



Grüße 2018

ROLA - “Piggyback rides” across the Alps!

European transalpine intermodal rail/road freight operations

Boyd Mistear

A pictorial Review



Programm

- European Typography
- Intermodal Transport
- European Corridors
- Freight across The Alps
- What is ROLA?
- Why ROLA?
- Alpine Trunk Routes
- Technical Challenges
- Current & Future Base Tunnel Developments
 - A pictorial look at the Lötschberg/Gotthard/Brenner
- Modelling ROLA in HO
- Postscript



European Topography



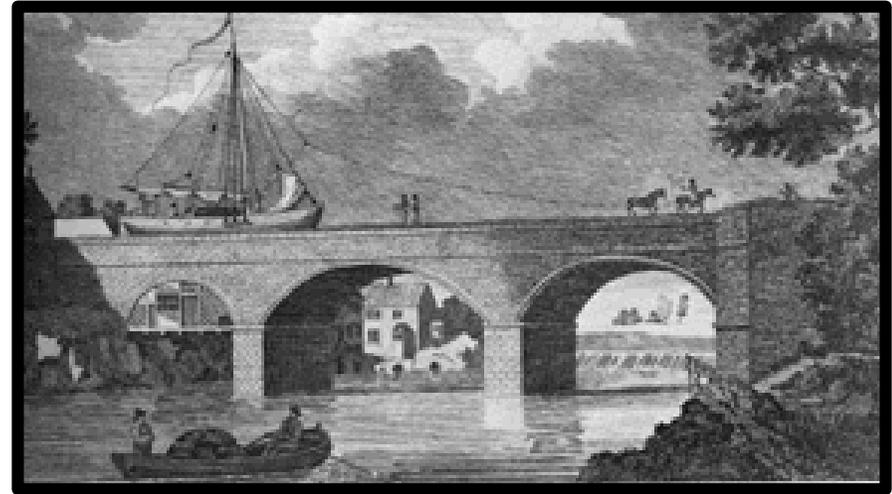
Intermodal Transportation

- Intermodal transportation goes back to the 18th century and predates the railways
- Some of the earliest containers were those used for shipping coal on the Bridgewater Canal in England in the 1780s



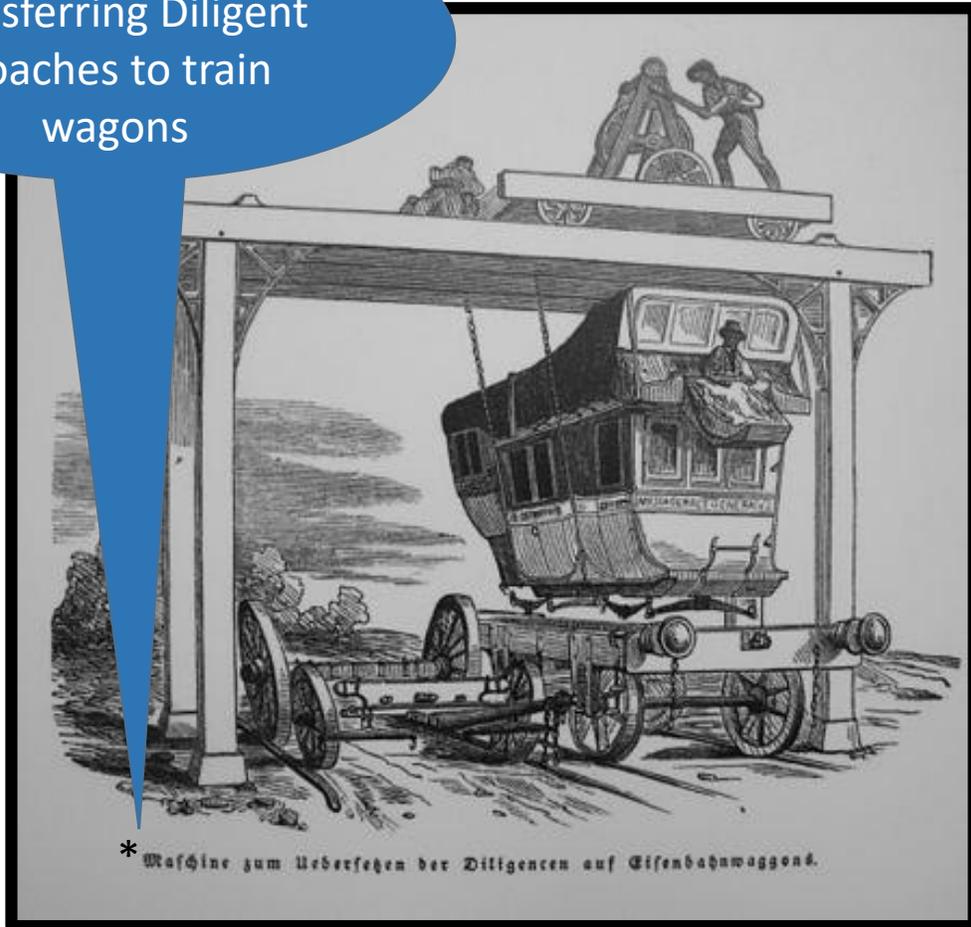
Intermodal Transportation

- Combined transport is where the major part of the journey is by rail, inland waterways or sea, **and** any initial and/or final legs carried out by road are as short as possible
- Two forms:
 - Unaccompanied – shortened to **Combined Transport and**
 - **Accompanied Combined Transport**



Intermodal Transport

* Machine for transferring Diligent Coaches to train wagons



- **Accompanied combined transport** is the movement of goods in one and the same loading unit or road vehicle, using successively two or more modes of transport without handling the goods in changing modes
- More specifically, **accompanied combined transport** is **one of the two types of combined transport**

Stagecoach transferred to a rail car with a simple Portainer, an example of early intermodal freight transport by the French Mail, 1844.
The drawing is exhibited in Deutsches Museum Verkehrszentrum, Munich, Germany.

Intermodal Transport – Combined Transport

Transferring freight containers 1928
London Midland & Scottish Railway



VW Train (Epoche III 1950s)



Intermodal Transport – Combined Transport

**DB Us676 Epoche IV (1965-1990)
CFF/Migros KombiRail**



**Modern Ship / Shore Transfer
Container Terminal Bremerhaven**



Intermodal Transport – Combined Transport

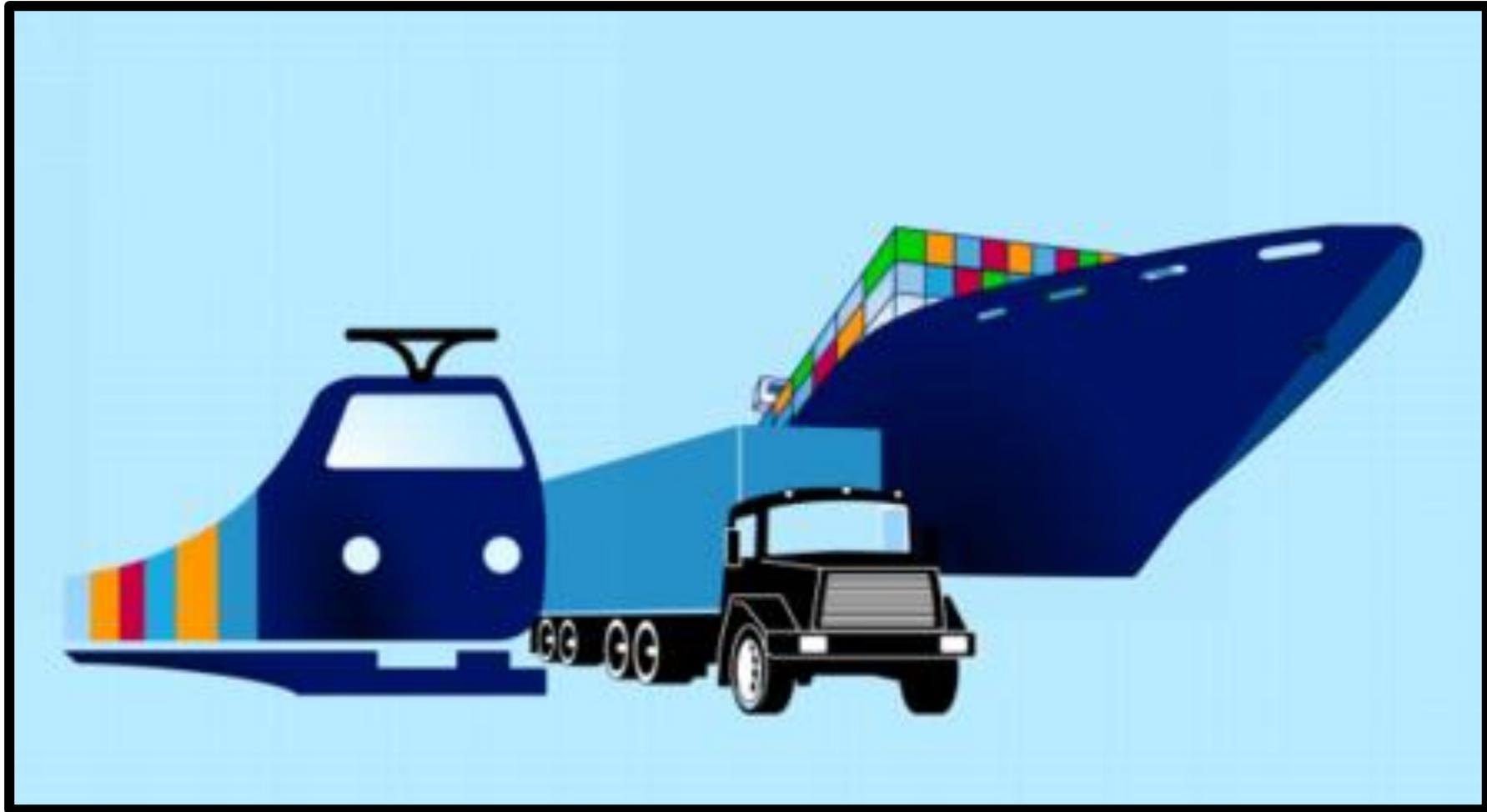
**Cargo Sprinter (DB Class 690/691)
1996/7**



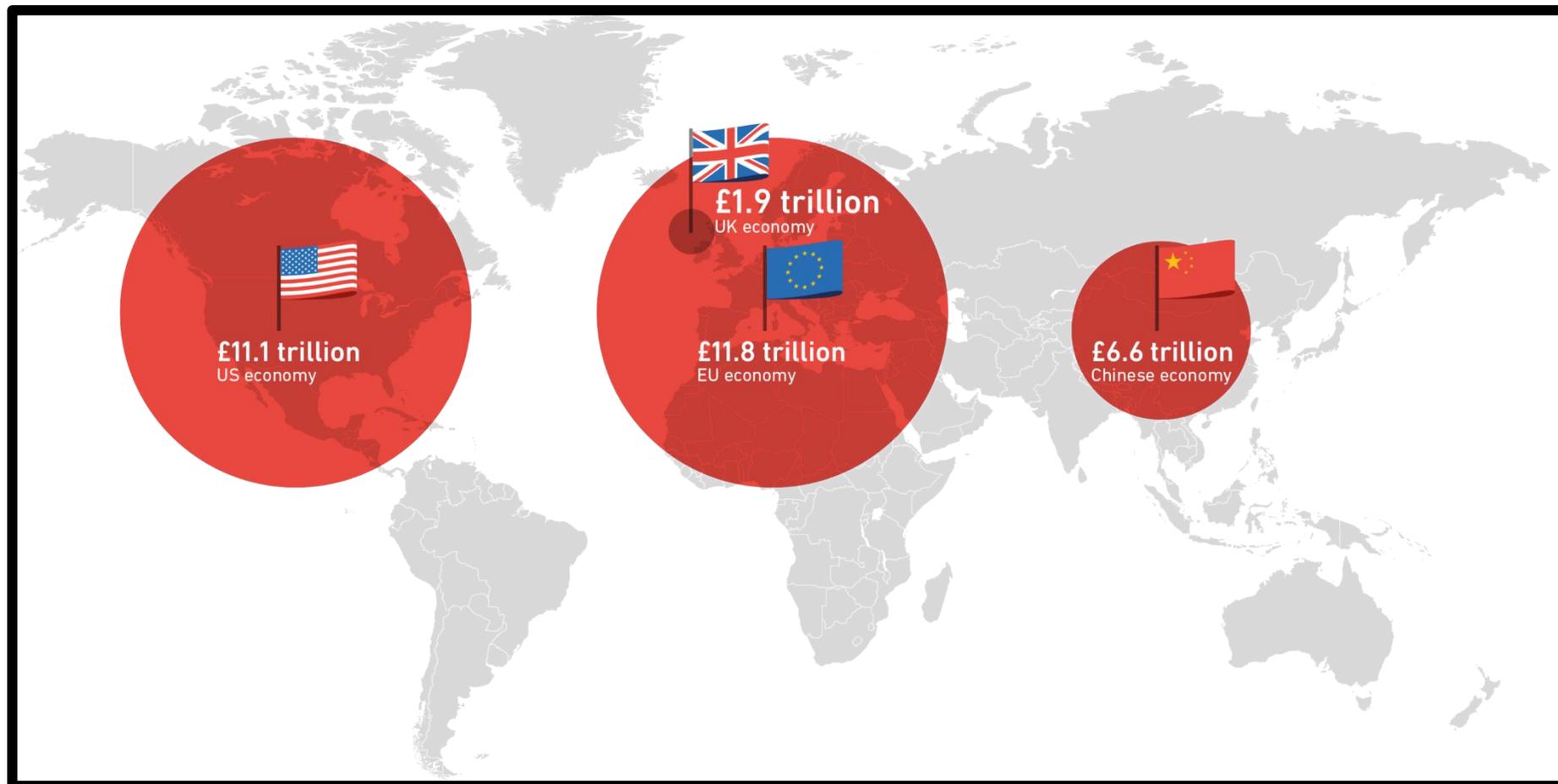
**Evolved into the
Modern Tunnel Fire Rescue Train**



