



Cargo

Digital Automatic Coupler

Groundbreaker for digitalization and automation in rail freight

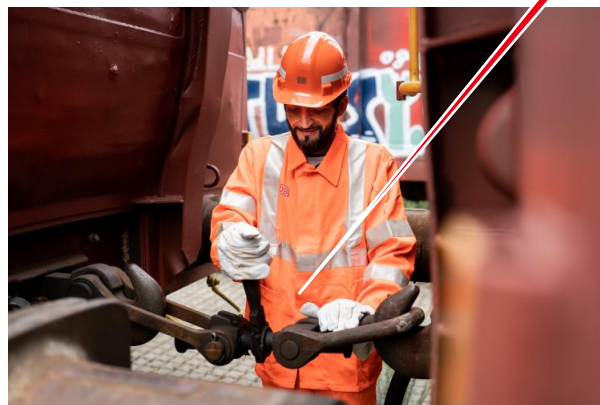
23.11.2022 | IRRB webinar - Assets for Automatic & Autonomous Operation | Online

With the DAC the work in train composition and preparation is tremendously simplified

The screw coupler is standard since more than 100 years. >70.000 couplings per day at DB Cargo in Europe



Completely manual connection with hook, spindle, brake hoses



Employee has to climb between the wagons

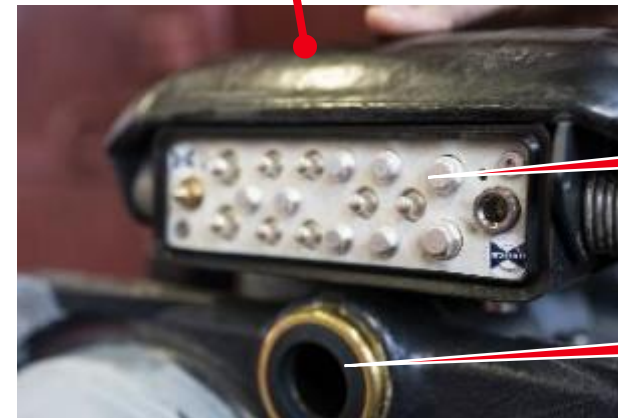
No power or data connection

The DAC: Scharfenberg-Design



Mechanical automatic coupling

Manual decoupling (depending on degree of automation)¹

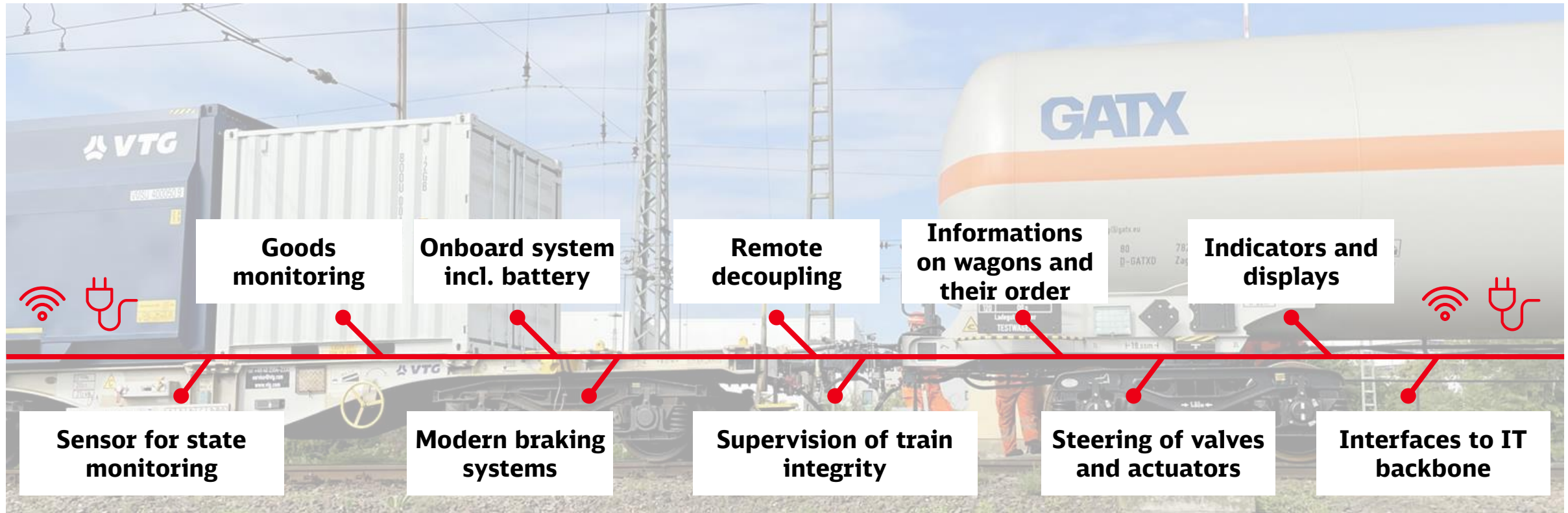


Automatic connection of electric and data lines

Automatic connection of brake pipes

(1) DAC Type 4: Automatic coupling, manual decoupling by lever. DAC Type 5: Includes automated decoupling

The DAC is more than a coupler: it is the basis for the intelligent freight train and thus for the digitalization and automation of rail freight



Currently two main European projects are pushing the development of the DAC and the intelligent freight train



- European Programme under the umbrella of the EU commission DG Move, to join forces of the rail freight sector and industry
- Responsible for certain system decisions, e.g. coupler type
