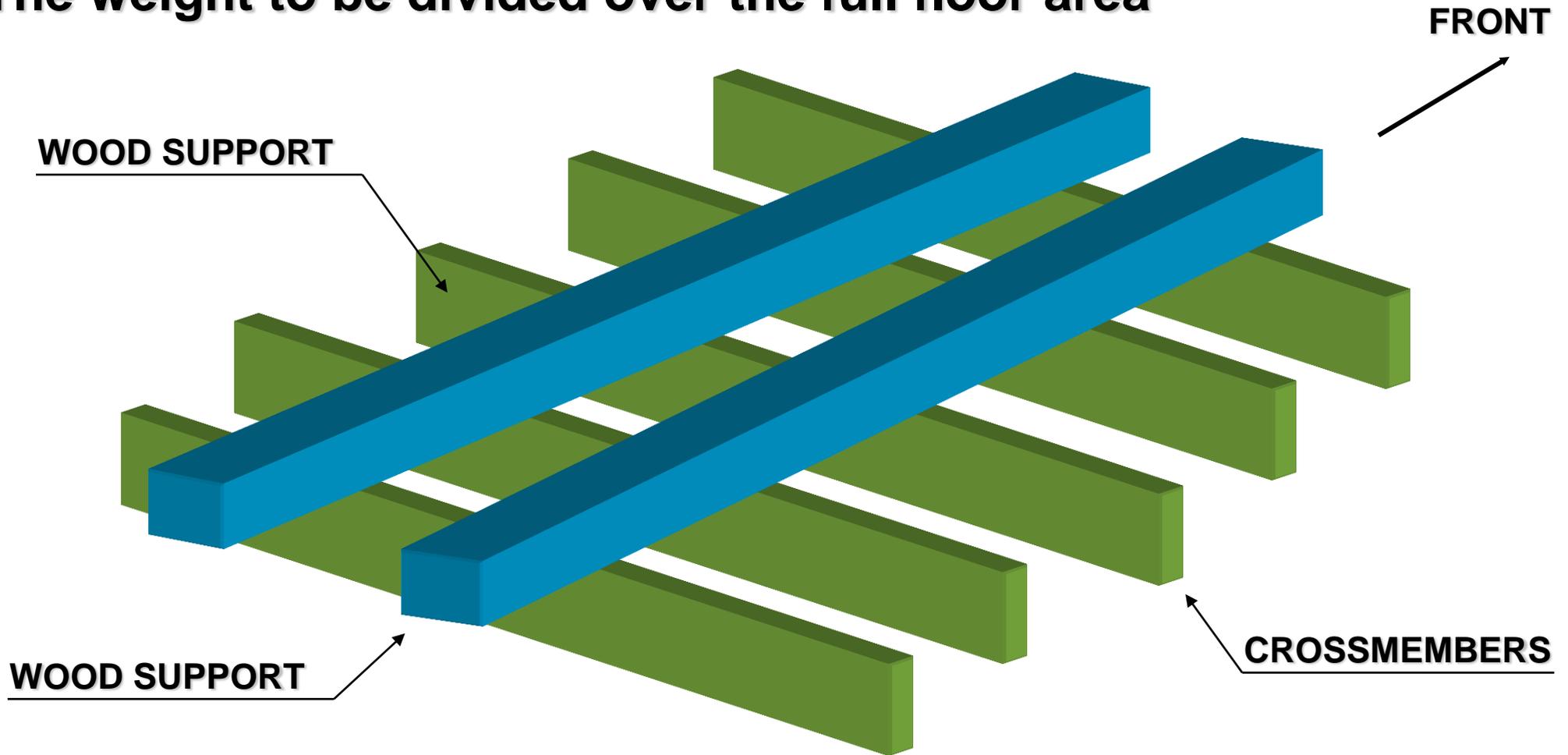


**Wrong weight distribution: Heavy floor damage,  
as well past wrong repair welding (cooking)**

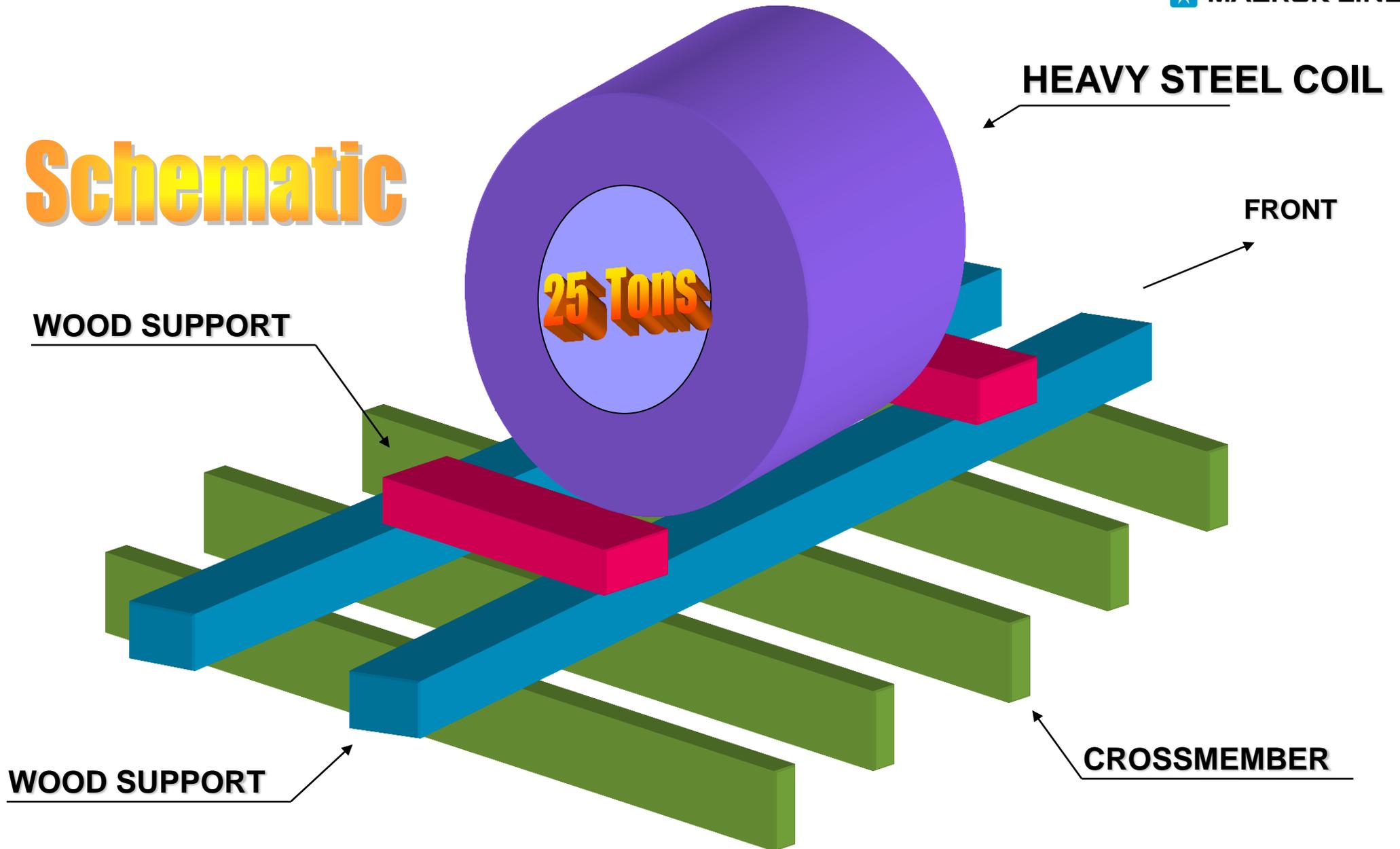