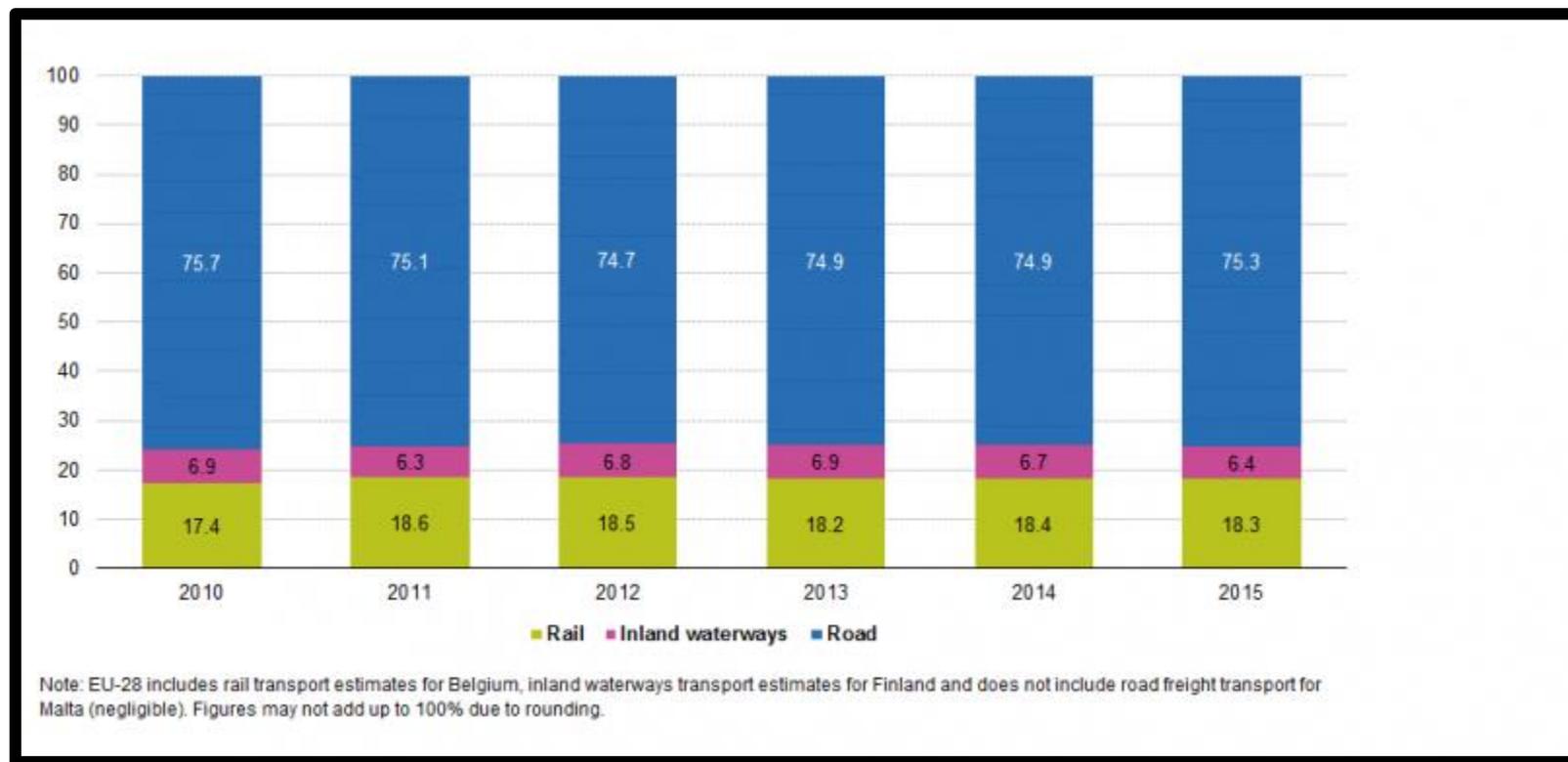
Fast forward to Today ...



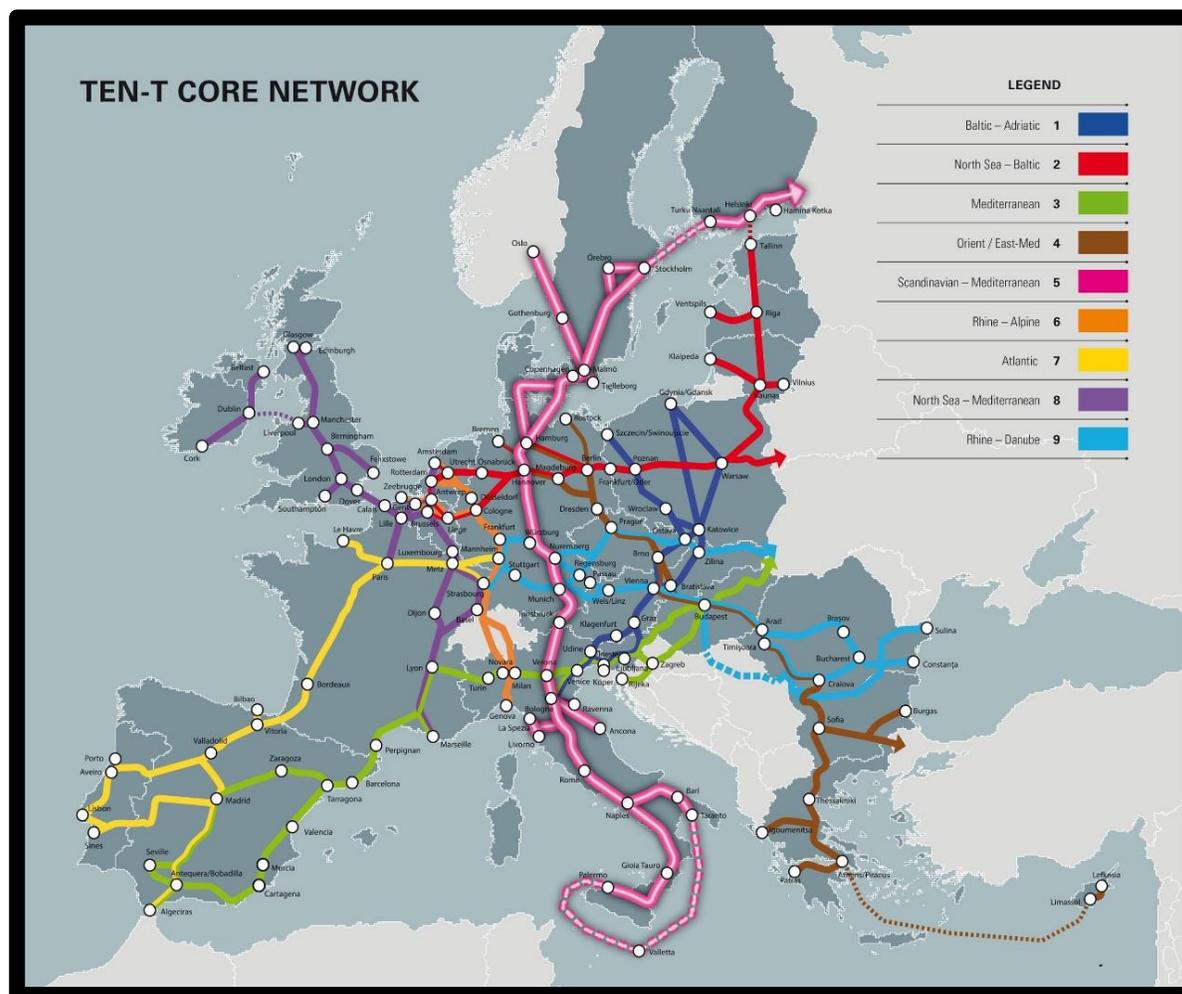
Major Economies (GDP - 2017)



Freight transport in the EU-28 – modal split



Europe's Core Transport Corridors



Alpine Goods Volumes

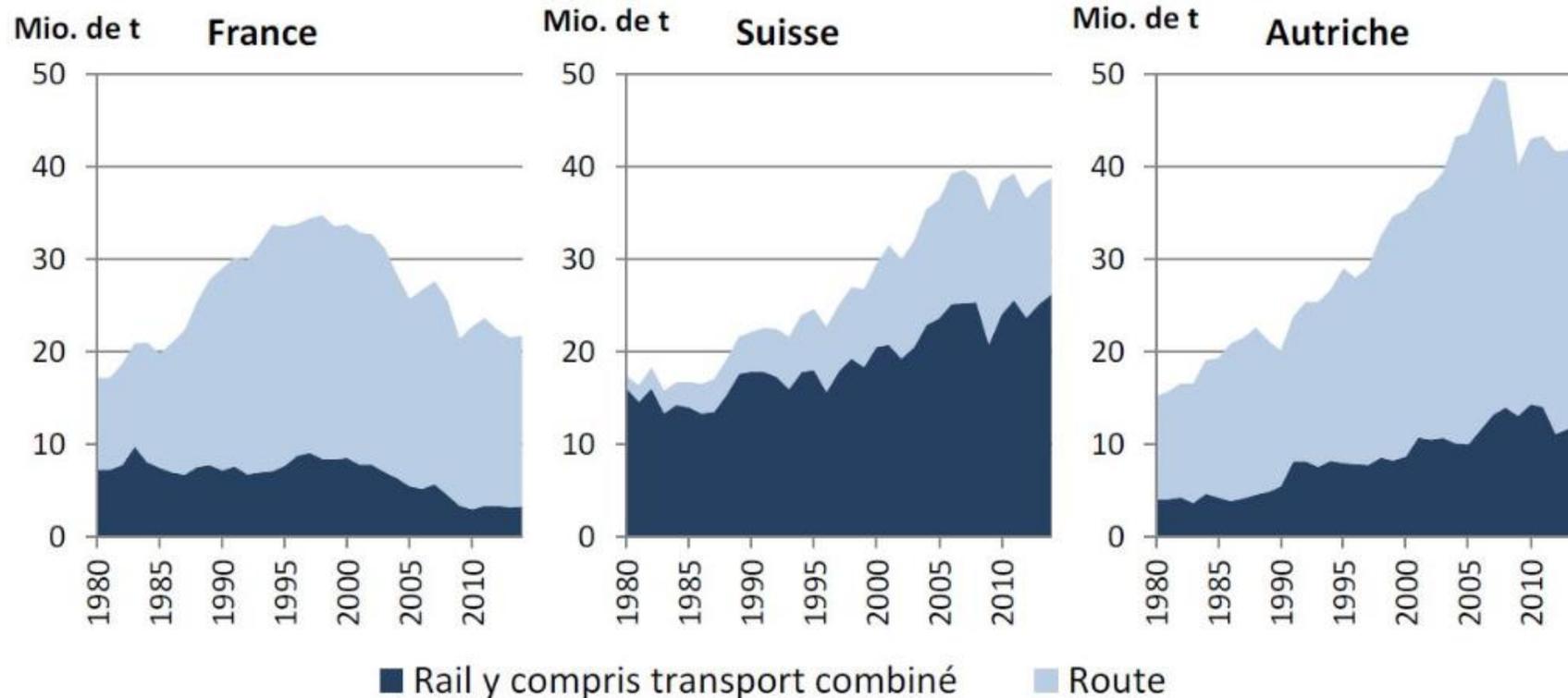
- In 2016, 40.4 million tonnes of goods were transported by road or rail across the Swiss Alps, with rail alone accounting for 71% of transalpine merchandise traffic
- Switzerland is leading the way for rail freight in comparison with other Alpine countries
- In 2014, rail freight traffic across the Alps accounted for:
 - 15.2% of the total volume of goods in France
 - 27.6% in Austria
 - 67.8% in Switzerland



Freight Traffic Across the Alps

Trafic marchandises à travers les Alpes 1980-2014

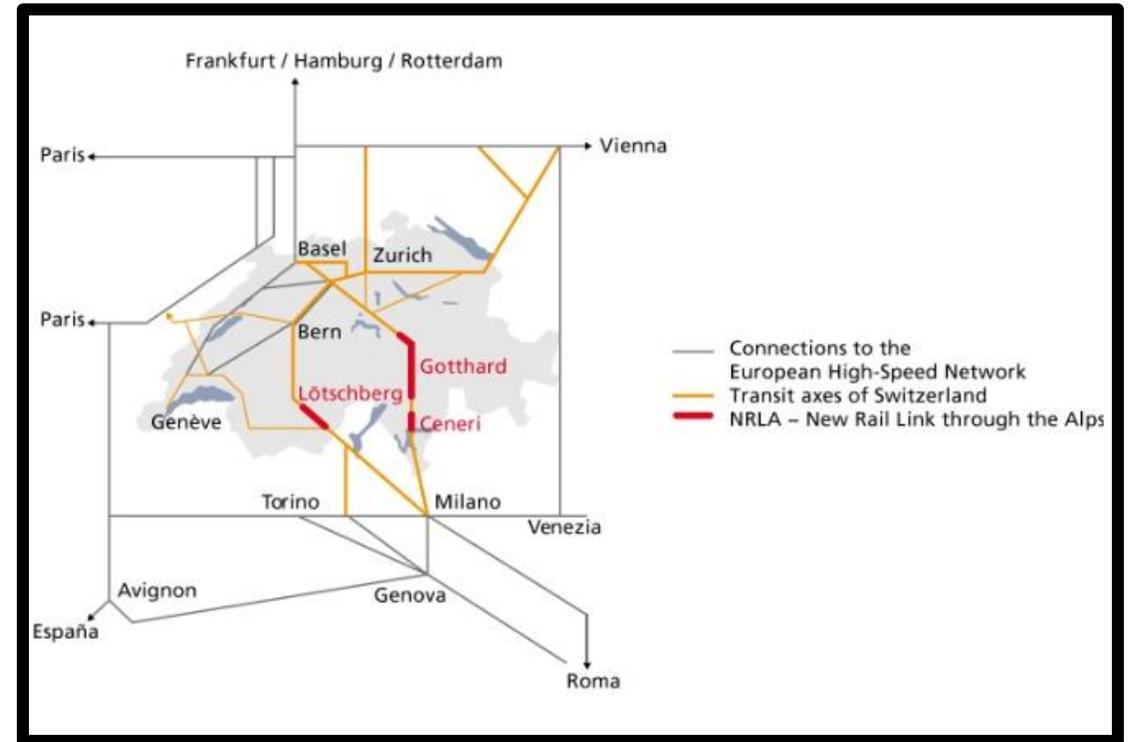
Mont-Cenis / Fréjus – Brenner (arc Alpin A) Millions de tonnes nettes-nettes/an



Traffic Transfer

Swiss transport policy aims to transfer freight traffic across the Alps from road to rail

- Following instruments and measures:
 - the new railway line across the Alps (NRLA)
 - the Heavy Vehicle Fee (HGV)
 - the 4-metre corridor and the layout of the terminals



Freight Handling by Rail ...

