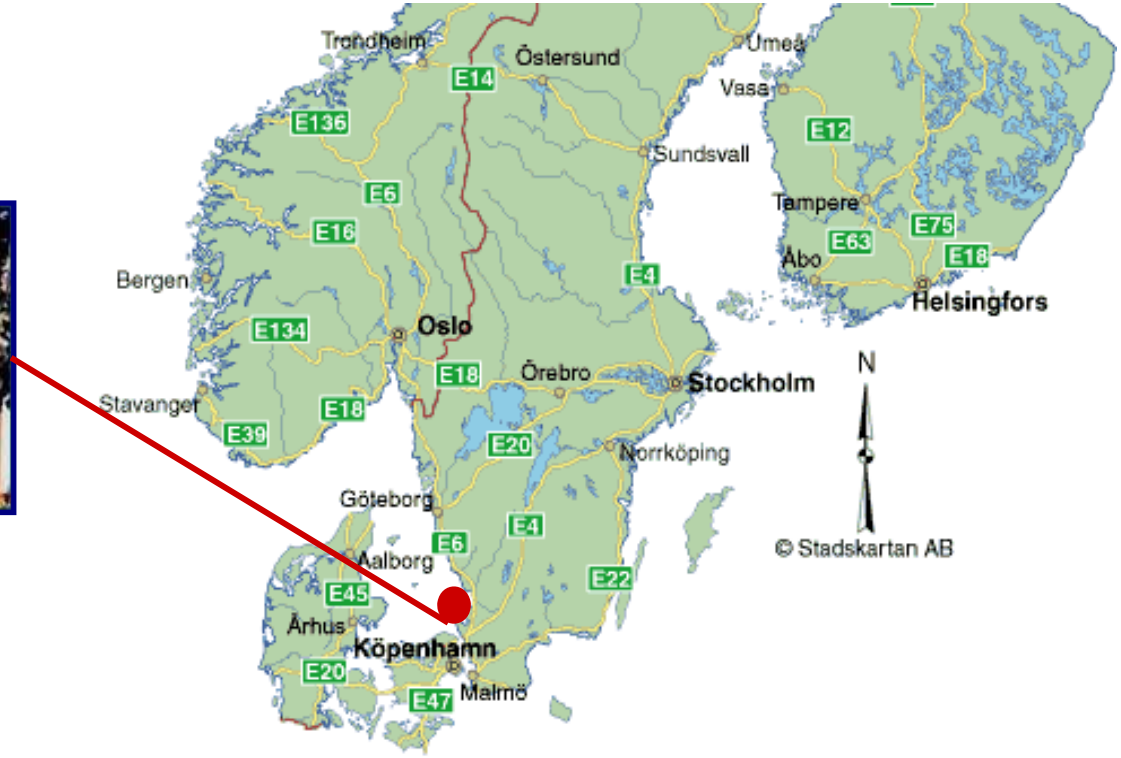
DESTINY – Topic 3: Load Securing Provisions

Destiny Final Conference – Brussel – 18.06.2014

Presentation of MariTerm AB

MariTerm AB has office in Höganäs, Sweden



Presentation of MariTerm AB

- Engineering company
- Activities within the following main areas:

  - Cargo securing and cargo care
  - Logistics
  - Ship design, safety and security
  - Transport of dangerous goods
- Established 1978
- 7 employees
- Owned by 4 senior consultants