# HEAVY CARGOES

The weight to be divided over the full floor area



# Schematic



**Remember: The weight to be divided over the full floor area**



**25 Tons**

**Example**



**Outokompo Tornio/Finland**

# Example



20  
tons

**This is wrong !!**

The coil is not resting

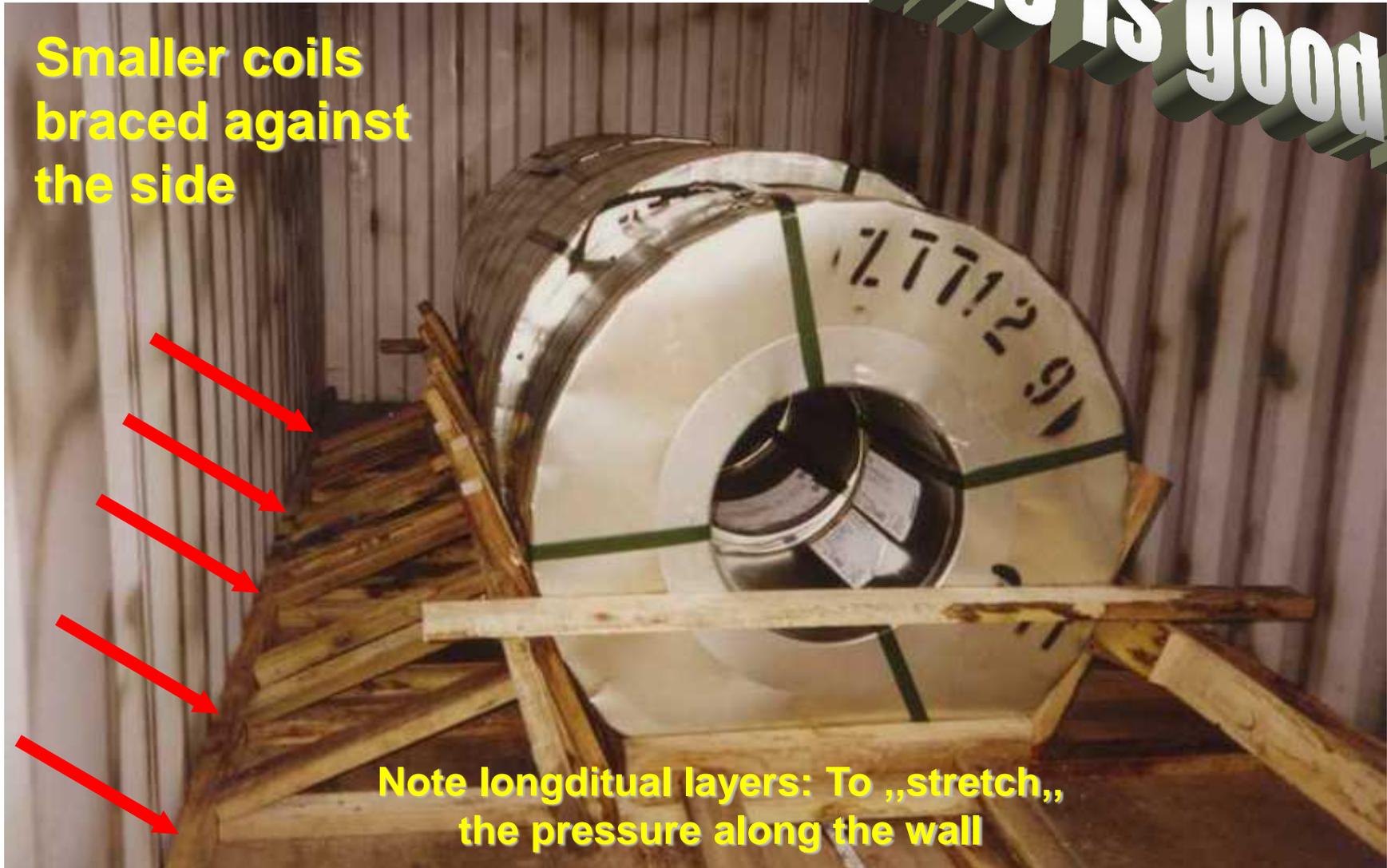
Result: Strip was slack and shifted

Space



This is good!!