- **Combined & Accompanied Combined Transport (ROLA)**
- **From Piggy-Back to Intermodal – nearing 50 years**



Modern Combined

Combined on Brenner North Ramp

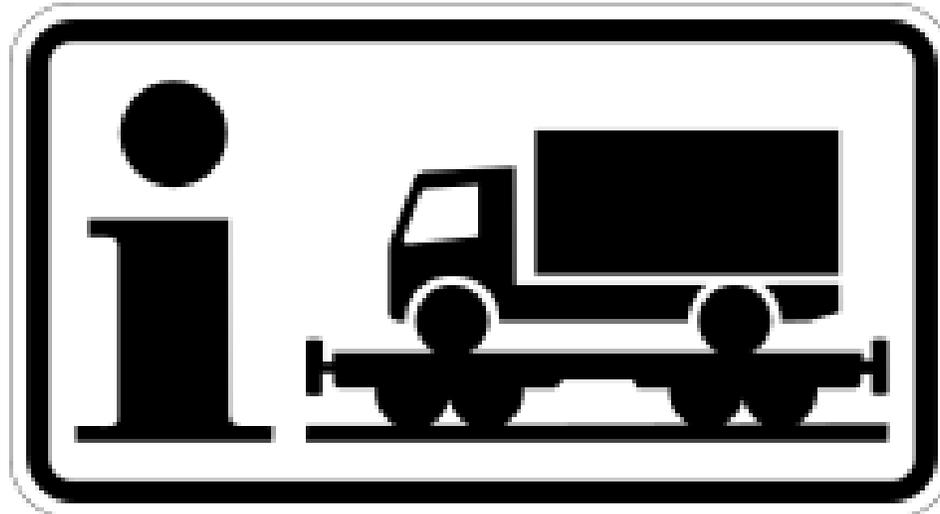


Block Combined
on Lötschberg South Ramp



What is “ROLA”?

- A **rolling highway/motorway** (originating from the [German](#) designation *Rollende Autobahn*, also known as *Rollende Landstrasse* ("rolling main road"), abbreviated *ROLA*)

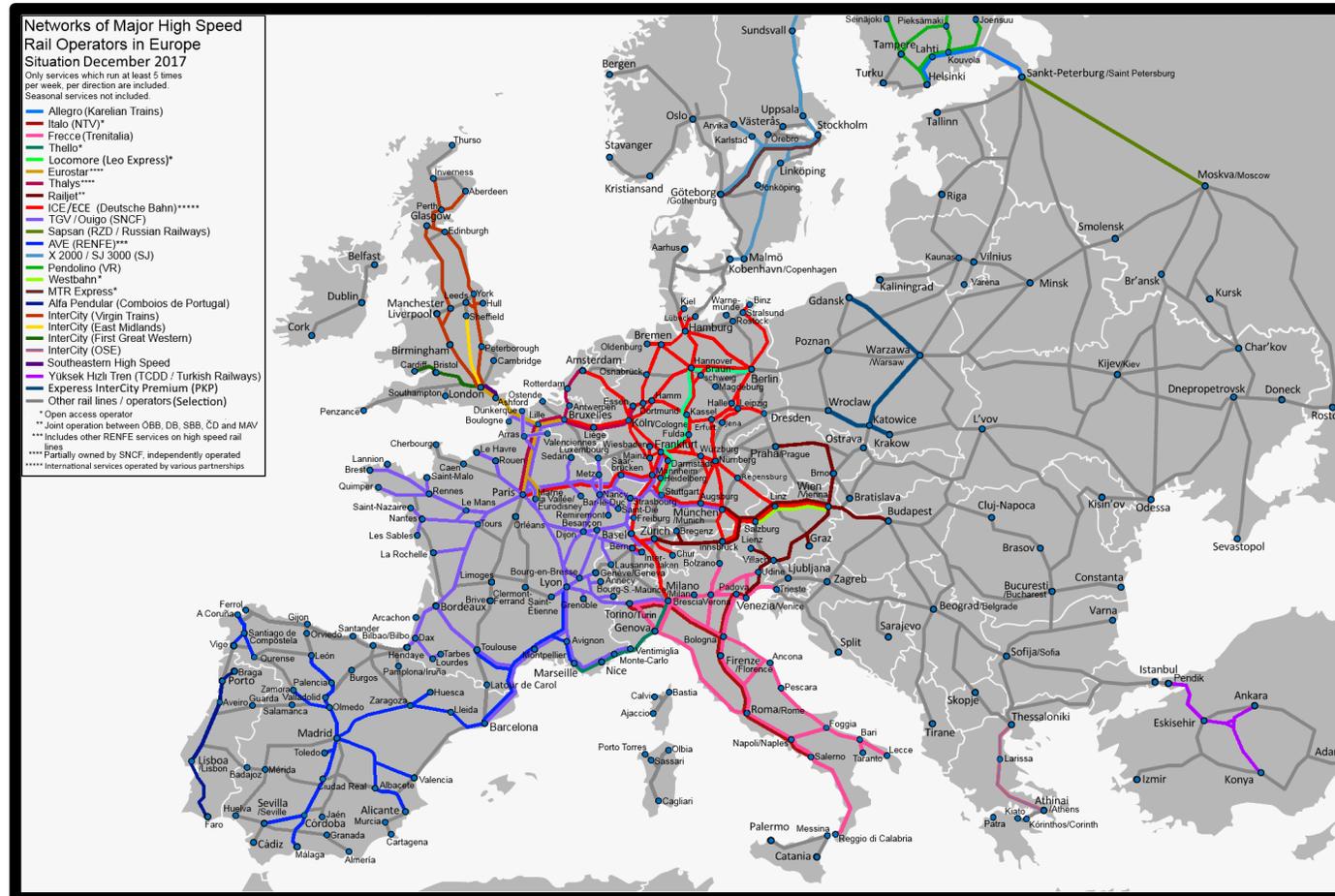


Why ROLA?



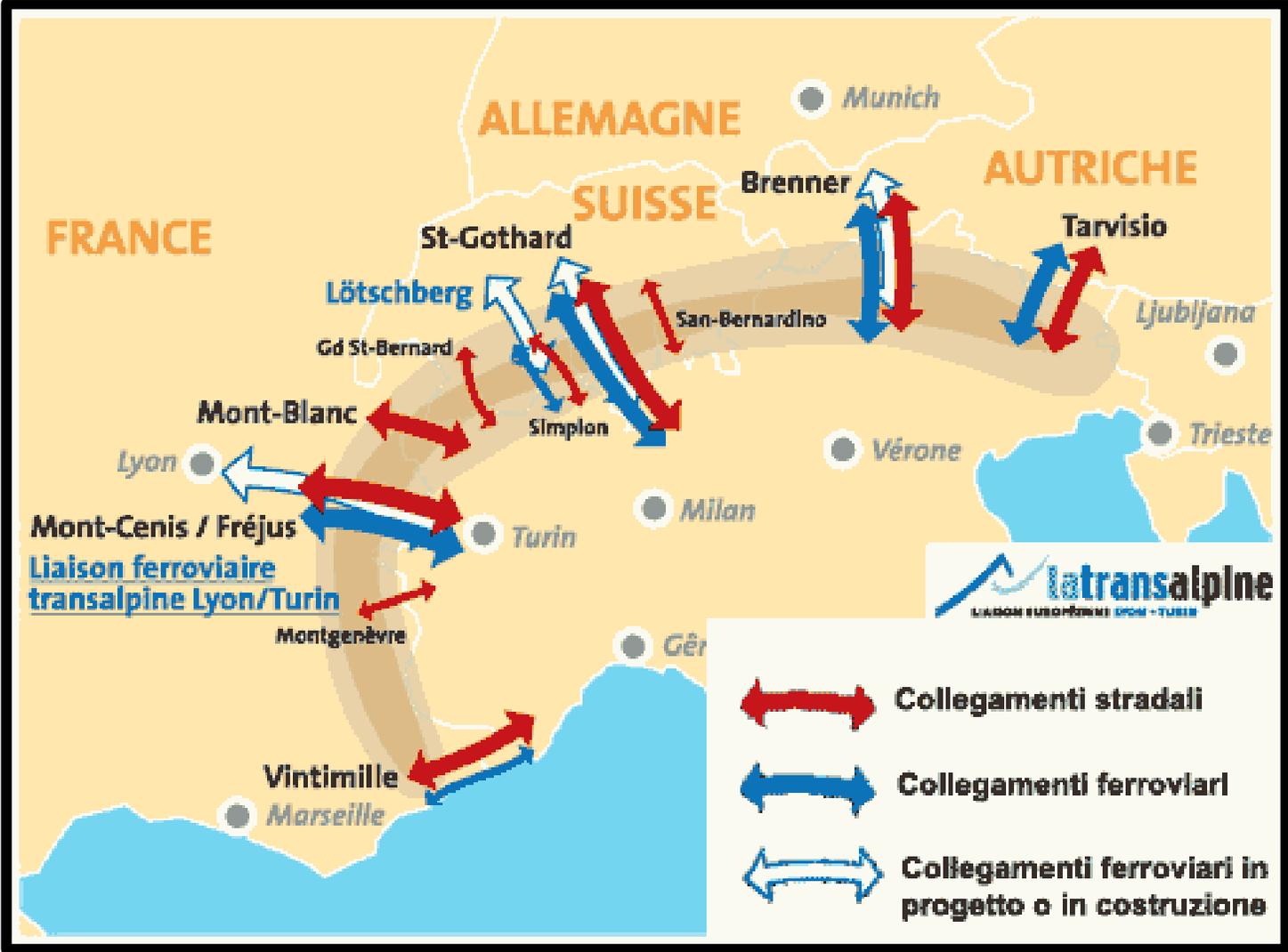
- **Safety & Environmental Considerations main drivers**
 - Saving energy reduces costs, emissions & noise - not contradictory goals!
 - CO2 emissions are already a significant cost factor and this is an upward trend
 - Environmental protection is already an important commercial competitive factor
 - Anticipated increase in environmental regulatory interventions
- **Rail freight transport is regarded as the preferred mode of transport for environmentally sound logistics processes**
- **Combined & Accompanied Combined transport** has an important role to play here - allows the transportation of individual consignments bundled with other consignments

Major Rail Operators in Europe - 2017



Source: Wikimedia Commons – Bernese media

Transalpine routes



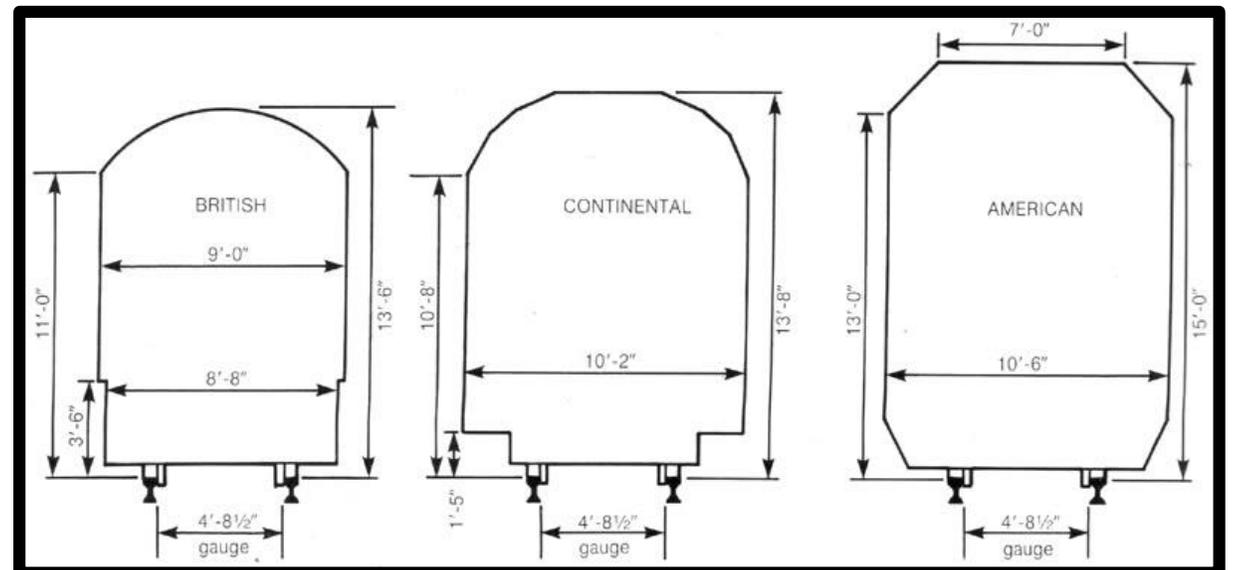
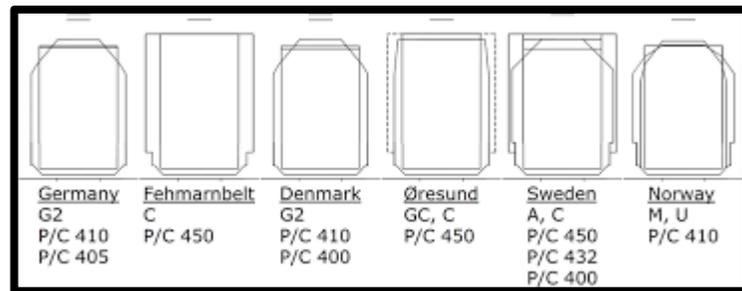
Road