- Currently intensive work on specifications and system design mechanically, pneumatically as well as for the power supply and data communication
- From autumn 2022, transfer and expansion of sector-wide efforts under the umbrella of the EU research program „Europe’s Rail“¹
- Funding and financing for the estimated EUR 6.4 – 8.6 billion (plus preparation and migration costs²) still must be worked out, continued lobbying is important



- Project launched by German Ministry of Transport, consortium DB, DB Cargo, SBB Cargo, RCA, VTG, GATX, ermewa
- 06/2020 – 12/2022, EUR 13 million
- Tests as a basis for selecting the coupler design
- Step-by-step construction of a demonstrator train with up to 24 cars with DAC and additional electronic components
- Since September 2021 tests in the operational environment, especially in large and small marshalling yards, sidings
- Carrying out test drives on the track
- Tests have been carried out in Austria, Switzerland, currently plans to continue test also in Poland, Czech Republic and France

(1) <https://shift2rail.org/shift2rail-successor/> (2) BMVI-study on DAC, 2020

The DAC migration planning ensures operations despite two incompatible coupling systems run in the same network

The DAK migration planning ensures that during the migration ...

- ... two vehicles with different couplings do not meet on the same track



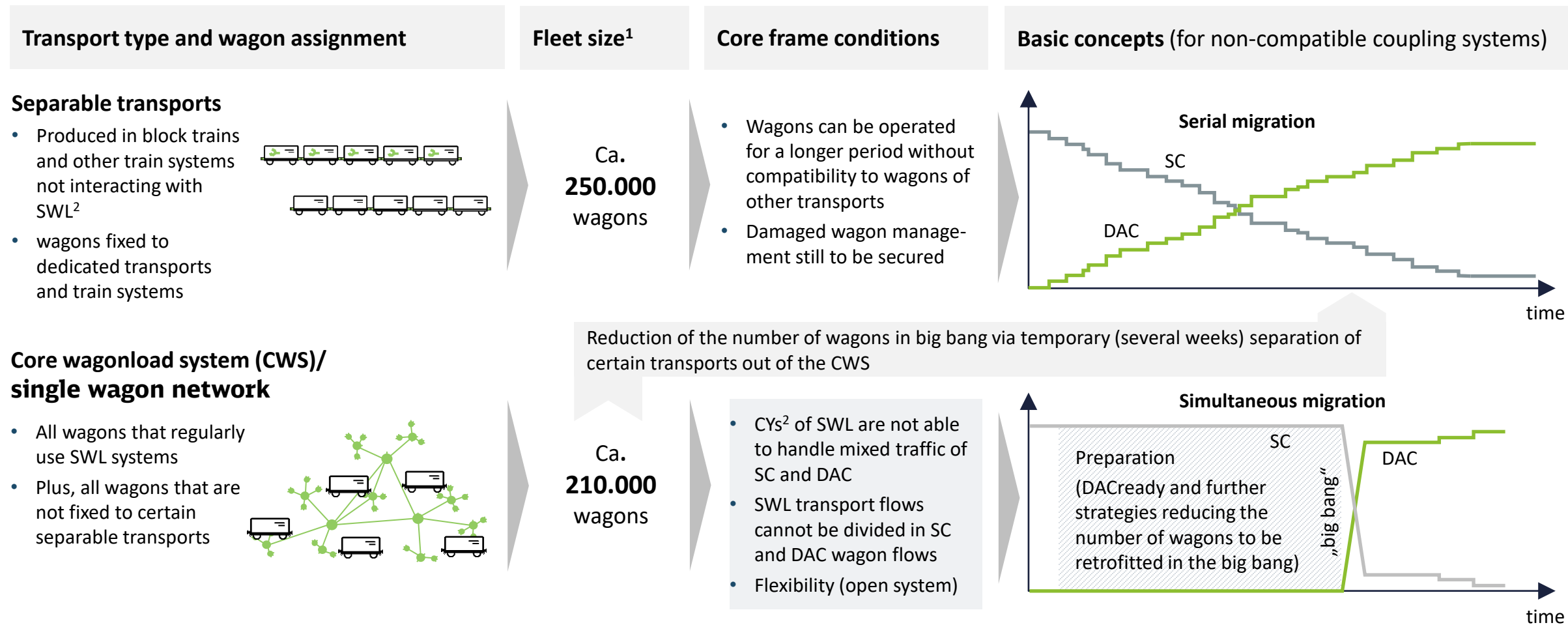
- ... the vehicles are not absent from the customer for too long