The company's senior consultants

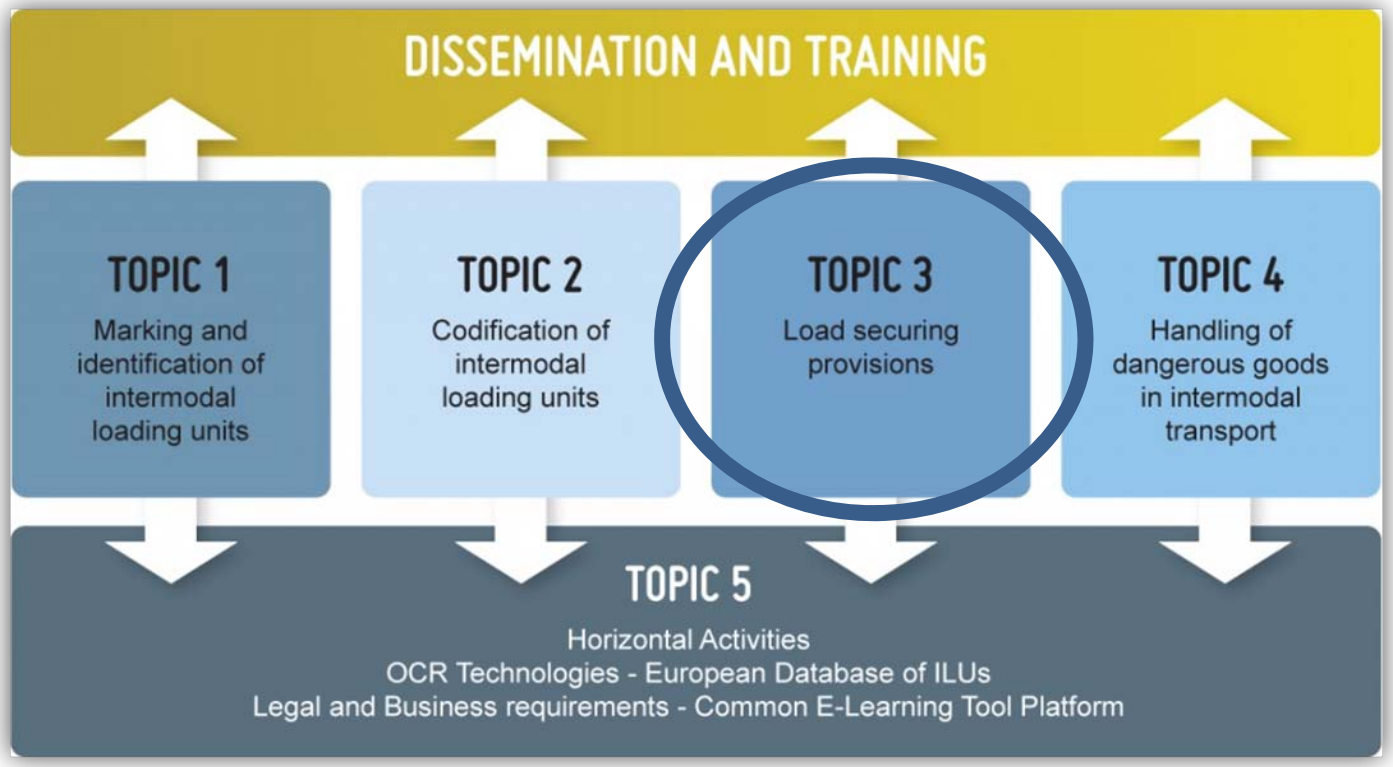
Peter Andersson,
M.Sc. Naval Architecture, Master Mariner

Sven Sökjer-Petersen
M.Sc. Naval Architecture

Nils Andersson,
M.Sc. Mechanical Engineering

Petra Hugoson,
M.Sc. Engineering Physics

TOPIC 3 – Load Securing



Objective Topic 3 – Load Securing

Unsecure loading is a cause of operational disturbances and ultimately accidents on all modes of transport. A lot of load securing guidelines and even standard exist, however better judging from practice, better information is required to make actors aware of regularly occurring problems.

Purpose Topic 3 – Load Securing

To elaborate a set of harmonised (European Level) load securing best practice guidelines, information and training materials for cargo owners, logistics service providers and forwarders.

TOPIC 3 – Task 3.1 – Analysis of current standards

Tasks	Milestones
3.1 Analysis of current standards	Report
3.2 Analysis of current needs	Report
Amendment: Dynamic tests and Inspections	Report
3.3 Elaboration of training materials	Input for e-learning tool
3.4 Dissemination activities	Organisation of 2 external seminars/conferences/ meetings
3.5 Training activities	a) Organisation of two targeted workshops b) 100 internal and external training sessions

TOPIC 3 – Task 3.1 – Analysis of current standards

Tasks	Status
Collection of regulations for road, rail and inland waterway (extended to maritime transport)	Done
Literature study (existing reports and studies, ongoing projects)	
Interview with different actors (project partners Hupac, Kombiverkehr and Novatrans)	
Milestone: Report - Analysis of current standards	

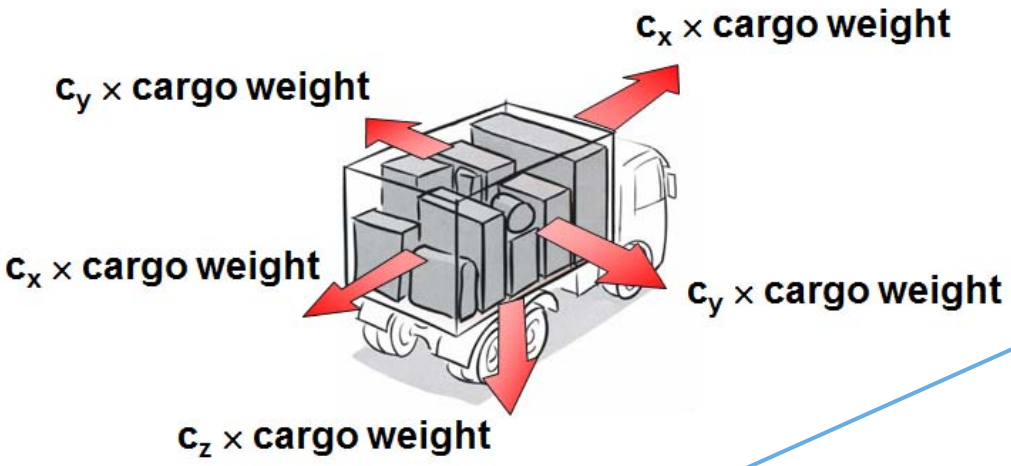
Task 3.1 – Analysis of current standards