Rail

New Rail Connections

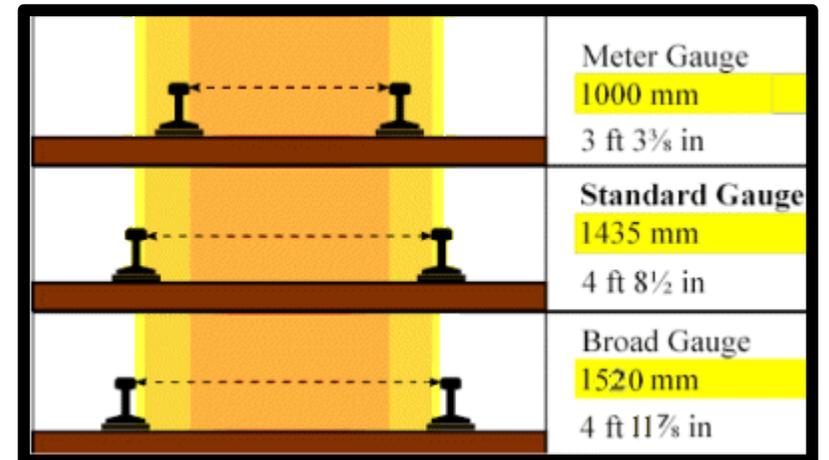
Technical Challenges to Implement

- Vary between Regions of the world
- In North America, the **loading gauge** for the most part is high enough to even accommodate double stack containers
- In Europe, with the exception of purpose built lines such as the Channel Tunnel, Lötschberg and Gotthard Base Tunnels, the **loading gauge height is much smaller**



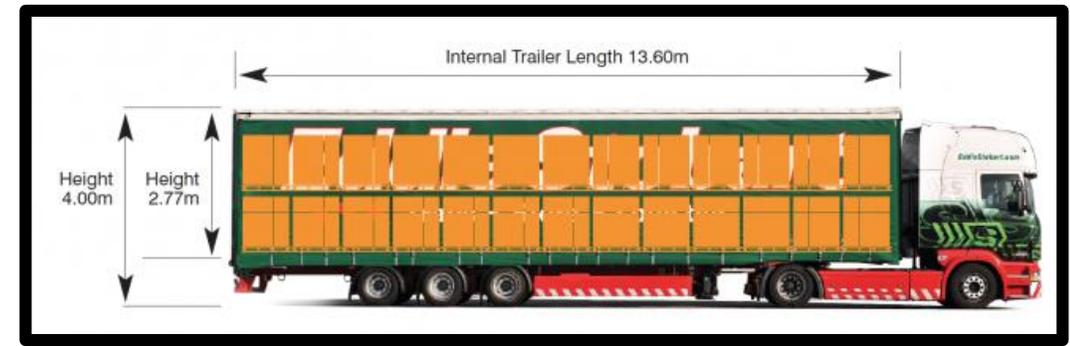
Technical Challenges ...

- Height of a lorry (truck!) parked on a deck above the wagon wheels is a non starter
- Special wagons with small diameter wheels & low axels have been designed
- But small wheels restrict the maximum speed
- And axel loading is a paramount consideration
- Various Rail Gauges



	Meter Gauge 1000 mm 3 ft 3 $\frac{3}{8}$ in
	Standard Gauge 1435 mm 4 ft 8 $\frac{1}{2}$ in
	Broad Gauge 1520 mm 4 ft 11 $\frac{7}{8}$ in

Swiss – Italy 4M Corridor



- In 2014 agreed to upgrade key freight link between the Swiss border and northern Italy to accommodate semitrailers with a 4m corner height
- An important part of the Swiss Federal Council's plan to create a continuous 4m corridor from Basle to Northern Italy via the Gotthard Base Tunnel, in line with its modal shift policy
- The agreement also includes a provision for Italy to spend €40m on upgrading the line between Chiasso and Milan. The work mainly involves increasing the loading gauge in tunnels and modifying platform canopies at stations

Accompanied Combined transport by rail

Two basic types of ROLA rail service that involves accompanied combined transport

A “Car Shuttle” Train (Kandersteg)



A “Rolling Highway” (Freiburg)



Rolling Highway – More than one Wagon Design

Due to market pressure resisting modification to lorries/trailers, currently more than one ROLA design in commercial service – each with advantages/disadvantages

" Modalohr"



"Cargobeamer"



Modalohr

Combined Transport



Swivel Platform



CargoBeamer

- Combined Transport
- Specially designed [pallets](#) which can carry a [road trailer](#); the pallets are fitted on top of [flatcars](#)



Rolling Highway – Low-Bed Wagons

Combined Transport

- Designed for transporting craneable semitrailers, containers and swap bodies
- Caters for a diversity of semitrailers

4-Axle ROLA (Sdgnss)



Rolling Highway – Low-Bed Wagons

Accompanied Combined Transport

- Intended for the transport of driver-accompanied truck-trailers and semitrailers, a form of combined freight traffic, and is employed in the transalpine shuttle sector
- Payload of 44 t and, responds to the transportation of semitrailers with a corner height of up to 4 m on the St. Gotthard Axis

8-Axle ROLA (Saadkms)



Rolling Highway – Manufacture

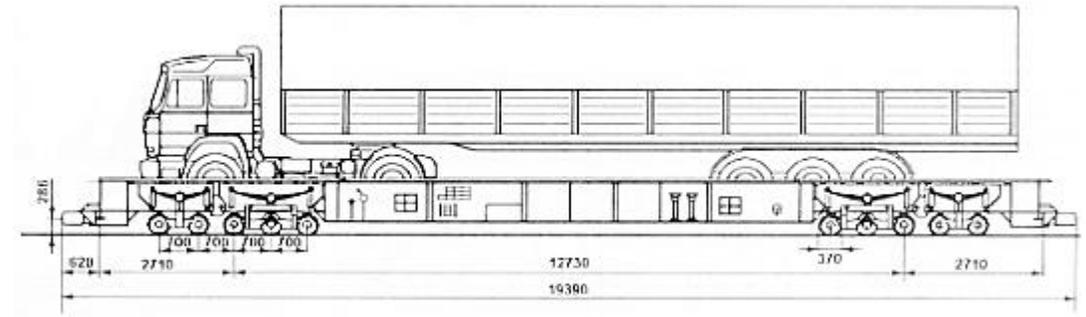


Rolling Highway – Low-Bed Wagons

Accompanied Combined Transport

- Also intended for the transport of driver-accompanied truck-trailers and semitrailers, a form of combined freight traffic
- Design and engineering licensed by ABB-Henschel
- 10-Axle handles increased loads over the 8-Axle max load

10-Axle ROLA (Saadkkms)



Rolling Highway – Low-Bed Wagons

4-Axle R (Sdgnss)

- Wagon length: 23460 mm
- Wagon axle base: 17600 mm
- Maximum width of the wagon:..... 2892 mm
- Height from the rail to the ceiling: 625 mm
- Bogie axle base: 1800 mm
- Automatic brake type:..... KE-GP-A
- Bogie type:..... 2+3
- Bogie axle base:..... 4x700mm
- Wheel diameter – as new: 760 mm
- Wheel diameter - as fully worn: 335 mm
- Dead weight:..... 22t
- Maximum load on axle:..... 16t
- Max. constructive speed:..... 120 km/h

10-Axle (Saadkkms) Trucks

- Wagon length:..... 20200 mm
- Wagon axle base:..... 12730 mm
- Height from the rail to the ceiling:..... 454 mm
- Automatic brake type..... KE-GP-A
- Bogie type:..... 2+3
- Bogie axle base: 4x700mm
- Diameter of the wheels – as new:..... 370 mm
- Diameter of the wheels - as fully worn:..335 mm
- Dead weight:..... 21,3t
- Maximum load on axle:..... 7,5t
- Net load of the wagon:..... 53,7t
- Max. constructive speed:..... 120 km/h

Rolling Highway – Low-Bed Wagons

Important Considerations / Compromises include

- Decrease in the rolling diameter
- Increase in the number of axles to maintain a constant net load
- Braking systems – due very low wheel plane used as brake disc

Source: XVII International Scientific Conference "Transport 2007" – www.mtc-ai.com
MTCAJ Article # 0158 ASPECTS REGARDING BRAKING FLAT WAGONS WITH SMALL WHEELS

10-Axle ROLA (Saadkkms) Trucks



Source: Grampet Debreceni Vagonyár Kft. - www.vagonyar.hu

UIC* Classification of Railway Codes



Abbreviated Explanations

8-Axle ROLA (Saadkms)

- S = special flat wagon with bogies
- aa = 6>8 wheelsets (axles)
- d = transportation of motor vehicles
- k = maximum axle load
- m = maximum loading length
- s = permitted speed (100 km/h)

Bcmz Carriages

- B = passenger coach with 2nd class seating
- c = coach with compartments
- m = passenger coach with a length > 24.5 Metres
- z = coach with power from bus-bar (no axle generators)

* **UNION INTERNATIONALE DES CHEMINS DE FER** - The Worldwide Railway Organization – HQ Paris, F

Source: UIC & Wikipedia

<https://uic.org>

https://en.wikipedia.org/wiki/UIC_classification_of_goods_wagons

https://en.wikipedia.org/wiki/UIC_classification_of_railway_coaches

Bcmz Carriages

Lorry Drivers Accommodation



Typical night configuration



ROLA Operators



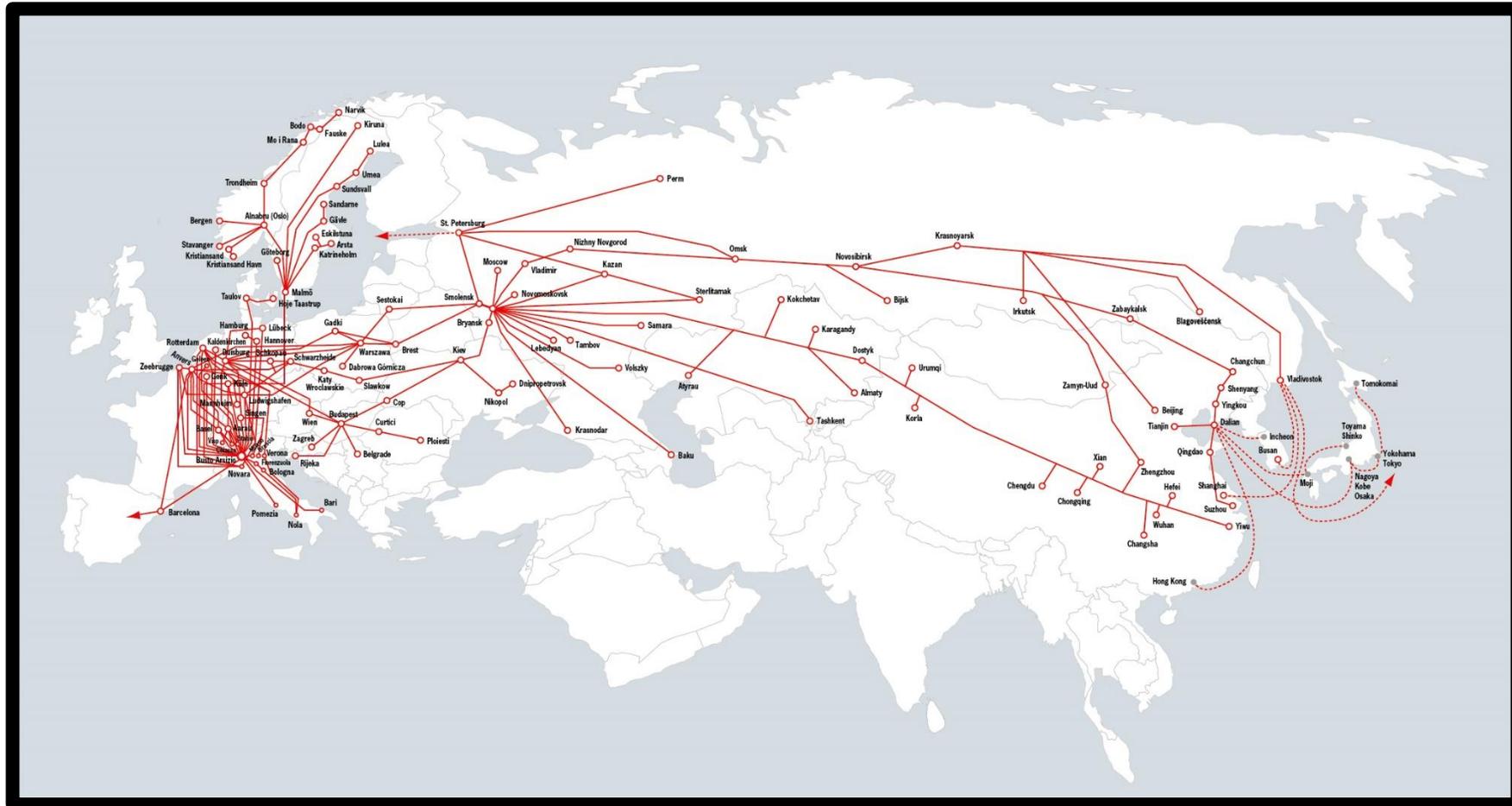
Sample Listing

ROLA Operators – sample Alpine operators

- Hupac AG – HQ Chiasso, CH
 - Handles approx. 740,000 trucks pa
 - Approx. 5,500 rail platforms
- RAlpin AG – HQ Olten, CH
 - Handles approx. 100,000 trucks pa
- Kombiverkehr – HQ Frankfurt am Main
 - Handles approx. 1,000,000 trucks pa
- ÖKOMBI – HQ Vienna, AT
 - Acquired by Rail Cargo Austria AG



