

Securing cargo in Road-Rail Combined Transport

Results of the project DESTINY



SAGIT Cargo Securing Conference – Stockholm – 12.11.14

Agenda

- **UIRR: the European voice of Road-Rail Combined Transport (CT)**
- **Cargo load securing in Road-Rail CT (DESTINY project)**
- **Recommendations**

UIRR: an industry association for Road-Rail Combined Transport

Members	<ul style="list-style-type: none">• Combined Transport Operators (16)• Terminal Operators (7)
Main figures	<ul style="list-style-type: none">• about 50% of Combined Transport in Europe• about 1,000,000 terminal handlings• wagon fleet of 13,000 wagons• network of 350 transshipment terminals with 500 CT trains per day
Strategy	<ul style="list-style-type: none">• PROMOTION of mainly Road-Rail Combined Transport• ENHANCEMENT (industry best practice, projects)• SUPPORT the daily operations of European CT (services)

Outline of the project: focus on standardisation

- great way to enhance the efficiency by a commonly agreed, homogeneous best practice, particularly true in intermodal transport which involves numerous actors.
- standards can only deliver their beneficial effects if they are applied and eventually become part of daily best practice.
- DESTINY proposes to facilitate the deployment of existing standards related to:
 - EN13044 (identification and codification of intermodal loading units)
 - Load Cargo Securing (inside the 'box')
 - Transportation of dangerous goods

The consortium

- **Partners**

Coordination

UIRR scr1 (Belgium)

Action partners

SGKV (main consultant)

Hupac Intermodal BVBA (CT operator)

Kombiverkehr (CT operator)

KombiConsult (consultant specialised in CT)

Mari Term (consultant specialised in cargo securing)