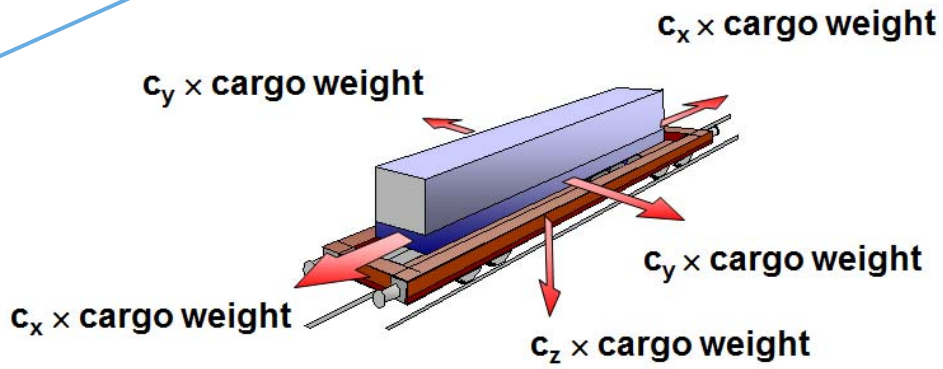
Standard/Regulation	Mode of Transport
The European standard on cargo securing EN 12195-1:2010	**Road** Combined Rail Sea 
European Best Practice Guidelines on Cargo Securing for Road Transport *(under revision)*	**Road** Combined Rail Sea 
IMO/ILO/UN ECE Guidelines for Packing of Cargo Transport Units (CTUs) *(under revision to CTU Code)*	Road Combined Rail **Sea** 
UIC Loading Guidelines	**Combined Rail** (Novatrans) 

Task 3.1 – Analysis of current standards

Standard/Regulation	Mode of Transport
Belgian road regulation, Federale Overheidsdienst Mobilitet en Vervoer 27 April 2007.	**Road**
German standard VDI 2700	**Road** Combined Rail
Swedish Road Regulation TSVFS 1978:10 and VVFS 1998:95	**Road**
BGL Praxishandbuch – Laden und Sichern	**Combined Rail** (Kombiverkher) 
B-cargo Combined traffic – Loading Guide applicable to Intermodal Traffic Units (UIRR home page)	**Combined Rail** (Hupac) 
Dangerous Goods Regulations; ADR, RID and IMDG Code	**Road** **Combined Rail** **Sea** 

Task 3.1 Comparison basic requirements different modes of transport





Task 3.1 Comparison basic road requirements

Transport mode/ Regulation	Forward		Backward		Sideways	
	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical
Road						
EN 12195-1:2010	0.8	1.0	0.5	1.0	0.5/ 0.6 (tilt)	1.0
European Best Practice Guidelines	1.0/ 0.8 (CEN)	1.0	0.5	1.0	0.5/ 0.7 (tilt CEN*)	1.0
IMO/ILO/UN ECE	1.0	1.0	0.5	1.0	0.5	1.0
CTU Code	0.8	1.0	0.5	1.0	0.5	1.0
ADR	Reference to EN 12195-1:2010					
Belgian Road Regulation	0.8	1.0	0.5	1.0	0.5	1.0
German standard VDI 2700	0.8	1.0	0.5	1.0	0.5/ 0.7 (tilt)	1.0
Swedish Road Regulation	1.0	1.0	0.5	1.0	0.5	1.0

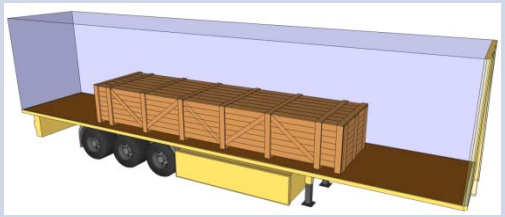
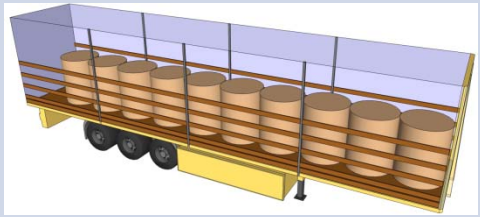
Task 3.1 Comparison basic combined rail requirements