HUPAC AG Network



Source: HUPAC

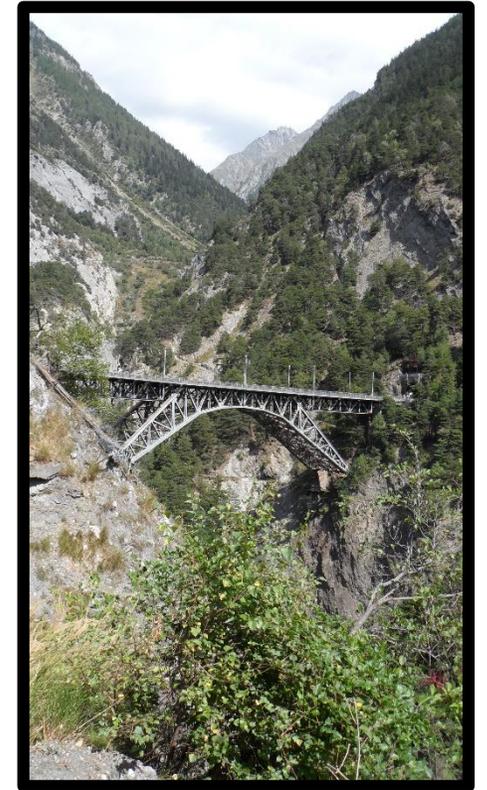
HUPAC AG Network



On the BLS Lötschberg South Ramp



Bietschtal Bridge



RAlpin AG



BLS Hauled over Kandersteg Viaduct, CH – Lötschberg North Ramp



Kombiverkehr



Intermodal at Prien Am Chiemsee (Near Munich)

3 Categories of wagons deployed

- **Pocket wagons for the transport of cranable semi-trailers**
- **Container carriers for the transport of containers and swap bodies**
- **Low-loader wagons for the transport of complete goods vehicles on the "Rolling Road"**



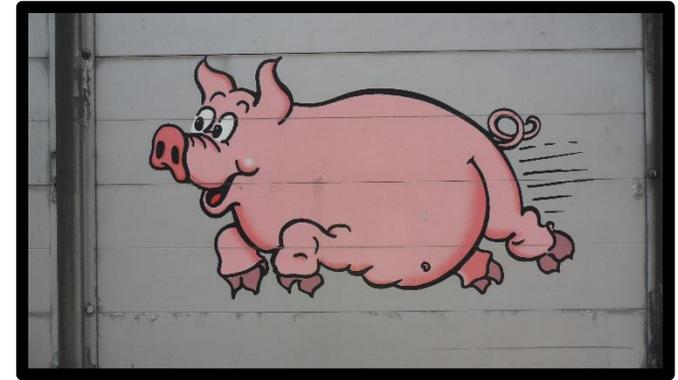
ÖKOMBI – RailCargo Austria AG

- **May 15, 2013 Okombi GmbH was acquired by Rail Cargo Austria AG**
- **Ökombi GmbH organizes and operates from and to accompanied transportation services in Austria**
- **Provides Rolling Road & intermodal piggyback rides in Europe**



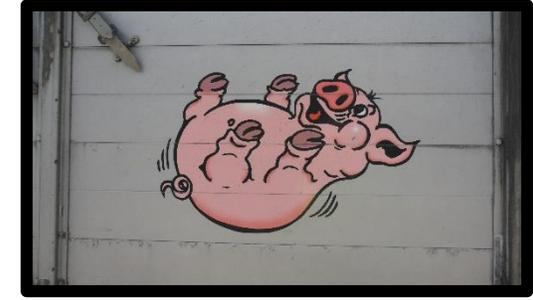
How Does ROLA Ride Work?

- Frequent regular interval timetable service
- Driver reports to the terminal with his freight lorry
- Truck is weighted, a ticket is issued
- Via a ramp, the driver drives his truck onto the "Piggyback"
- Driver secures the vehicle
- Drivers relax in the recreation wagon
- Drivers can also purchase snacks and drinks
- On arrival, the trucks leave the ROLA via the ramp again



[Pig paintings spotted on a trackside freight building in CH]

How Much does ROLA Cost?



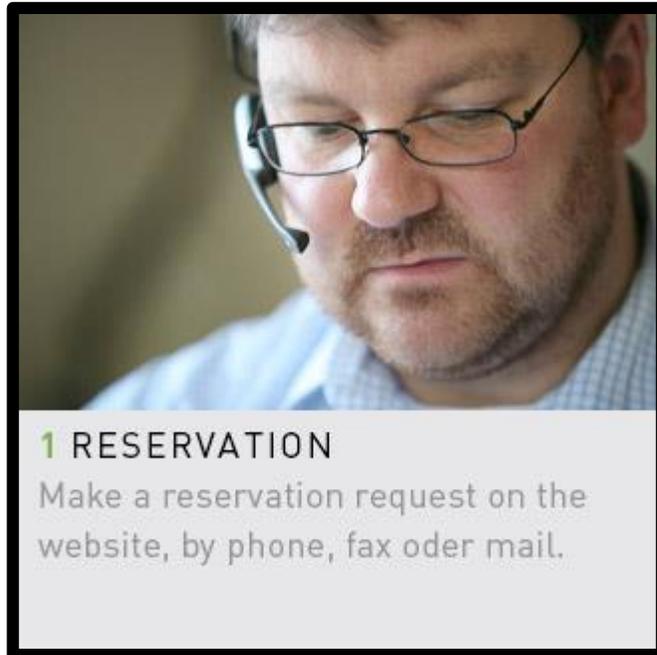
- The price for a ROLA ride depends on the length of the route and the time of day. Round-trip discounts often available
- A ROLA ride is deliberately priced economically
- Example Brenner route (Brenner - Wörgl) Austria*
 - 80 € toll fees and approx. + 38 € for fuel for a road transport = 118 €
 - ROLA ride tickets same route are available starting at 92 €
- Payment by Account / Fuel Cards / Cash



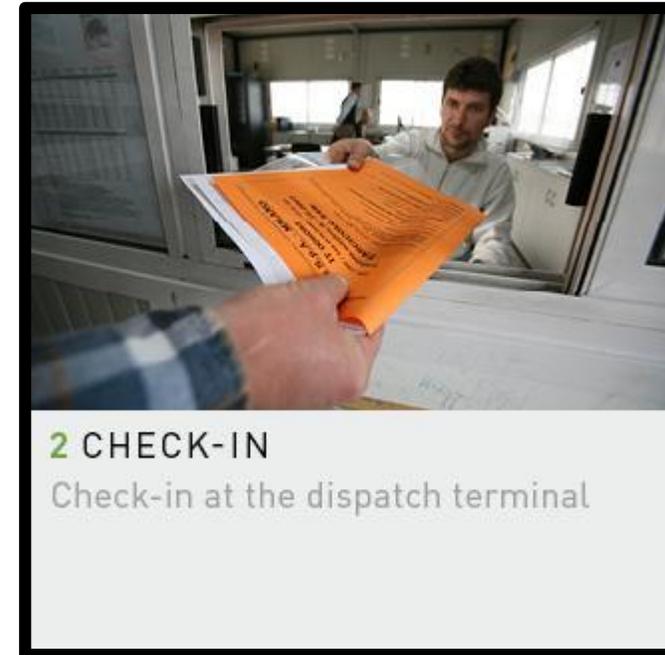
* Source: Rail Cargo Operator – OBB www.ROLA.at

ROLA in Action – RAlpin Explain!

Reservation

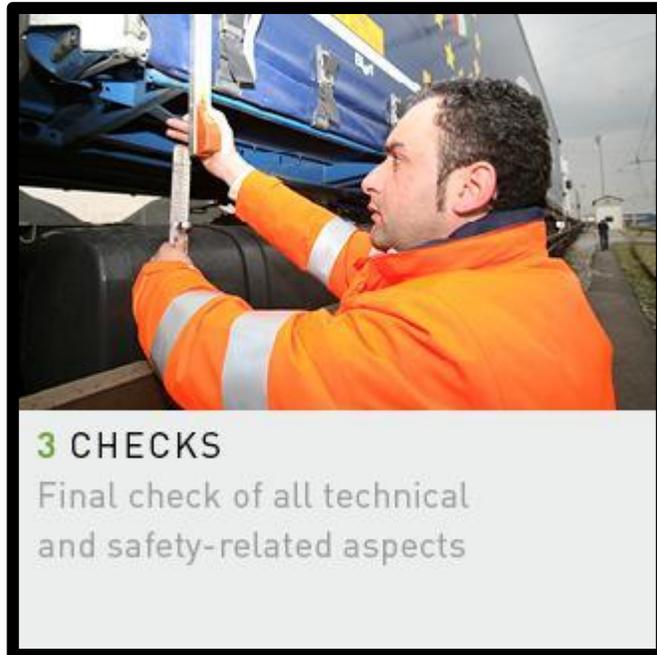


Check-In



ROLA in Action!

Pre Boarding Checks – VERY important!



Load – Carefully, but Quickly



ROLA in Action!

Journey – Lötschberg Ramp



5 JOURNEY

The Rolling Highway sets off

Driver rejuvenation!

Couchettes/Couches – Snack bar



6 REST

Drivers observe their statutory rest periods during the journey

ROLA in Action!

Unloading – Drive off!



Back on the Highway!



ROLA Safety Check List Example

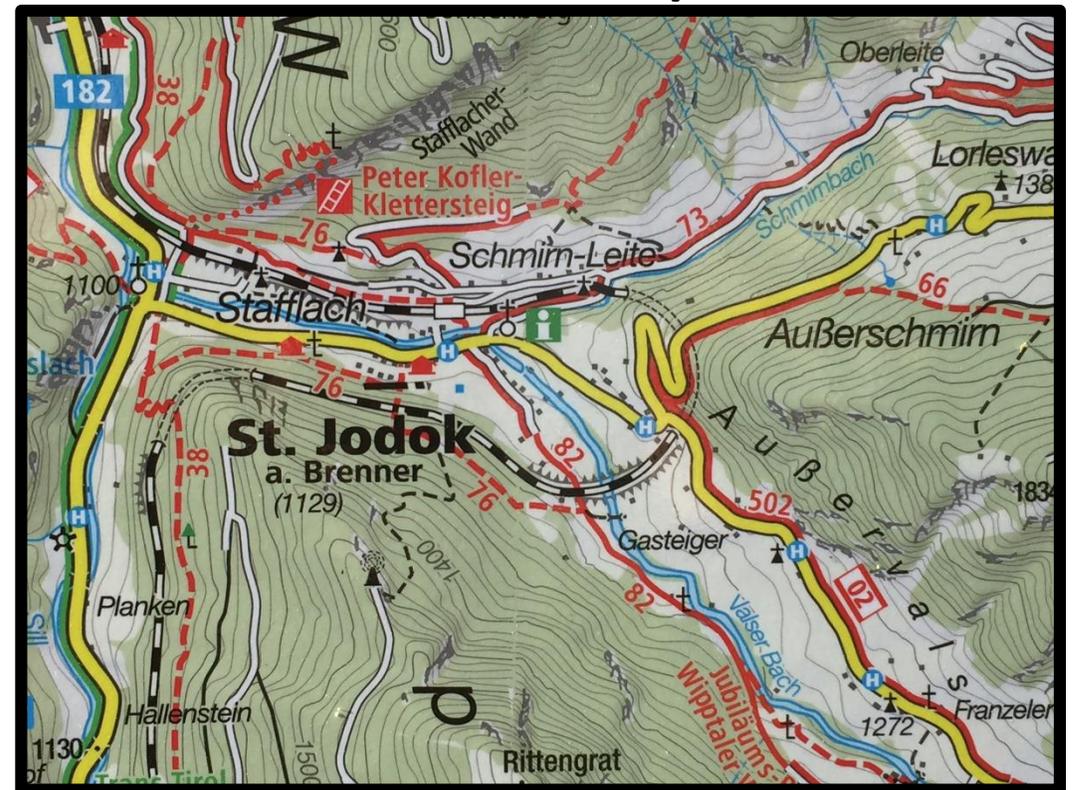
SAFETY CHECK FORM ROLA-TRUCK (EN)		Rail Cargo Operator	
	Please put on warning clothes and sturdy shoes!		Rear doors of semi-trailer closed and locked
	Keep away from adjacent railway tracks, don't cross tracks - serious danger!		ROLA Wörgl-Brenner v.v. with belt on the rear side of the semi trailer
	Keep distance of min. 3 meters from high voltage constructions - serious danger!		In parking position on the wagon air-suspension lowered
	Tarpaulin and tarpaulin-sliding-roof closed and locked		Truck-aerial up to max. truck-height of 4.0 m or removed Well fitted air deflectors on the cabin
			Truck: engage 1 st gear Spring-operated brake or hand brake put on
			Secure your truck with 4 wheel chocks
			Car transporter only: protection foils of the cars checked and fixed if necessary
<p>The truck driver confirms with his signature, when leaving the truck on the train, that the safety-rules according to this check list are fulfilled, the requirements have been understood and that he saw the safety film.</p>			
Wörgl > Brennersee <input type="checkbox"/> Brennersee > Wörgl <input type="checkbox"/>	Wörgl > Trento <input type="checkbox"/>	train number / booking number _____	<input type="checkbox"/> semi-trailer <input type="checkbox"/> trailer <input type="checkbox"/> car transporter
company, town _____	name 1st driver _____		
trailer plate number _____	name 2nd driver _____		
loaded goods _____	total weight truck + load _____	date _____	
ADR-hazardous goods <input type="checkbox"/> yes <input type="checkbox"/> no	signature _____		
<p>The general terms and conditions of Rail Cargo Operator - Austria GmbH/ROLA as well as the conditions of use for transportation on the rolling road apply.</p>			

Brenner ROLA

Traffic Route



North Ramp



Brenner ROLA

Diversity of Train Operating Companies



St Jodok



Brenner ROLA

Line Siding



Wörgl > Brenner Shuttle



Brenner ROLA

Arriving Brenner ROLA Terminal



Two Terminating Tracks



Brenner ROLA

Uncouple Driver's Accommodation



Open the hinged buffer bar



Brenner ROLA

Roll ramp into position



Drivers drive off!