There are several fields of action

- **Migration strategies** considering train routing, train formation facilities, stations and sidings
- **Conversion concepts** and **staff resources** for the workshops
- Technical layout: **coupler design** in line with migration strategies
- Framework conditions: **Procurement** and **public funding programs** without restrictions on migration
- Coordination at **European level**, ensuring a **synchronized and controlled migration** over the entire period

The European rail freight market can be separated in 2 main segments - the migration is particularly demanding in the core wagonload system

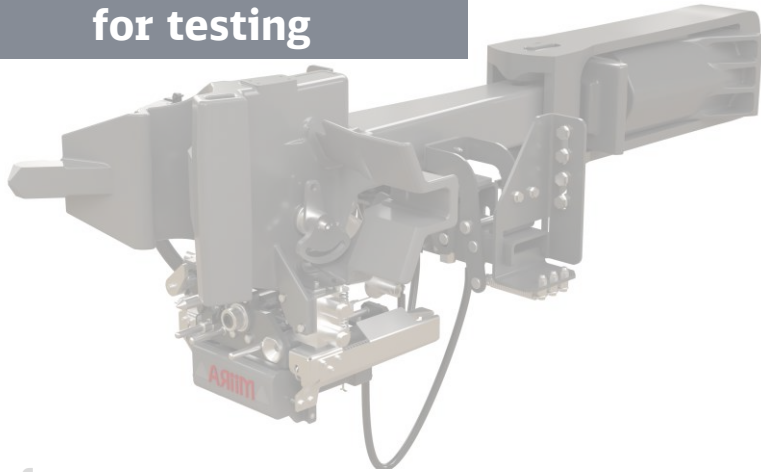


(1) Source: DACcelerate D4.2 final report, p. 48. Estimation based on wagon and transport data of 6 major RUs (ČD Cargo still to include, as no traffic data has been provided), scaled up to the full market

(2) SWL: Single wagon load; CY: classification yard, SC: Screw coupling, DAC: Digital automatic coupling