Transport mode/ Regulation	Forward		Backward		Sideways	
	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical
Combined Transport (rail)						
EN 12195-1:2010	1.0	0.7	1.0	0.7	0.5	0.7 (slide)/ 1.0 (tilt)
European Best Practice Guidelines	1.0/ 0.6 (tilt)	1.0	1.0/ 0.6 (tilt)	1.0	0.5	0.7/ 0.6 (tilt)
IMO/ILO/UN ECE	1.0	0.7	1.0	0.7	0.5	0.7
CTU Code	0.5	1.0	0.5	1.0	0.5	1.0
RID	Reference to EN 12195-1:2010 for transport units and trailers for combined transports					
UIC Loading Guidelines	1.0	0.7	1.0	0.7	0.5	0.7
German standard VDI 2700	1.0	0.7	1.0	0.7	0.5	0.7
BGL	1.0	0.7	1.0	0.7	0.5 (slide)/ 0.7 (tilt)	0.7
B-CARGO	1.0	0.5	1.0	0.5	0.5	0.5

TOPIC 3 – Task 3.2 – Analysis of current needs

Tasks	Status
Gap analysis between the current standards, regulations	Done
Milestone: Report - Gap Analysis	

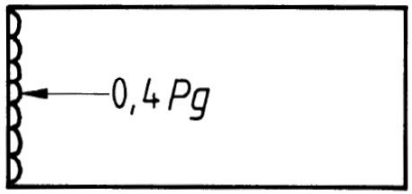
Task 3.2 Gap Analysis, Three different examples

Ex 1: Wooden Box	Ex 2: Paper Reels	Ex 3: Palletized cargo in container
		
m = 20 ton μ_{static} = 0.45 $\mu_{dynamic}$ = 0.34	m = 24 ton μ_{static} = 0.6 $\mu_{dynamic}$ = 0.45	Blocked against walls and void filled with dunnage bags

Task 3.2 Gap Analysis, Three different examples

Test criteria for end walls of containers and swap bodies

Strength of container end walls according to ISO 1496

A.7	End loading Test No. 5	

Strength of swap body end walls according to EN 283

5.6.1 Static test

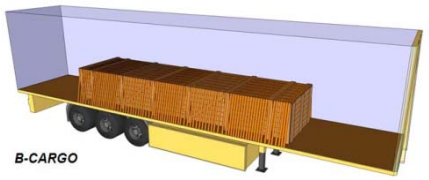
The swap body shall be tested each end when only one end wall is equipped with doors. In the case of symmetrical construction, one end wall only needs to be tested.

Each end wall shall be subjected to an internal loading of 0,4 P. The internal loading shall be uniformly distributed over the end wall under test. When the end walls are tested separately, the reaction forces shall be applied to the base structure.

The test load shall be applied for 5 minutes.

Task 3.2 Gap Analysis, Three different examples

	Example 1 No. of lashings for a wooden box	Example 2 No. of lashings for paper reels	Example 3 Filling ratio* of a container
B-CARGO *(Hupac)*	83	70	48 % (at μ_d)
BGL *(Kombiverkehr)*	76	62	52 % (at μ_d)
VDI 2700-7 *(Kombiverkehr)*	57	47	52 % (at μ_d)
UIC Loading Guidelines *(Novatrans)*	Instructions not available	Lashing is no option.	52 % (at μ_d)
EN 12195-1:2010 Rail	35	23	73 % (at μ)
EN 12195-1:2010 Road	25	0**	100 % (at μ)
CTU Code **Combined rail transport**	4	6***	100 % (at μ)



Task 3.2 Meeting with UIC Load Securing Group

UIRR and MariTerm had a meeting with UIC Cargo Securing Group in Paris the 27th of February and the gap analysis was presented and discussed.

The meeting agreed upon a **Action Plan**:

- Planning of the inspections and measure of accelerations
- Inspection of Cargo Transport units (4 terminals – around 80-100 loading units)
- Dynamic tests for Combined Transport - Measuring of the acceleration forces on the cargo inside a loading units during at least 5 transports
- Analysis of the inspections and tests
- MariTerm shall perform Dynamic Tests and Inspection with a budget from Destiny project
- The members in UIC Cargo Securing shall be invited to participate in the inspections

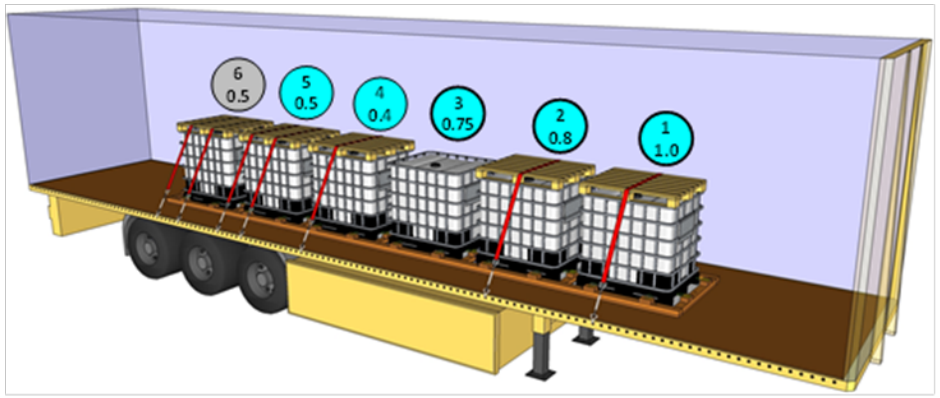
TOPIC 3 – Task 3.2 – Analysis of current needs