Brenner ROLA

Waiting drivers drive on ...



Shunt up the Drivers Coach



Brenner ROLA

Couple up ...



Proceed on the way ...



Brenner ROLA

Line Siding



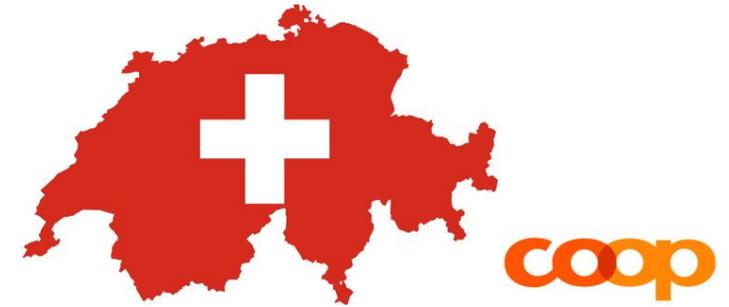
Up close and personal!



Innovative Intermodal

Swiss Operators Optimize Short-Haul Railfreight

- RailCare established in 2009
- Taken over by Co-OP – one of the largest supermarkets in CH
- Trains run fixed schedules
- Philosophy - keep the collection and delivery by road at either end of the rail trunk haul as short as possible



Horizontal Loading (ContainerMover 3000)



Metre Gauge Intermodal



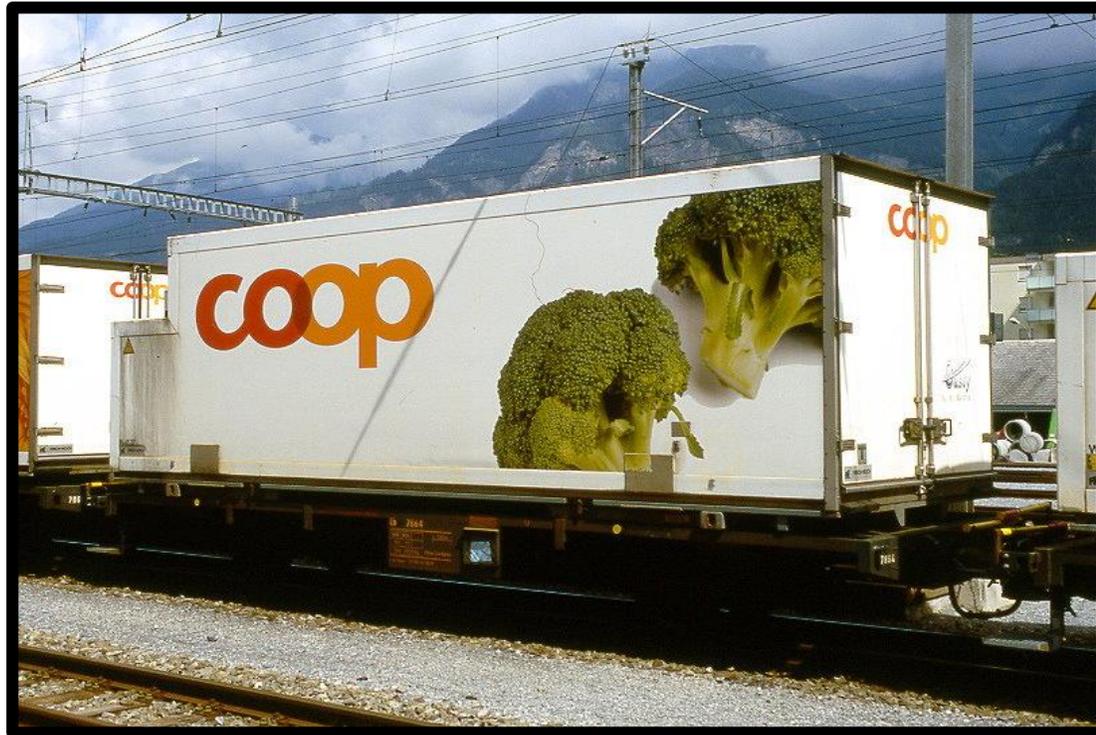
Post by rail encouraged



Metre Gauge Intermodal



Supermarket supplies by rail



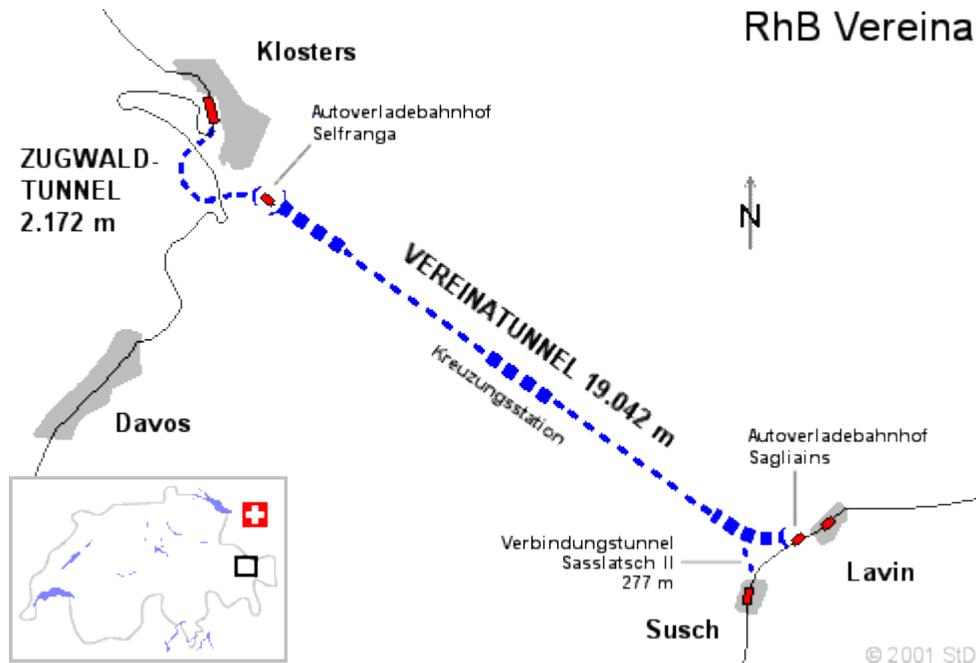
All goods by rail until “Last Mile”



Metre Gauge ROLA



Vereina Tunnel



Drive On – Drive Off



Metre Gauge ROLA



Vereina Tunnel - Summer

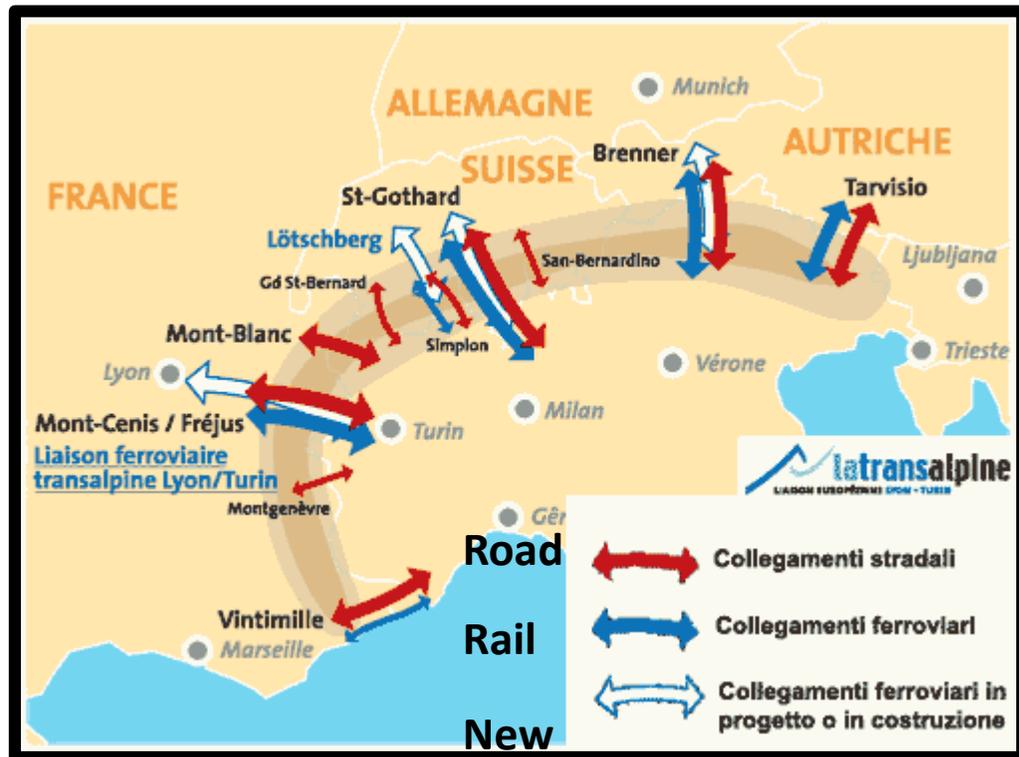


Winter



Base Tunnel Route Development

Alp Massiv

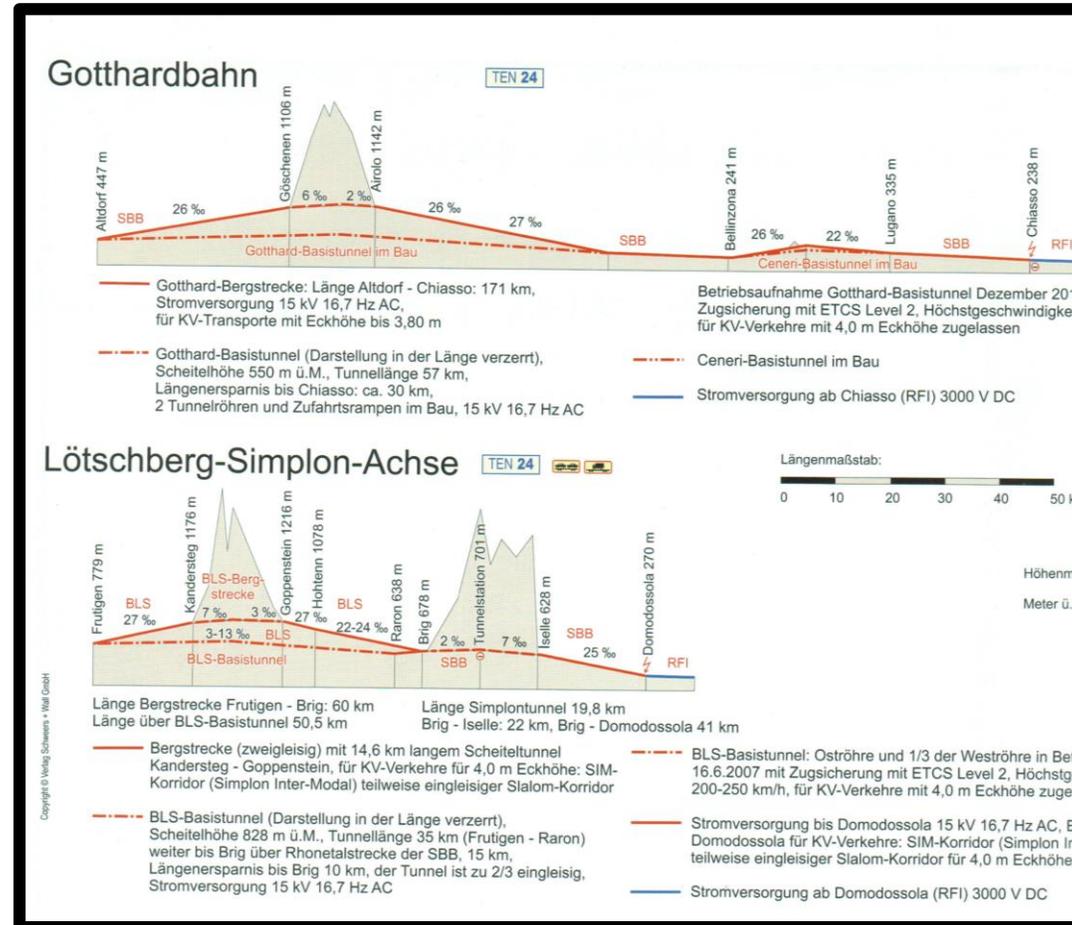


Rail Connections

Basis Tunnel Status

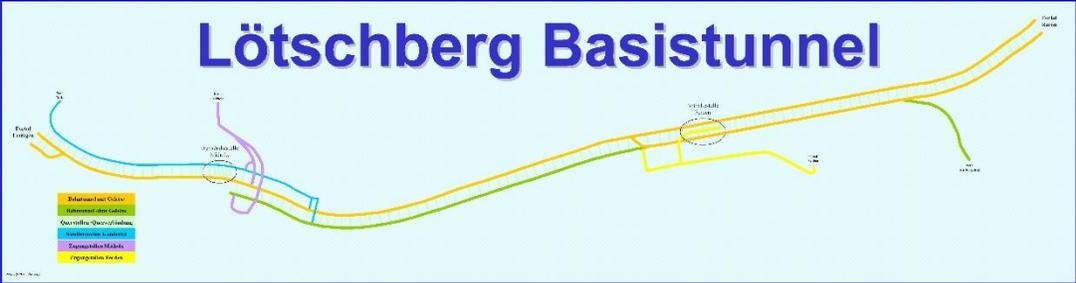
- Lötschberg – 34.57Km Opened 2007, Partially Completed Dual Bore
- Gotthard – 56Km Opened 2016, Dual Bore
- Ceneri – 15.4Km Due open 2019/20
- Brenner – 55Km Due open 2026
- Mont-Cenis – Construction yet to start

