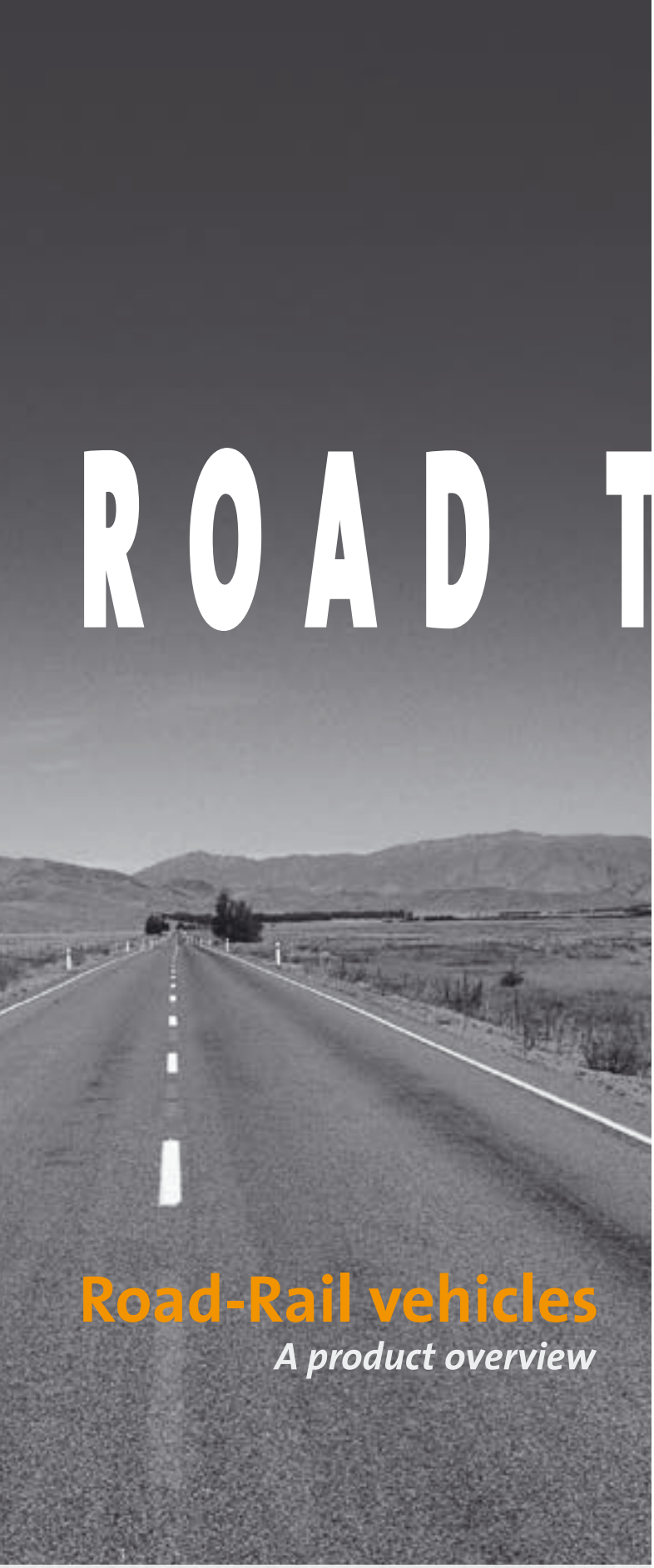
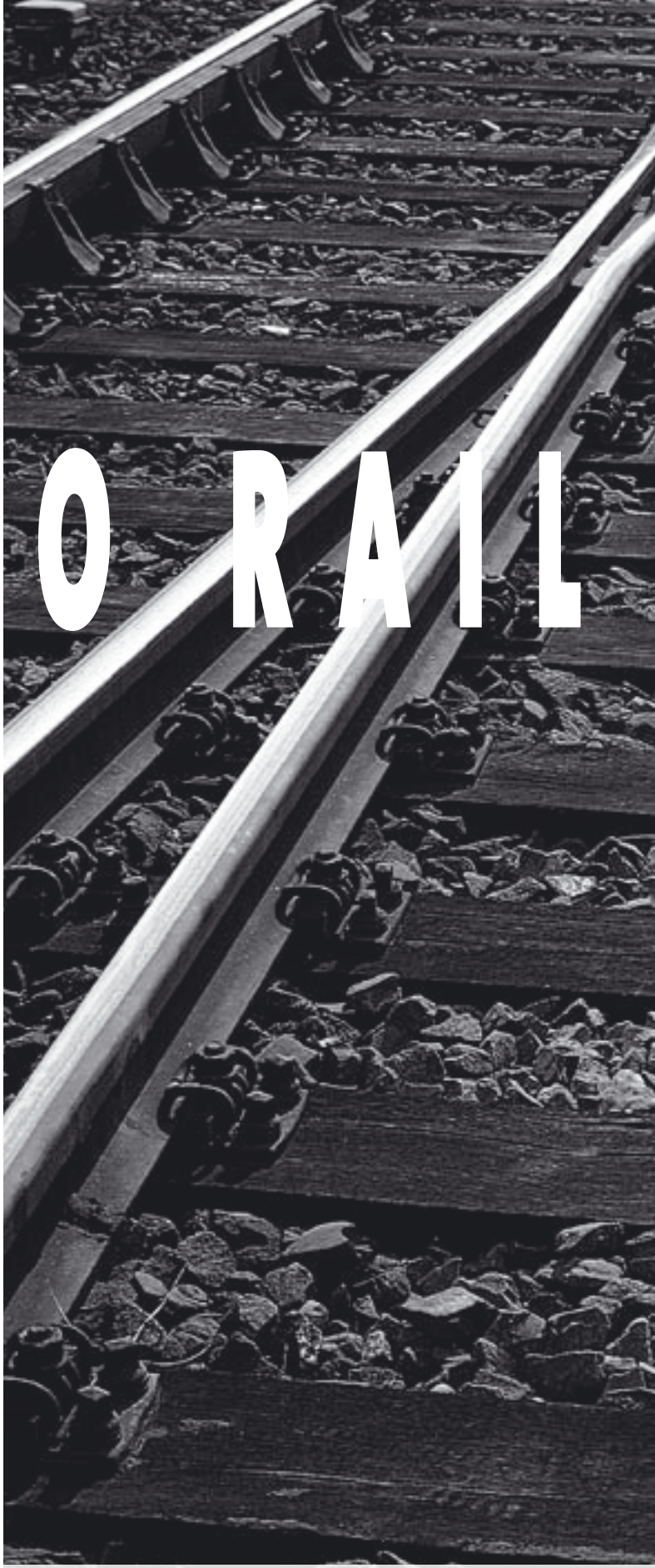
ROAD TO RAIL