Tasks	Status
Gap analysis between the current standards, regulations	Done
Milestone: Report - Gap Analysis	

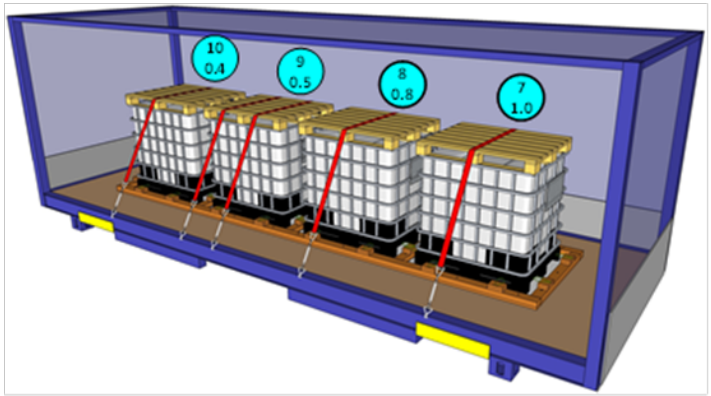
Amendment	
Dynamic Tests and Inspections to get basic data for a decision for a new level of dimensioning criteria for load securing	Done
Milestone: Report - Analysis from the Dynamic Tests	Ongoing