Transalpine Barrier – Engineering Challenge



Transalpine - The Lötschberg

Tunnel Breakthrough - 2005



Inside the Lötschberg

North Portal

Lötschberg Operational 2007



Inside

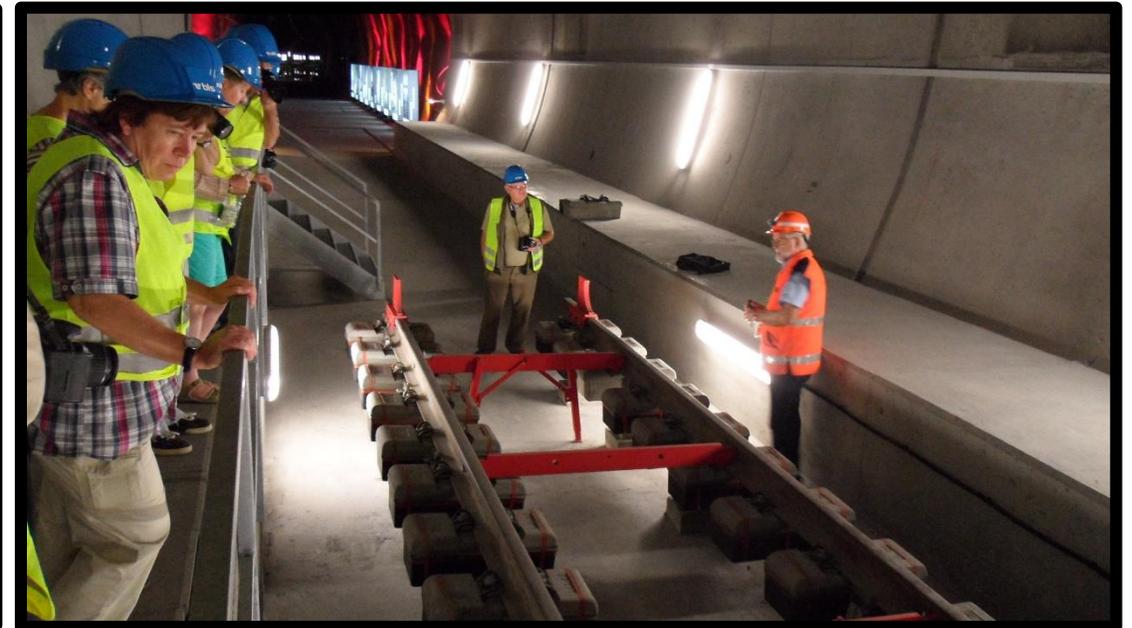


Inside the Lötschberg – Study Tour

Preparing to go inside!



Inspecting the track construction



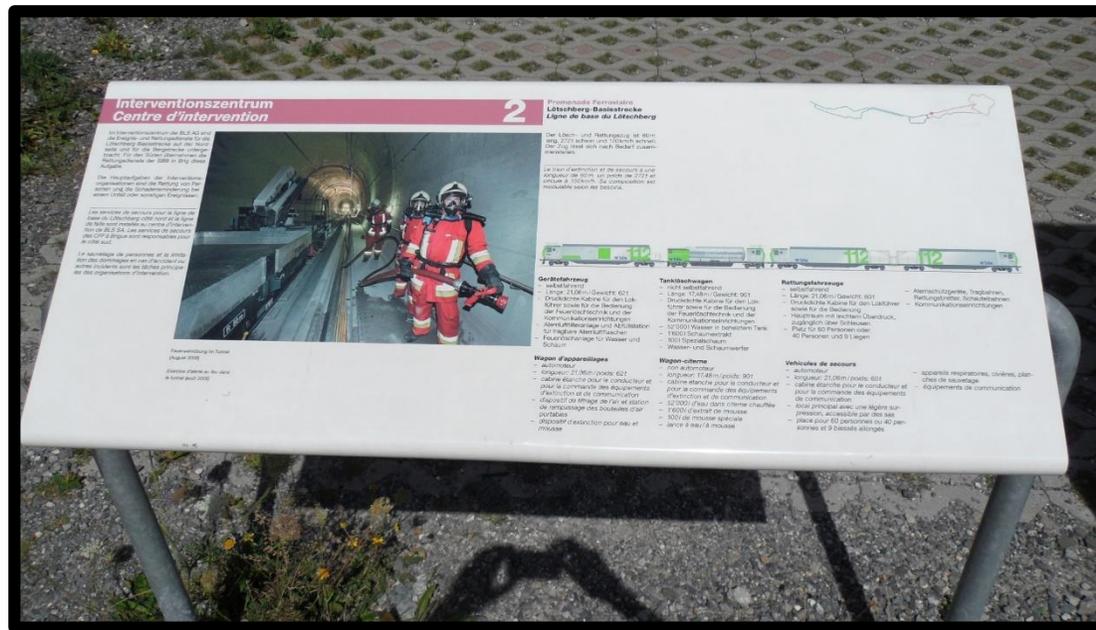
Inside the Löttschberg – Sleeper (Tie) design



Rail Safety – Emergency Tunnel Intervention

Safety Taken VERY seriously!

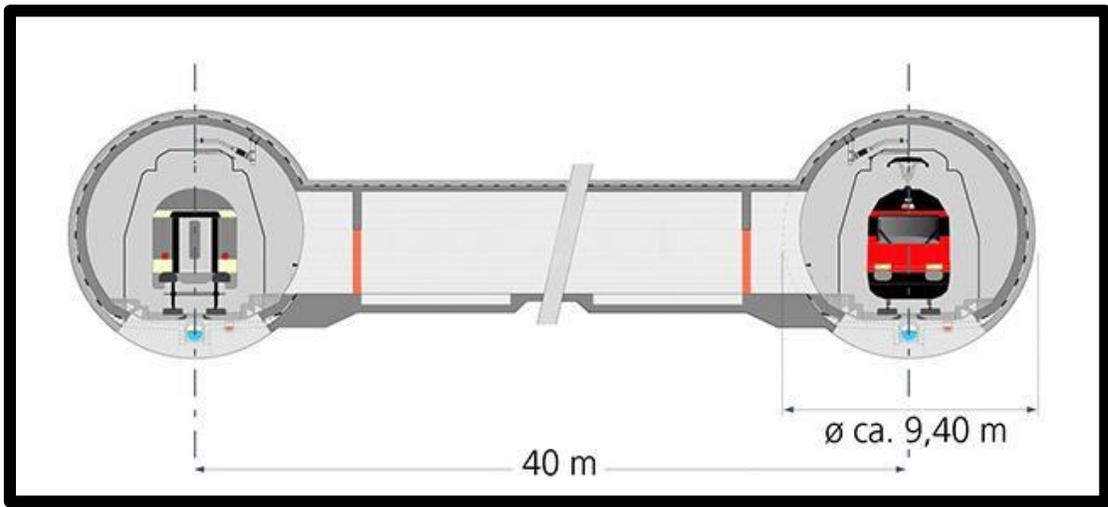
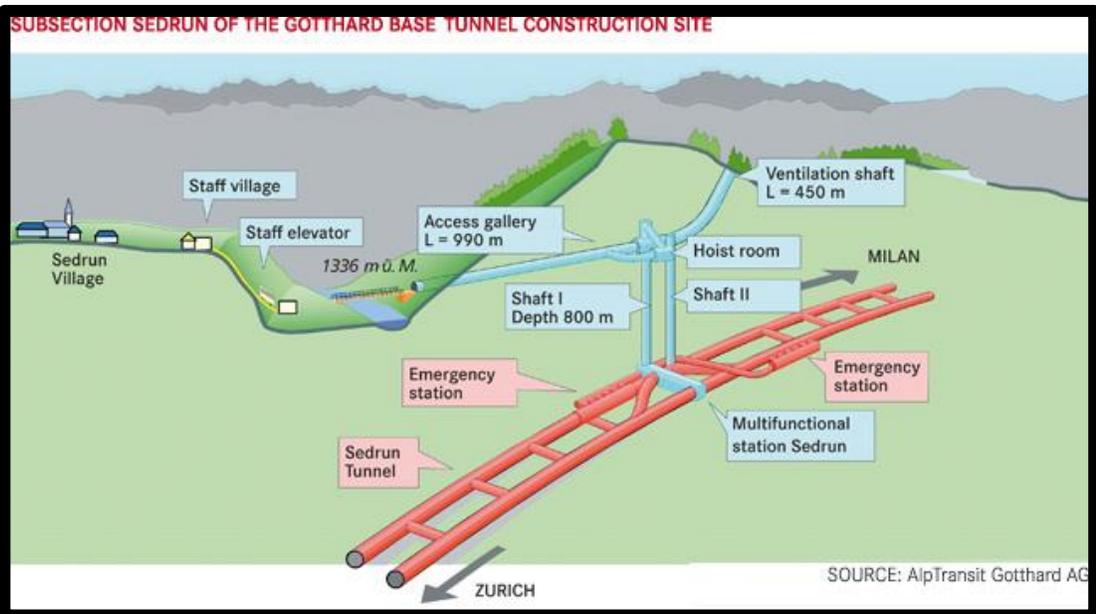
BLS Tunnel Rescue Train
Ready to Roll – 90 seconds!