Smaller coils  
braced against  
the side



Note longitudinal layers: To „stretch,,  
the pressure along the wall



**Overdone**

**Is this the way to do it !!**



**The nylon belts are only a support !!**

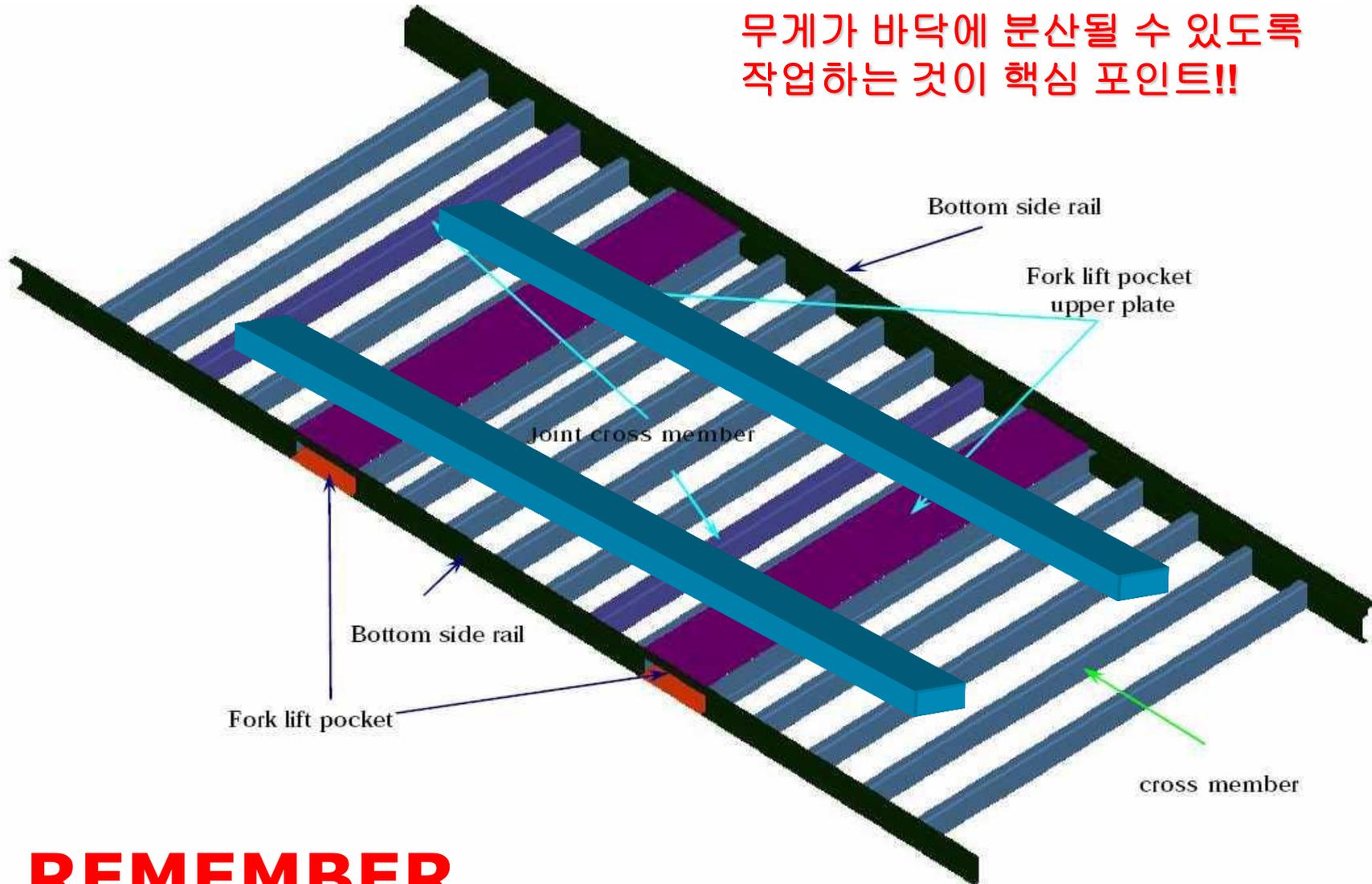
**This is good!!**



**Pressure divided over the full height**

**Weight streched over the full floor lenght**

무게가 바닥에 분산될 수 있도록  
작업하는 것이 핵심 포인트!!



**REMEMBER**

Wrong

Info ref lashing eyes



Coil not stowed on longitudinal timber layers

Under-lashing 사례로 벽면의 압력을 3.5ton의 인장력을 가진 로프로 지탱시킨 사례