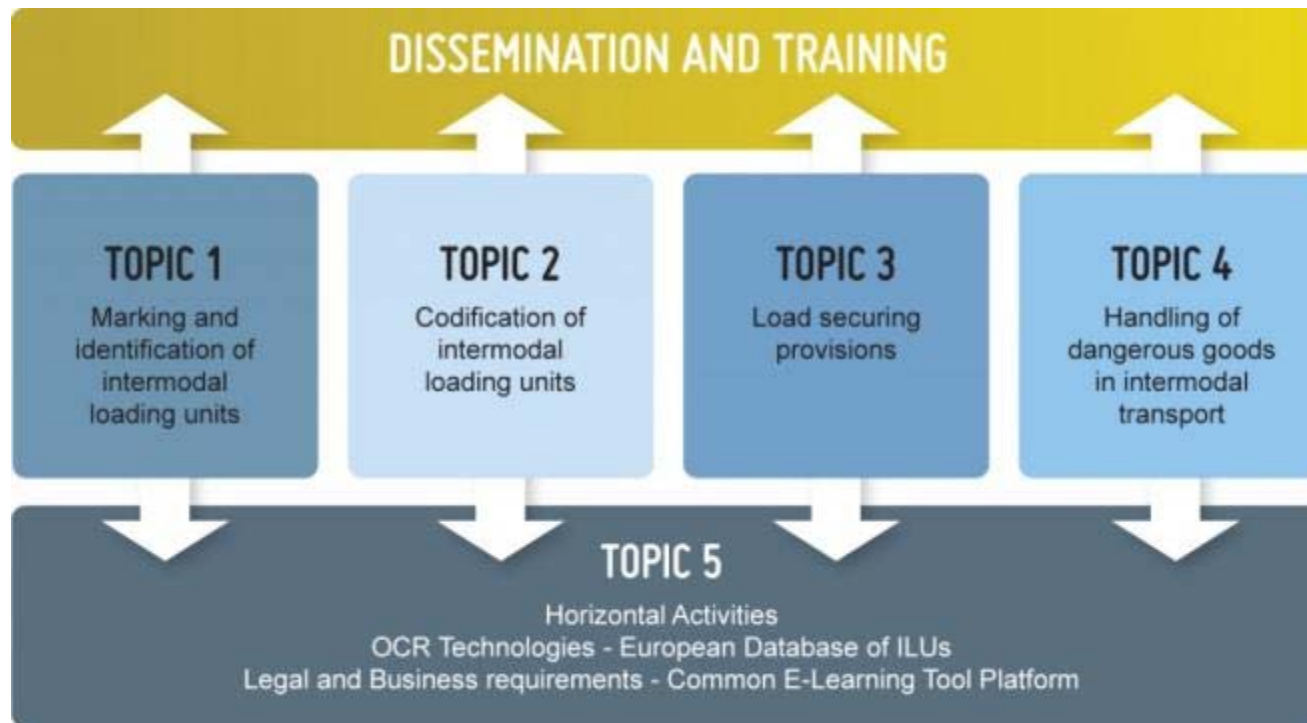
- **Project duration**

28 months

Start: 1st September 2012

End: 31st December 2014

Structure by topics



Topic 1&2 (UIRR)

- ILU-Code
- Rail certification

Topic 3 (MariTerm)

- Analysis
- Tests
- Dissemination
- Training

Topic 4 (Hupac)

- Market analysis
- National rules
- Dissemination
- Training

Topic 5 (SGKV)

TOPIC 3 – Tasks performed

Tasks	Status
Analysis of current standards	<ul style="list-style-type: none">• Collection of regulations for road, rail and inland waterway (extended to maritime transport)• Literature study (existing reports and studies, ongoing projects)• Interview with different actors• Report
Analysis of current needs	<ul style="list-style-type: none">• Gap analysis between the current standards, regulations• Dynamic tests and inspections• Report
Dissemination & training activities	<ul style="list-style-type: none">• Common guidelines for load securing in the intermodal transport chain• Training materials and e-learning tool

TOPIC 3 – Results of the analysis for Road-Rail CT (1)

- UIC Loading Guidelines (tomes 1 and 2) where the static accelerations are defined for both longitudinal and transversal forces:

UIC rules	Forward		Backward		Sideways	
	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical
	1.0 g	0.7 g	1.0 g	0.7 g	0.5 g	0.7 g

- ‘Legal’ framework: General Contract of Use for Wagons (GCU Contract) - article 29
(The RUs shall ensure that shippers comply with the UIC loading guidelines in force.)

but in practice...

TOPIC 3 – Results of the analysis for Road-Rail CT (2)

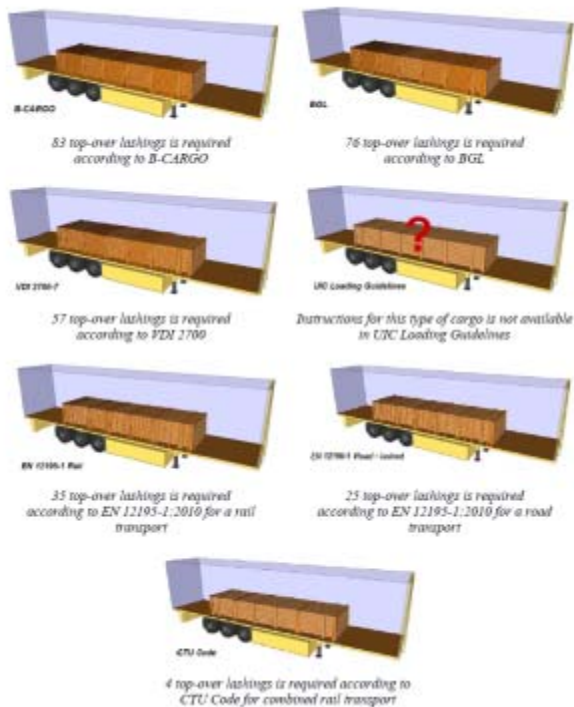
Regulation/Standard	Forward		Backward		Sideways	
	Horizontal	Vertical	Horizontal	Vertical	Horizontal	Vertical
B-CARGO <i>(Hupac)</i>	1.0	0.5	1.0	0.5	0.5	0.5
BGL <i>(Kombiverkehr)</i>	1.0	0.7	1.0	0.7	0.5 (slide)/ 0.7 (tilt)	0.7
VDI 2700-7 <i>(Kombiverkehr)</i>	1.0	0.7	1.0	0.7	0.5	0.7
UIC Loading Guidelines	1.0	0.7	1.0	0.7	0.5	0.7
EN 12195-1:2010 Rail	1.0	0.7	1.0	0.7	0.5	0.7(slide)/ 1.0 (tilt)
EN 12195-1:2010 Road	0.8	1.0	0.5	1.0	0.5	1.0
CTU Code Combined rail transport	0.5	1.0	0.5	1.0	0.5	1.0

- Different acceleration values imposed by various railway undertakings/Europe
- Different possible standards (EN 12195, CTU Packing Code)

Are the values implementable in practice? How to inform the customers ?