Task 3.2 Dynamic Test

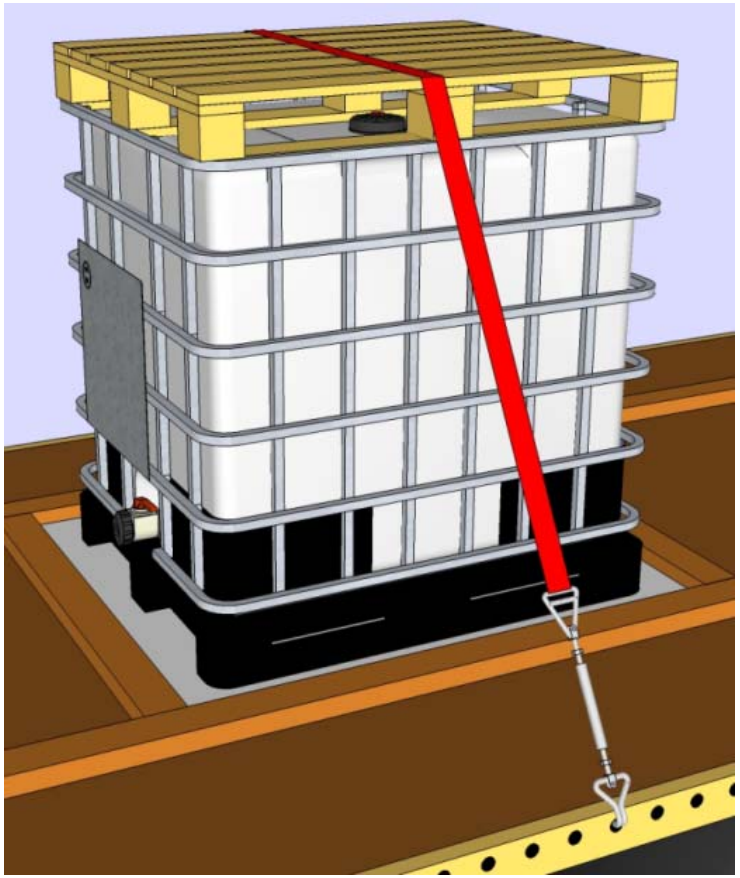
DHL Trailer



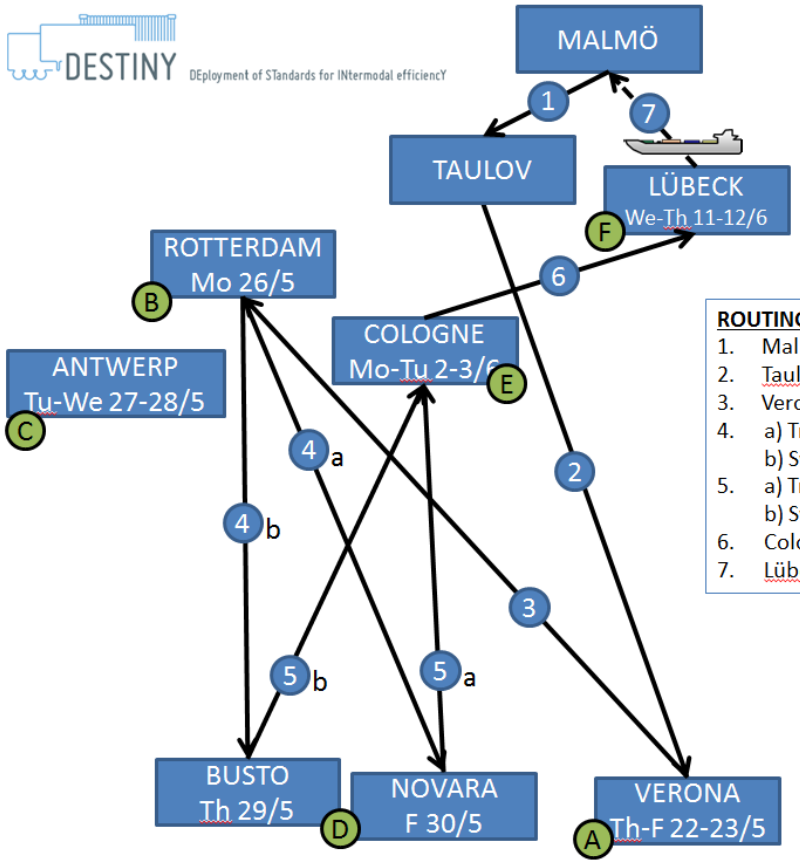
DFDS Swap Body



Task 3.2 Dynamic Test



Task 3.2 Dynamic Test

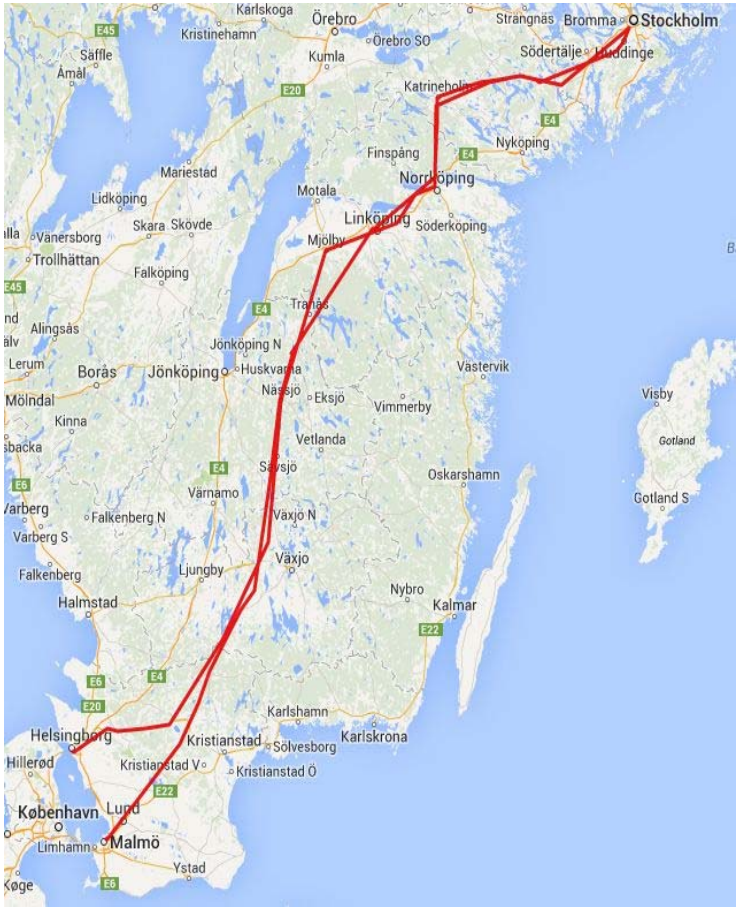


UNITS FOR TESTS
- DHL trailer P400
- Swap body DFDS

ROUTING
1. Malmö SE – Taulov DK
2. Taulov DK – Verona IT
3. Verona IT – Rotterdam NL
4. a) Trailer: Rotterdam NL – Novara IT
   b) Swap body: Rotterdam NL – Busto IT
5. a) Trailer: Novara IT – Cologne DE
   b) Swap body: Busto IT – Cologne DE
6. Cologne – Lübeck
7. Lübeck – Malmö

TERMINAL ON-SITE VISIT
A. Verona (Units/CTUs)
B. Rotterdam (Units)
C. Antwerp (CTUs)
D. Busto/Novara (Units/CTUs)
E. Cologne (Units/CTUs)
F. Lübeck (Units/CTUs)

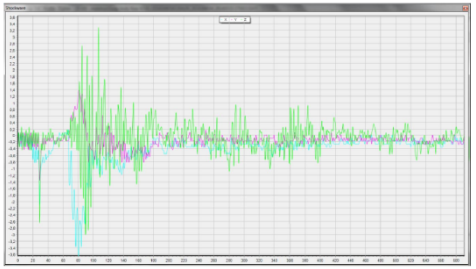
Task 3.2 Dynamic Test Leg 0 – Helsingborg – Stockholm – Malmö