Road-Rail vehicles

A product overview



SRS

World leading manufacturer of multiflexible road - rail vehicles

One of the first road-rail vehicles from the 1940:s.

SRS Sjölanders History

1976 First road-rail vehicle for overhead lines equipped with lift – "lift rail vehicle" – LRB with front rail axle placed behind front road axle.

1978 Second generation lift rail vehicle LRB with front rail axle placed in front of the front road axle.

1981 First exported lift rail vehicle, LRB, to the Danish State Railway in Denmark.

1982 Lift rail vehicle LRB 8-21 with front steering axle and fully insulated cage, Gothenburg's Tram System, Sweden.

1983 First export outside Europe, Lift rail vehicle LRB to Canada.

1984 Lift rail vehicle LRB 8-3 – first 3-arm lift, Holland.

1985 Bridge inspection vehicle, BRB 7-4, Sweden and USA.

1986 - Since then we have delivered more than 500 vehicles world wide.

Why road-rail vehicles?

The continuous increase in rail traffic brings with it an increased need for maintenance activities. On stretches with high traffic intensity and thus increased wear, maintenance must be performed more frequently and faster, to minimize disturbances to the ordinary traffic. A general trend is that the available track-time for maintenance work is decreasing. This has meant increased costs when using conventional track-bound machines and working methods. The demand for efficient and flexible machines and working methods has therefore increased.

A two-way vehicle can be driven on the road as closely to the work site and track as is possible. After which, the vehicle can be driven up onto the track and continue to the work site, perform the work and then drive back to the drive on/off point. This reduces the transport time on the track considerably. The effective working time is therefore increased.

The vehicle can be fitted with a variety of equipment – a modular system – which means that these can easily be adapted for different types of work tasks with a high degree of usability.