TOPIC 3 – Results of the analysis for Road-Rail CT (3)

Practicality: example of a wooden box in a semi-trailer



	Forward	Backward	Sideways	Factors
B-CARGO (Hupac)	83	83	33	$\mu_d, k = 1.5$
BGL (Kombiverkehr)	76	76	27	$\mu_d, k = 1.5$
VDI 2700-7 (Kombiverkehr)	57	57	20	$\mu_d, k = 2$
UIC Loading Guidelines (Novatrans)	Instructions for this type of cargo is not available			-
EN 12195-1:2010 Rail	35	35	12	$\mu, f_0 = 1.1, (k = 2)$
EN 12195-1:2010 Road	25/ 0 if blocked	4	4	$\mu, f_0 = 1.25/1.1, (k = 2)$
CTU Code Combined rail transport	4	4	4	$\mu, k = 1.8$

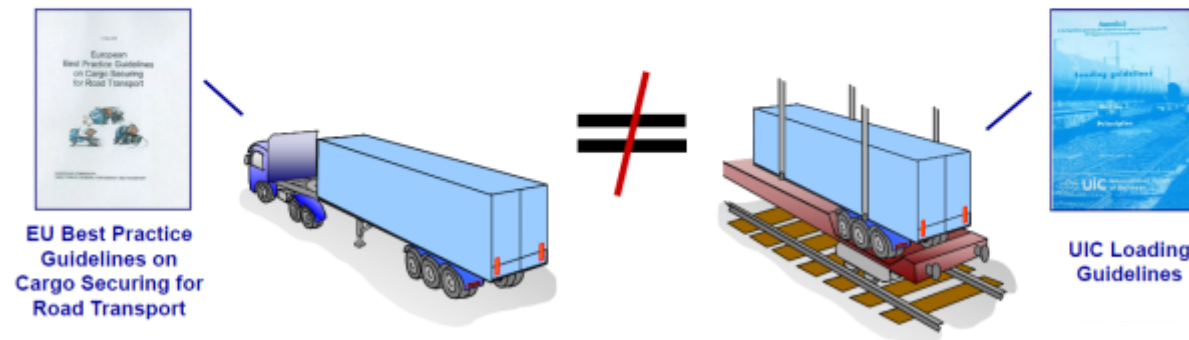
Same load has to be secured with 4 up to 83 top-over lashings depending on the regulation or standard

TOPIC 3 – Results of the analysis for Road-Rail CT (4)

Information to the customers: need for harmonisation in Road-Rail CT

Comparison road – rail basic requirements

Basic Cargo Securing Principles



Shall the principles for cargo securing for road transport be also accepted in Road-Rail Combined Transport?

TOPIC 3 – Dynamic and static tests (1)

Dynamic tests

- Measurement of movements in test units
- Measurement of shocks in test units



Static tests

- Inspections of randomly chosen units (data collection on current level)