IBC	Forward	Left
Trailer		
1	5	-9
2	5	1
3	16	0
4	72	-1
5	72	3
6	61	1
Swap body		
7	-7	1
8	-5	2
9	-69	3
10	-71	11

Shock 2014-05-15 16:44:46

Shock 2014-05-15 16:54:22



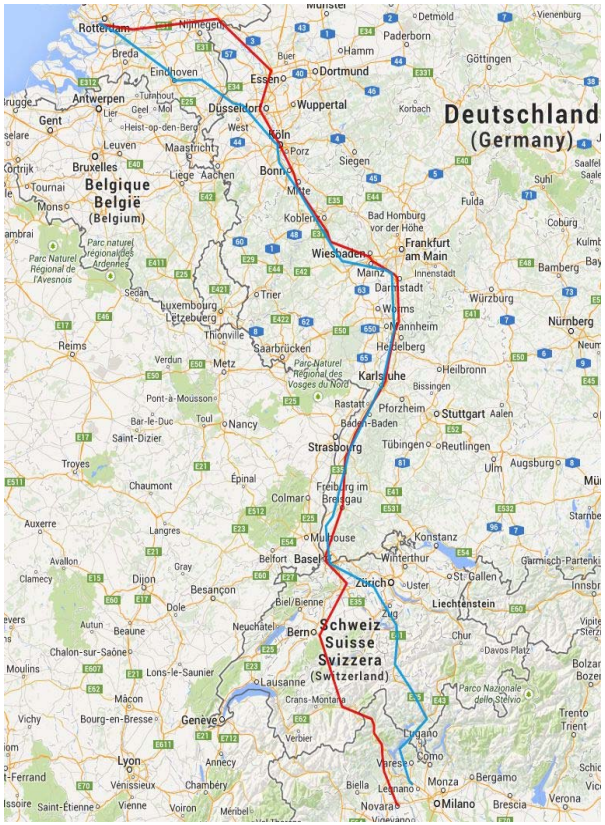
Task 3.2 Dynamic Test Leg 1 – Malmö – Taulov - Verona

IBC	Forward	Left
Trailer		
1	0	0
2	1	-1
3	0	0
4	2	-1
5	-1	-1
6	-1	1
Swap body		
7	0	0
8	1	0
9	0	-1

Task 3.2 Dynamic Test Leg 2 – Verona - Rotherdam

IBC	Forward	Left
Trailer		
1	0	1
2	0	0
3	0	0
4	-1	-1
5	1	-1
6	0	-1
Swap body		
7	0	0
8	1	0
9	-2	-1
10	-49	0

Task 3.2 Dynamic Test Leg 3 – Rotherdam – Busto/Novara

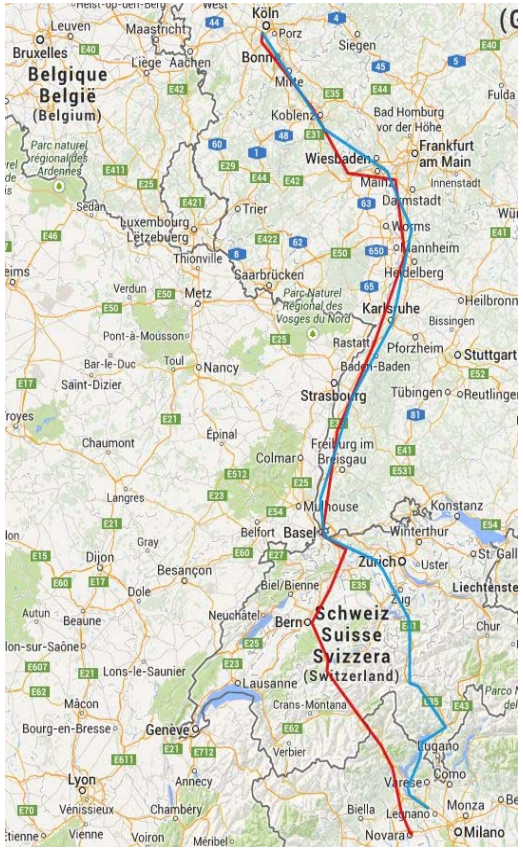


IBC	Forward	Left
Trailer		
1	1	-1
2	0	1
3	0	0
4	1	1
5	-1	0
6	2	0
Swap body		
7	-1	0
8	-1	0
9	3	0
10	-23	3

Dynamic tests

Leg 5 – Busto/Novara - Köln

Task 3.2 Dynamic Test Leg 4 – Busto/Novara - Cologne



IBC	Forward	Left
Trailer		
1	0	1
2	0	-1
3	0	1
4	2	-1
5	0	0
6	-3	2
Swap body		
7	2	0
8	1	-1
9	-1	-3
10	-40	-1