The investment costs for a two-way vehicle are generally considerably lower than for a vehicle that is entirely track-bound.

Two-way vehicles can also be used for a longer period of time at the actual work site than a pure track-bound vehicle, due to the transport distance to the work site generally being shorter for the two-way vehicle. In addition, the two-way vehicle can be loaded at the depot and transport material by road, drive up onto the track and continue to the work site without having to reload.

A two-way vehicle is normally built up on a standard truck chassis. This provides great economic advantages, something that gives lower investment costs and good availability to service via authorised workshops with good geographic coverage.

The vehicle is highly mechanised and can be equipped with an automated steering system, which reduces the number of operators and thus reduces operating costs.

The modern two-way technology increases in importance, due to both technical and economical factors, through its greater flexibility, higher usability and reasonable investment and operational costs.

SRS Sjölanders has more than 30 years experience of supplying two-way vehicles, both nationally and internationally. Vehicles that are designed and manufactured in accordance with the strict safety regulations that apply to track-bound vehicles. The two-way concept in combination with newly developed tools and working methods is the modern way of safely and efficiently performing the maintenance activities that 21st century railways demand.

Steel against steel with hydro-static drive versus rubber tyre drive

Characteristic	Steel against steel	Rubber tyres
Driving On/Off	Reliable, smooth and quick at crossings. Properly and quickly performed with lateral movement legs, without the need for a level crossing. All this without effecting traffic on adjacent tracks.	Slower transfer to rail at level crossings and unreliable without level crossings.
Design	Design equivalent to a train on rails. Rail travelling equipment front and back provides the vehicle with a stable working platform.	Trucks rebuilt for driving on rails. Rubber tyres in their normal position provide less stability to the work platform.
Speed	Can be driven at 70-80 km/h both forwards and backwards.	In most countries, restricted to about 30 km/h forward speed on rails and technically even lower speed backwards.
Operating costs	Low	Considerably higher. Wear on the gearbox and tyres along with "derailing" result in higher operating costs.
Braking ability	Reliable under all weather conditions. EU-approved integration with the vehicle's braking system.	Large variations between wet and dry rails.
Rail tracking	Behaves like a track-bound vehicle when crossing points, level crossings and third rails.	Reduced speed required to cross points, level crossings and other crossings to ensure a safe passage.
Safety	Solid safety statistics after more than 500 vehicles have been delivered to a large number of countries. Safety is built-in at the design stage. A stable work place.	Questionable braking ability due to weather conditions.

SRS road-rail vehicles – advantages

SRS Sjölander's patented two-way system is equipped with hydrostatic drive, which means that there is no contact between the chassis' ordinary rubber tyres and the railway rails. When the vehicle is track-bound, it rests entirely on the rail wheels.

The design provides impressive performance on the rails especially concerning **safety, traction, rail tracking, braking ability, speed and comfort.**

The design of the SRS rail travelling system provides for **fast and safe driving on/off of rails.** Which gives both **time and cost savings.** Compared with conventional systems, SRS rail travelling system requires less space during the driving on/off procedure. The requirement for transfer width is about half of the length of the vehicle.

Two-way vehicles can also be **complemented** with a device for **lateral movement,** which subject to certain conditions allows driving on and off without using a level crossing. With the SRS system it is also possible to quickly and easily drive on/off in a relatively tight curve. This means that every **track disposition/working period can be used more efficiently,** with shorter transport times to the work site, which gives increased effective working time on the track.

The design allows driving on and off without the vehicle encroaching on the free space for the adjacent track.

SRS two-way vehicles are normally designed for **a speed of 70 km/h on the track.** In comparison with rubber tyre-driven systems, the SRS system functions with the highest safety within its speed range, since the vehicle travels on rail wheels and therefore in principle, has the same characteristics as a purely rail-bound vehicle on the track.

This means:
- **Minimal risk for derailment when crossing points, wing rails and level crossings.**
- **Technically, there are no special speed restrictions requirements in curves, points and level crossings.**
- **Rapid transport to and from the work site.**

Braking capacity and traction are in the same class as rail-bound vehicles, which **increases safety.** No wear on the rubber tyres with the SRS two-way system, since they do not have contact with the rails. This gives a **considerable saving in costs** since the tyres do not need changing so often due to the extreme wear caused by rail contact.