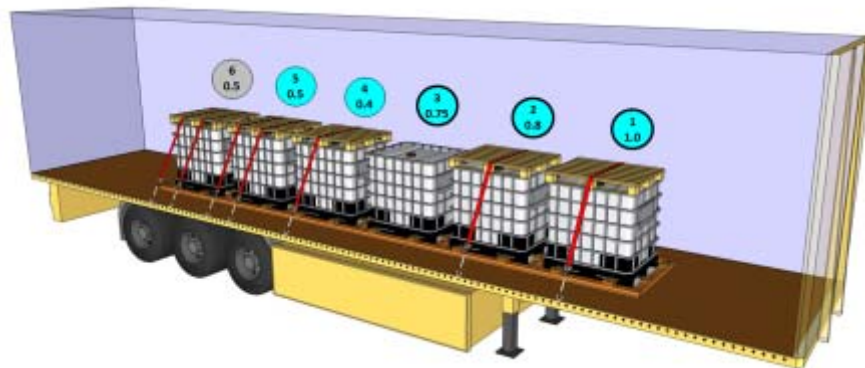
Collaboration and participation



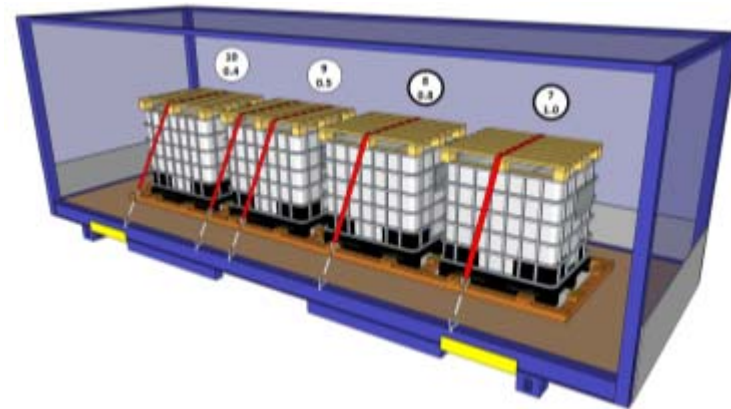
MariTerm AB



TOPIC 3 – Dynamic tests (2)



Semi-trailer



Swap-Body

Test setup

- Identical cargo items (IBCs) secured to withstand different accelerations (semi-trailer and swap-body) - one IBC was filled with water and another with concrete
- Installation of accelerometers (front and back of the loading units)
- GPS receivers on two accelerometers

TOPIC 3 – Dynamic tests (3)



6 routes in total – about 6,000 km

- Leg 1 – Helsingborg (SE) – Arsta (SE)– Malmö(SE)
- Leg 2 – Malmö (SE) – Taulov (DK) – Verona (IT)
- Leg 3 – Verona (IT) – Rotterdam (NL)
- Leg 4 – Rotterdam (IT) – Novara (IT) / Busto (IT)
- Leg 5 – Novara (IT) / Busto (IT) – Cologne (DE)
- Leg 6 – Cologne (DE) – Lübeck (DE)

For every route, records on:

- shocks (peak and mean values)
- movements
- speed

TOPIC 3 – Dynamic tests – main results (4)

Movements

- There was no noticeable movement for the IBCs secured for 0.5 g or more in neither unit (in all directions)
- No difference between solid and liquid. The two IBCs secured for 0.5 g behaved identically, although one was filled with water and one with concrete.
- When subjected to hump or fly shunting, all IBCs secured for 0.5 g or less moved significantly. The IBC secured for 0.75 g moved slightly.

TOPIC 3 – Dynamic tests – main results (5)

Shocks

- Only leg 1: shocks recorded clearly showed that the units had been subjected to fly or hump shunting.

Shocks with the following characteristics were recorded:

- Mean acceleration: 0.8 g – 1.5 g
 - Peak acceleration: 1.1 g – 3.6 g
 - Duration: about 100 ms
- During these shocks, IBCs secured for 0.75 g or less moved.

TOPIC 3 – Dynamic tests – main results (6)

Shocks

- Legs 2 to 6: during usual Road-Rail CT transport, shocks with the following typical characteristics were frequently recorded:
 - Mean acceleration: 0.5 g – 0.8 g
 - Duration: about 10 - 40 ms
- During these shocks, IBCs secured for 0.5 g or more did not move!

TOPIC 3 – Static tests – inspection of units (1)