Task 3.2 Dynamic Test – Preliminary Conclusions

The test was finished last week and the conclusions are preliminary:

- During a test run in Sweden the units were exposed for a shock with a peek of 3.6 g and all units secured ≤ 0.5g moved significantly
- During the actual dynamic test run in Europe some shocks with an average value 0.7-0.8g have been measured
- The cargo unit lashed for 0.4g in the swap body have moved almost every leg but all the other cargo units have been standing still
- Report is under writing

Task 3.2 Dynamic Test – Preliminary Conclusions

Preliminary conclusion:

The statement in the CTU code seems to be correct

Rail transport (combined transport)				
Securing in	**Acceleration coefficients**			
	Longitudinally (c_x)		Transversely (c_y)	Minimum vertically down (c_z)
	forward	rearward		
Longitudinal direction	0.5 (1.0)†	0.5 (1.0)†	-	1.0 (0.7)†
Transverse direction	-	-	0.5	1.0†
† **The values in brackets apply to shock loads only with short impacts of 150 milliseconds or shorter, and may be used, for example, for the design of packaging.**				

Task 3.2 Inspections

Inspections of actual cargo securing will be carried out in intermodal terminals in Europe.

In total about 100 units; trailers and swap bodies, will be inspected. The actual cargo securing arrangement will be documented together with weight and dimensions of the cargo. The arrangements will later be evaluated and the acceleration for which the cargo has been secured will be calculated. Cargo transport units with different types of cargoes will be inspected.

Task 3.2 Inspections - Preliminary Conclusions

- **Performed in:** Verona, Antwerp, Genk, Novara, Busto, Köln and Lübeck
- **Number of units:** 130 pcs
- **CTU types:** Trailers, Swap Bodies, Containers, Refrigerator Containers
- Vide range of commodities

Preliminary Conclusions

- Typically secured more against forward than backward movement
- Top-over lashing by far the most common type of lashing
- Large difference in capability of the securing arrangements

TOPIC 3 – Task 3.3 – Elaboration of training materials

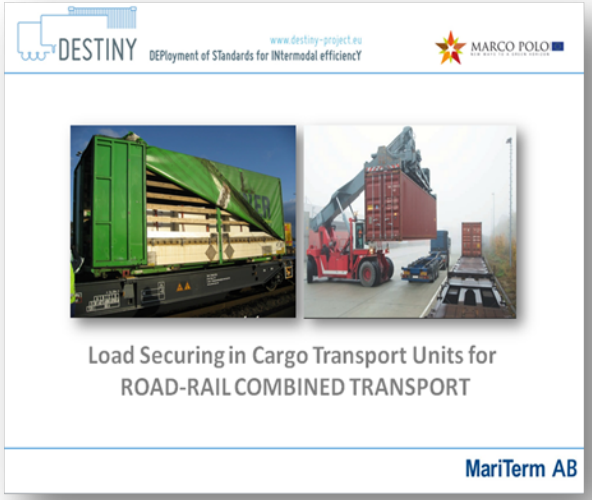
Tasks	Status
a) Input for the e-learning tool	Ongoing
b) Input for the leaflets	Under review
c) Input for slides	Under review
Milestone: Input for the e-learning tool – topic 5.4	Ongoing

TOPIC 3 – Task 3.3 b – Input for Leaflet

A leaflet of 12 pages is developed based on standard EN 12195-1:2010

TOPIC 3 – Task 3.3 c – Input for Slides

A PowerPoint Presentation including 52 slides is developed based on standard EN 12195-1:2010



TOPIC 3 – Task 3.4 – Dissemination activities

Tasks	Status
Prepare articles for the specialised press	Ongoing
Participaton in workshops, seminars…	Ongoing - Green corridor Demo Day - SAGIT and CARING meetings - Destiny seminar in Stockholm - ANGORA meeting
Milestone: Organisation of 2 external seminars/conferences/ meetings	Done

TOPIC 3 – Task 3.4 – Dissemination activities

Green Corridor Day Malmö 2012-12-12

MariTerm boot

Information regarding CombiSec and Destiny

Green Corridor Inauguration

Ministers / representatives from Norway, Sweden, Denmark, Germany and the Netherlands

TOPIC 3 – Task 3.5 – Training activities

Tasks	Status
Prepare training sessions on load securing	Ongoing Sessions are organised by the various partners
Perform training on load securing	
Milestone: a) Organisation of two targeted workshops b) 100 internal and external training sessions (also including Dangerous goods training topic 4)	Done Ongoing MariTerm 2012-13: 39 sessions with 421 participants

Thank you for your attention

MariTerm AB
Nils Andersson
nils.andersson@matierm.se
+46 42 33 31 00