The SRS system is normally supplied with un-insulated rail wheels, in order to effect the signal system, but the rail travelling unit can also be supplied with insulated wheels. The SRS system allows **remote control of the vehicle** from e.g. a lift, a working platform or from a crane. This means that no driver is required in the cab during this work, **which saves money and time,** and also eliminates the risk of misunderstanding between the driver and the operator.

Product overview

Category/rail travelling -system	8 – 10 ton	12 – 17 ton	20 – 30 ton	20 – 35 ton
Overhead line vehicle	 FRB 8	 LRB 9–3  LRB 8–21  VRB 17	 VRB 25  TRB 20	
Bridge and tunnel inspection vehicle		 BRB 7–4  LRB 7–2 S	 BRB 12–5	
Rail welding vehicle	 CRB 8	 CRB 17  SRB 17	 SRB 20–V	
Recovery and emergency vehicle	 SRB 8		 VRB 25 LR	 KRB 33
Flexible vehicle		 FRB 17	 FRB 25	
Special vehicle		 CRB 20 SU	 PRB 25	

Types of standard chassis for rail travelling equipment:
Volvo, DAF, Mercedes Benz, Scania, Ford, Izuzu, Hino, Weststar, Peterbilt, International.
All systems can be supplied for the following track widths (mm): 891, 1000, 1067, 1435, 1524, 1600 and 1676.
Adjustable* system for switching between two track widths (mm): 1000-1435.
*Adjustable drive bogie system with double hydraulic motors for total weight >20 ton, can only be delivered for track widths from 1067 mm and above.
Accessories: Line lifting rod, generator, length measurement, cranes, drum holders, snow brush, optic-cable holder, snow thrower, stop device, grass cutters/rotary impact cutters, lateral movement legs.

SRS three point drive-on drive–off procedure

At a level crossing

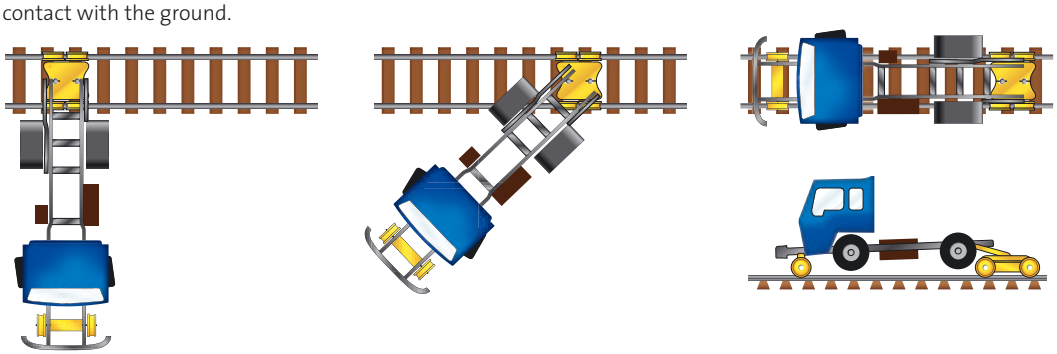
1. The vehicle is reversed into the level crossing and stops when the bogie is positioned above the track.

2. The bogie's transport lock is released, it is aligned with the track and lowered hydraulically, so that the rails wheels are applied to the rails. The rear of the vehicle is thus raised, which frees the road wheels from contact with the ground.

3. The vehicle is then pulled backwards by the hydrostatic rail bogie until the front rail axel is directly above the track.

4. The front rail wheel axle is then lowered by the driver in the cab which frees the front road wheels, when the front rail wheels are applied to the rails.

5. The vehicle is now completely track-bound.



Without a level crossing

1. The vehicle is reversed into the track and stops when the bogie is positioned above the track.

2. The bogie's transport lock is released, it is aligned with the track and lowered hydraulically, so that the rails wheels are applied to the rails. The rear of the vehicle is thus raised, which frees the road wheels from contact with the ground.

3. The vehicle is then pulled backwards by the hydrostatic rail bogie until one of the road wheels fastens against a sleeper or a rail.