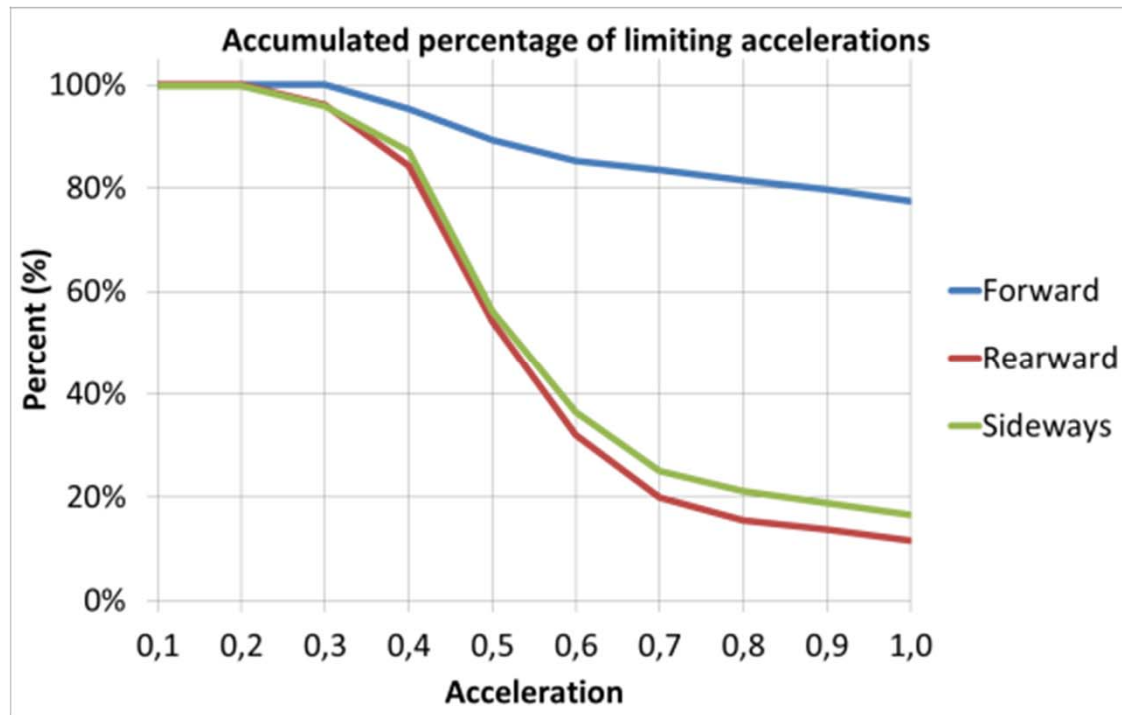
Terminal	Trailers	Swap bodies	Containers	Total
Verona, Interterminal Quadrante Servizi	19	11	-	30
Antwerpen, IFB terminal	-	11	4	15
Genk, Euro Terminal	7	1	-	8
Novara, Novara CIM	1	2	-	3
Busto, Busto Arsizio-Gallarate	8	4	3	15
Cologna, DUSS Köln-Eifeltor	24	7	-	31
Lübeck, Baltic Rail Gate	29	-	-	29
Total	88	36	7	131



Inspection procedure

- Units randomly chosen without notification to the customer – only unsealed units
- All relevant properties of the loading unit, the cargo and the cargo securing measures
- Calculation of the pre-tension with a DELOG tension meter
- Calculation of the actual limiting acceleration of the securing arrangement in every direction

TOPIC 3 – Static tests – inspection units – main results (2)



For 1.0g (UIC loading guidelines)

- forward: 78%
- rearward: 12%

For 0.5g (road standard)

- forward: 90%
- rearward: 54%

TOPIC 3 – Cargo Load securing in Road-Rail CT - Conclusions

- **0.5 g (horizontal longitudinal direction) is safe for static design of cargo securing arrangements in Road-Rail Combined Transport.** Higher accelerations might occur during transport but do not have enough energy to move cargo inside the loading unit (low impulse shocks on short durations).
- **For hump or fly shunting, a design acceleration of more than 0.5 g is needed.** However, Road-Rail CT is not submitted to this kind of shunting at all (special marking on the CT wagons).
- **Strong efforts should be made to improve the level of securing so that more units can withstand 0.5 g in all directions.**

Recommendations

- **Change UIC Loading Guidelines design acceleration in longitudinal direction to 0.5 g for combined transport but only for terminal-to-terminal with marshaled sorting of wagons**
 - ➔ UIC Loading Guidelines Group: official approval for editorial changes and realisation of a risk analysis
- **Consider sector's participation in revision of standard EN12195-1 (adapting the railway values for Combined Transport).**
- **Consider efforts of the sector to improve the level of securing so that more units can withstand 0.5 g in all directions.**
 - ➔ intensification of dissemination/training activities (sector 'road' and 'rail')
support of the Commission

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Any questions?