DAC4EU tests started with four different coupler designs

Design not mature
for testing



SA3-Kupplungskopf

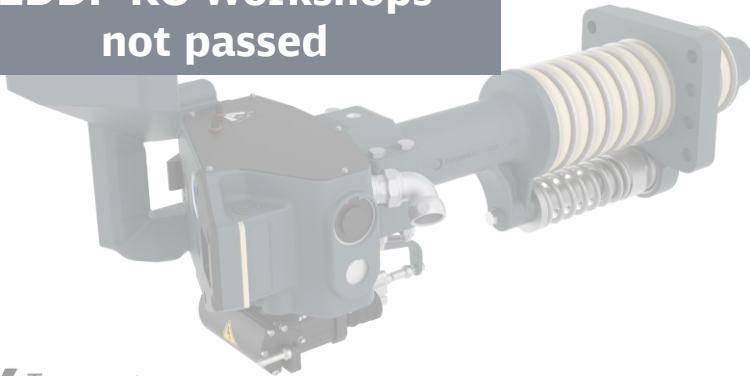
EDDP KO-Workshops
passed



Latch-Type-Kupplungskopf

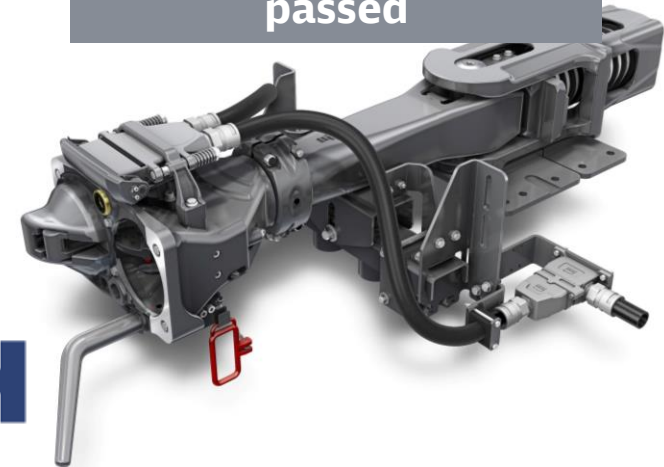
Generation 2

EDDP KO-Workshops
not passed

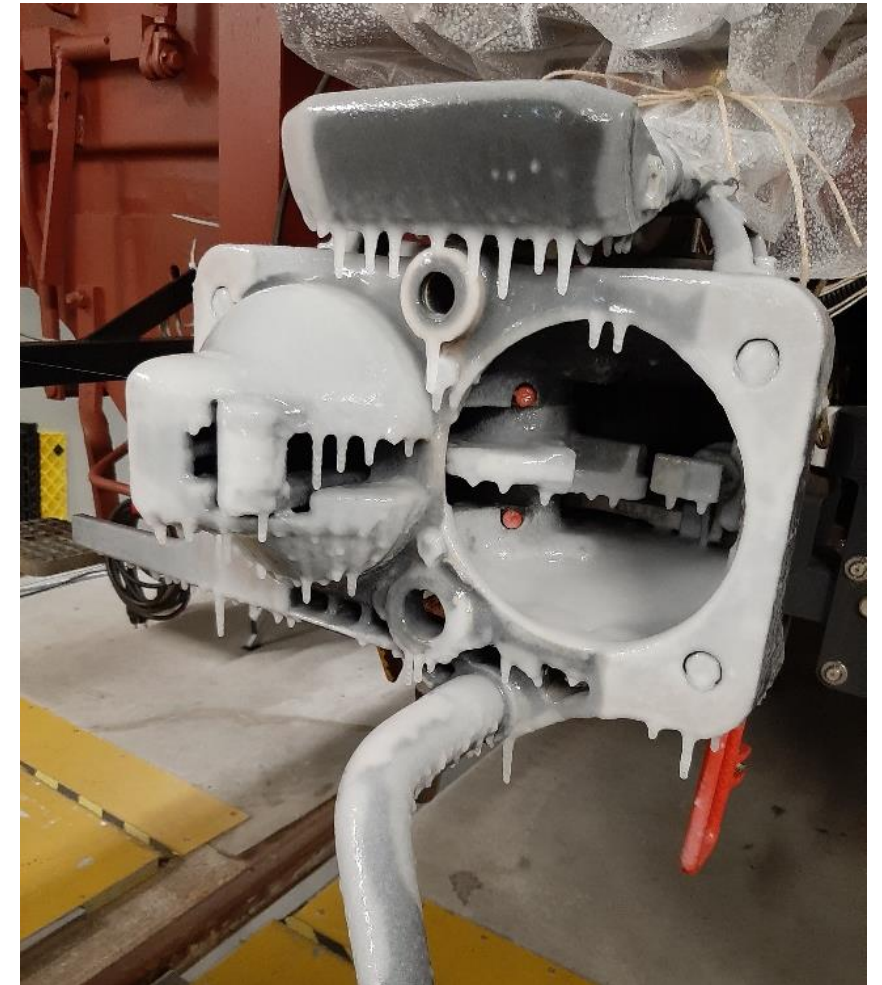


Schwab-Kupplungskopf

EDDP KO-Workshops
passed



Impressions DAC4EU Tests – detailed and systematic coupler tests incl. climate chamber



Aside the „simple“ DAC other types are needed

Reasons are mainly special type of vehicles and intended use



Hybrid coupling for traction vehicles

- As long as wagons with screw couplings still exist, not only in the main phase of migration
- Convertible to DAC without the hybrid function



Specific solutions needed for **vehicles without sufficient space available (UIC 530) or missing stability** – to be differentiated:

- With low relevance of the length (e. g. traction vehicles)
- With high relevance of the length (e. g. wagons)
- Stabilizing rework on the vehicle body



Low-cost solutions for old shunting traction vehicles, in order to provide a simple offer to users with few shunting movements (e. g. **adapters**)



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DB

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