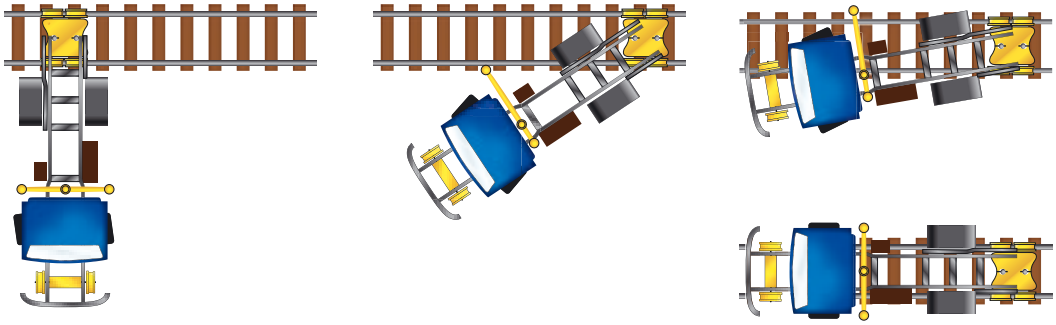
4. The forward lateral movement beam closest to the track is extended towards the rails. Both of the front lifting cylinders are then deployed simultaneously and lift the front end of the vehicle, thus freeing the front road wheels.

5. The forward part of the vehicle is then moved laterally via the hydraulic lateral movement beams about 1 m sideways. The forward part is then lowered and the road wheels then contact the ground.

6. The lateral movement beam closest to the track is extended again. The forward end is lifted again and moved another approx. 1 m sideways closer to the track.

7. The process in points 3 and 5 is repeated until the forward end is directly above the track and the front rail wheel axle can be lowered so that the rail wheels are applied to the rails.

8. The lateral movement beams are returned to their transport position and the vehicle is now track-bound.



Without a level crossing – parallel lateral movement with lateral movement beams.

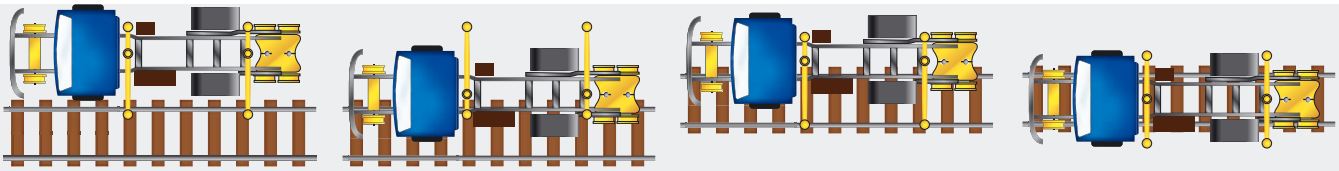
1. The vehicle is parked close to and parallel with the track.

2. The two (front and rear) lifting beams on the side of the vehicle closest to the track are fully extended.

3. The vehicle is lifted by all four lifting cylinders simultaneously and is then moved approx. 1 m sideways and lowered.

4. The process in points 2 and 3 is repeated until the vehicle is directly above the track.

5. The bogie and front rail wheels are lowered so that the rail wheels are applied to the track. The lifting beams are returned to their transport position and the vehicle is now fully track-bound.



SRS Overhead Line Vehicles

SRS Bridge and Tunnel Inspection Vehicles

SRS Rail Welding Vehicles

SRS Recovery/Emergency Vehicles

SRS
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SRS Flexible Vehicles

SRS Crane Articulated Vehicles

SRS Sjölander's international sales organisation

SRS has a complete sales and service organisation through its international network of agents and dealers, SRS is currently represented by its own daughter companies or via agents on more than 20 international markets.

SRS is the world leader within two-way technology with more than 30 years experience of development, design and manufacture of various types of two-way vehicle. We make continuous investments in product development of rail travelling systems, superstructures and accessories, in cooperation with our customers. We have, through the years, delivered two-way vehicles manufactured in accordance with specific specifications and local regulations, to many international markets.

SRS is active entirely within the railway sector, so we are well aware of the specific demands for railways vehicles that must always be the basis for our designs, material selection and manufacturing methods. We can therefore always guarantee the highest quality, both technically and functionally, irrespective of if it is a standard system or a specially designed concept.

Even in the future, SRS will continue to work with product development that promotes more efficient working methods, personal safety and the reliability of our two-way vehicles, which will help our customers through increased productivity and thereby improved profits.

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SRS Sjölanders Product overview
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