Transalpine – Gotthard Base Tunnel

Sedrun Multifunctional Emergency Station

Twin Bore Design



Source: Alptransit Gotthard

Transalpine – Gotthard Base Tunnel

Breakthrough 2010!
Tunnel Boring Machine



Multifunctional Junction



Gotthard Base Tunnel – Opening Ceremony

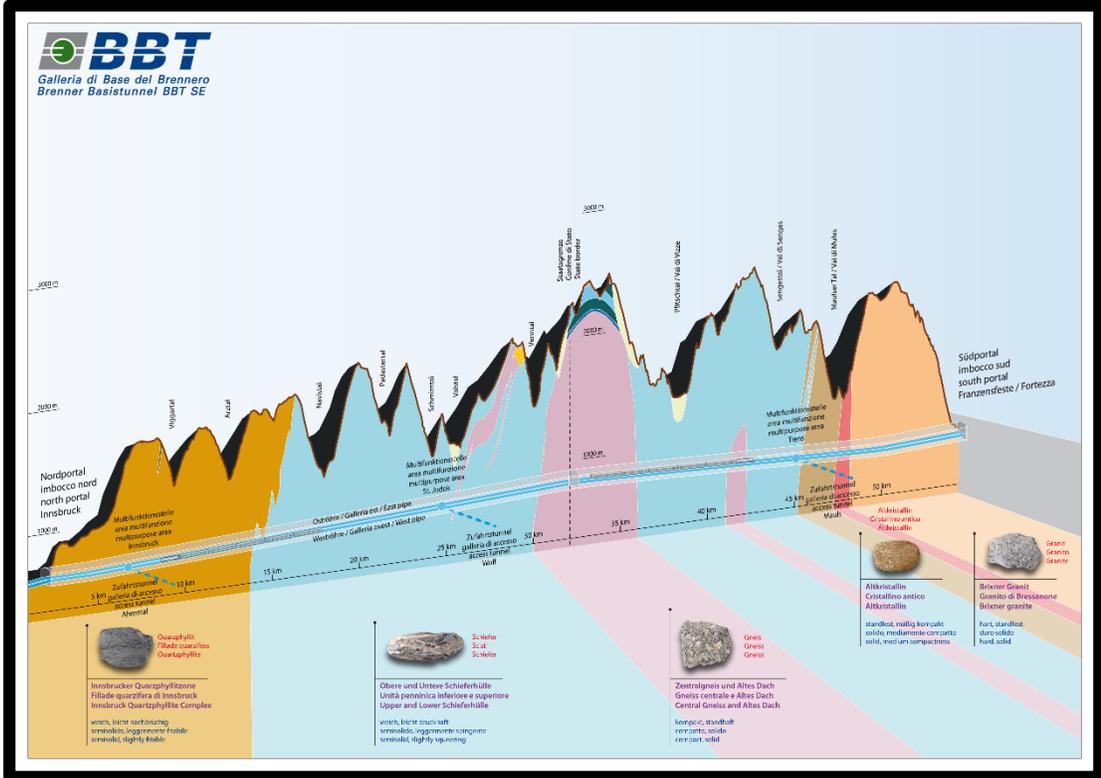
2016



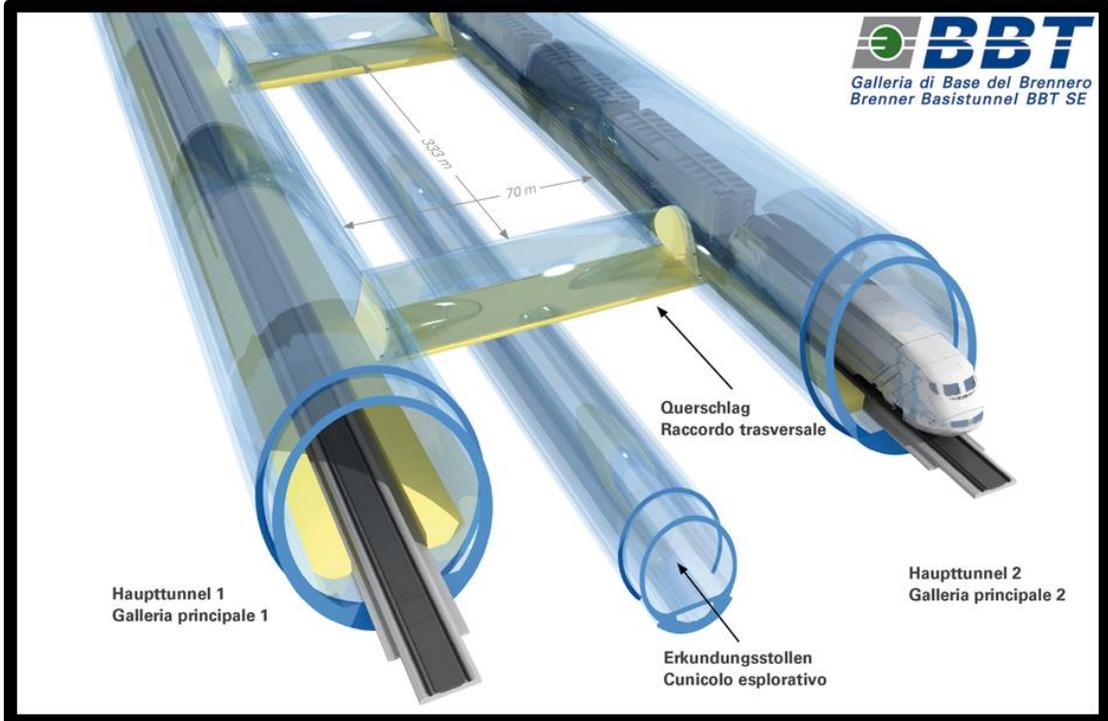
Source: Alptransit Gotthard

Transalpine – New Brenner Base Tunnel

Geological Challenges



3 – Tunnel Design

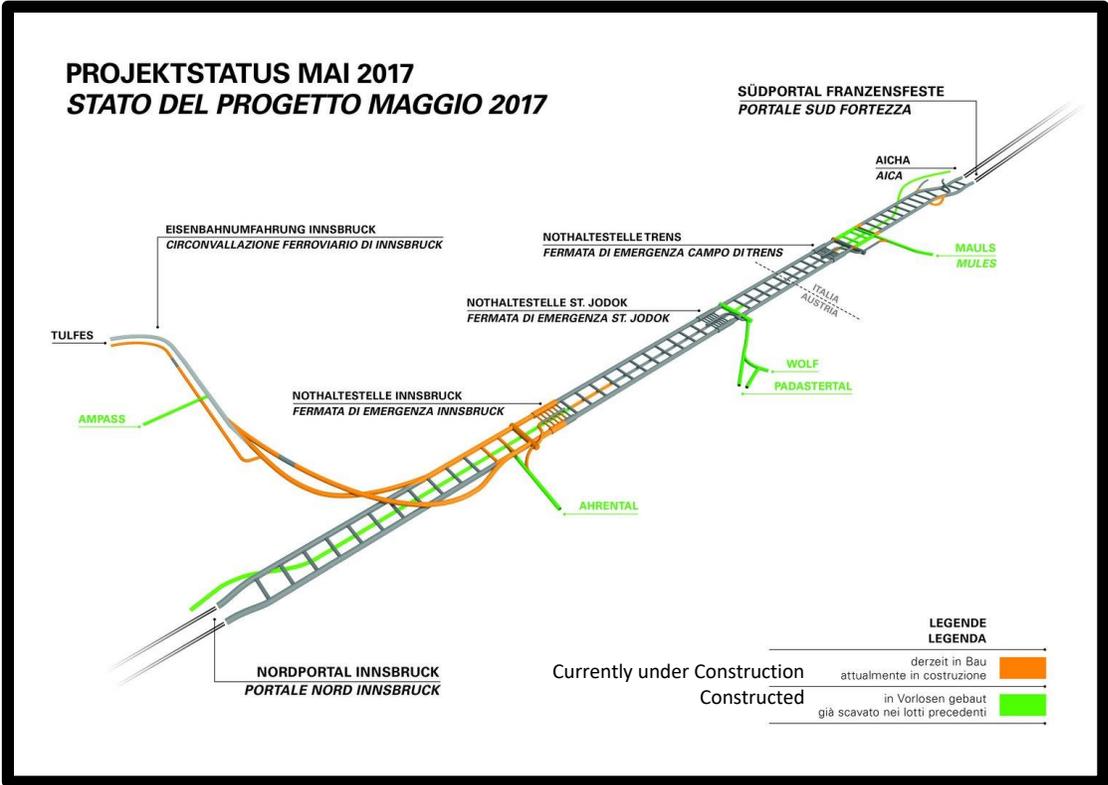


Transalpine – New Brenner Base Tunnel

Construction



Status May 2017 – due to open 2026



Modeling ROLA in HO

Low Floor Wagons and Driver Coaches



HO stock available from Marklin, Trix, Roco, Fleischmann, HAG, Liliput to name examples

Standard Dimension of ISO Containers

Many Considerations

Modelling

SEA CONTAINER SPECIFICATIONS

DRY CARGO CONTAINERS



Type	Container Weight			Interior Measurement				Door Open	
	Gross (kg)	Tare (kg)	Net (kg)	Length (m)	Width (m)	Height (m)	Capacity (m ³)	Width (m)	Height (m)
20 ft	24,000	2,370	21,630	5.898	2.352	2.394	33.20	2.343	2.280
40 ft	30,480	4,000	26,480	12.031	2.352	2.394	67.74	2.343	2.280

CHARACTERISTICS
Manufactured from either Aluminium or steel, they are suitable for most types of cargo / general cargo. Aluminium containers have a slightly larger payload than steel, and steel containers have a slightly larger internal cube.

REFRIGERATED CONTAINERS



Type	Container Weight			Interior Measurement				Door Open	
	Gross (kg)	Tare (kg)	Net (kg)	Length (m)	Width (m)	Height (m)	Capacity (m ³)	Width (m)	Height (m)
20 ft	24,000	3,050	20,950	5.449	2.290	2.244	26.70	2.276	2.261
40 ft	30,480	4,200	26,280	11.690	2.250	2.247	57.10	2.280	2.205

CHARACTERISTICS
Recommended for delicate cargo. Bottom-air delivery system ensures refrigerated cargo reaches its destination in optimum condition.

OPEN TOP CONTAINERS



Type	Container Weight			Interior Measurement				Door Open	
	Gross (kg)	Tare (kg)	Net (kg)	Length (m)	Width (m)	Height (m)	Capacity (m ³)	Width (m)	Height (m)
20 ft	24,000	2,580	21,420	5.629	2.212	2.311	32.00	2.330	2.263
40 ft	30,480	4,200	26,280	11.763	2.212	2.311	65.40	2.330	2.263

CHARACTERISTICS
Allowing cargo to be loaded from the top, open top containers are particularly suitable for bulky cargo such as machinery. They are fitted with a PVC tarpaulin cover and attachable boxes with cable casting devices. The container doors can be removed to make the stuffing of cargo more convenient. Manufactured from steel.

SCALE SIZES (a guide only)

NOTE: Scale sizes are an approximate guide only. H = Height, W = Width (length), D = Depth. PDF files can be easily scaled on a home printer - OO (print same size), HO reduce print to 87%, S scale increase to 118%, Z reduce to 35%, N reduce to 48%. Not recommended for O scale.

MODEL NUMBER	OO Gauge (1:76)						HO Scale (1:87.1)					
	Centimeters			Inches			Centimeters			Inches		
	W	H	D	W	H	D	W	H	D	W	H	D
20 ft	8	3.5	3.2	3.1	1.4	1.3	7.0	3.1	2.8	2.7	1.2	1.1
40 ft	16	3.5	3.2	6.3	1.4	1.3	14.0	3.1	2.8	5.5	1.2	1.1

10ft containers also available (see above)

MODEL NUMBER	N Scale (1:160)						Life Size (1:1)					
	Centimeters			Inches			Meters			Feet		
	W	H	D	W	H	D	W	H	D	W	H	D
20 ft	3.8	1.7	1.5	1.5	0.7	0.6	6.1	2.7	2.4	19.9	8.7	8.0
40 ft	7.6	1.7	1.5	3.0	0.7	0.6	12.2	2.7	2.4	39.9	8.7	8.0

Help is at hand – armchair reading



Postscript! In case you are wondering Not everything works 100%

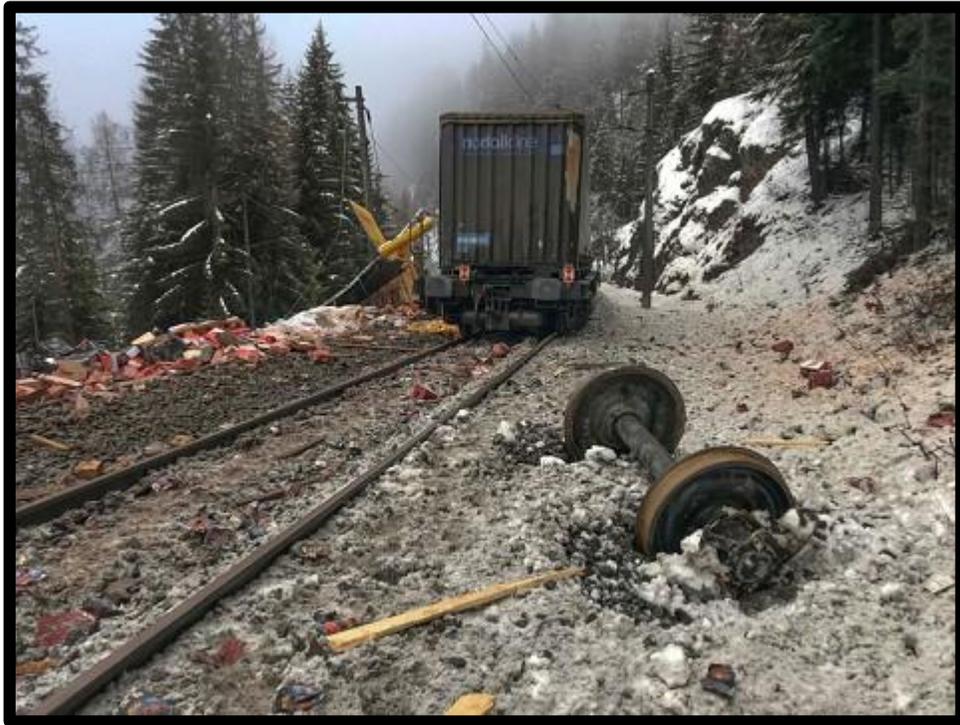
December 2017 Derailment



Brenner Pass

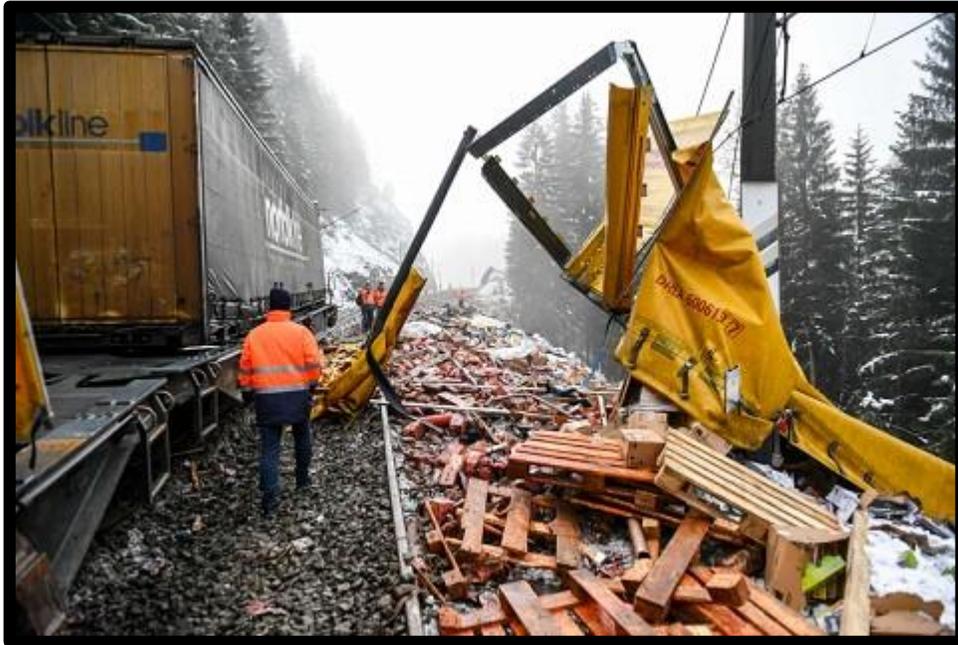


Closed the Brenner for one week



No one was injured

Cause under investigation



Questions?



