Your ticket to ride
Gear units for rail vehicles

voith.com
Worldwide on track: Drive systems for rail applications

Urban railways or trams, metros, regional railcars, locomotives or high-speed trains and special rail vehicles: Voith offers drive components and systems solutions for all rail vehicles.

The Voith portfolio covers all components of the drivelines: from a wide range of transmissions, diesel engines, cardan shafts and couplers to traction inverters and cooling systems to motor-gear units, RailPacks and energy absorption elements. No other supplier has such a comprehensive overall competency in the driveline. Decades of experience and meticulous research make us an expert partner for individual requirements.

Double decker train of Metra Chicago, built by Nippon Sharyo, Japan.
Internationally networked for excellent service
Voith meets local production demands – in Europe, as well as in China, USA and India. Whatever the country of application, our customers receive local service and support – be it during construction, maintenance and service or repairs of their vehicles. Our spare parts are available quickly and all over the world.

Systems supplier – everything from one single source
As a systems supplier we offer complete solutions to our customers. Voith looks after the complete design, assumes systems responsibility and is thus the sole contact. Apart from logistics benefits, this also results in shorter delivery times. Reduced interfaces ensure fewer adaptation processes.

Maximum speeds of up to 700 km/h
Worldwide trains with our transmissions achieve maximum scheduled speeds. The current top speed with a Voith transmission achieved in trial operation on a test stand is at 700 km/h.
Production surface of 15,000 m²

Gear units per year: 10,000
Hi-tech engineering, measuring and production methods
Reliability is what drives us

On a production surface of 15,000 square meters Voith produces mechanical drives for rail vehicles at the location Heidenheim. The assembly runs in a strict cycle: every 1.2 hours a complete gear unit leaves the production hall. Worldwide, Voith has assembly capacities for over 10,000 gear units per year.

Engineering methods for optimum design
We use state-of-the-art CAD-3D for the design of the gear units, and optimize interfaces to adjoining components in the bogie. The finite element method helps us to determine loads within the component and to achieve targeted perfection of all structures. With this and other engineering processes, for example multi-body simulation, we develop products that meet all anticipated stress loads and have an optimum weight.

Prototypes tested under maximum load
Prototypes are tested intensively. This includes tests under load, as well as measurements of the noise and vibration behavior. In the environmental chamber, the transmissions are put on the test stand and are examined under extreme temperatures. Each transmission undergoes a series test run before it leaves the Voith plant.

Competency in material use
For special applications that require an even lower transmission weight, Voith produces gear units with weight-saving aluminum housings. Many of our components also undergo special surface and hardness treatments, in order to ensure optimum strength and wear characteristics. Be it for specific customer requirements or for standard applications – our materials meet the highest demands.

Voith offers complex engineering services already during the planning stage of the driveline. Our products meet the highest demands on quality, safety and reliability.
Seamless dynamics
Motor-gear units for all applications

We offer complete electric drivelines as motor-gear units (MGU) for all trams, urban and standard-gauge railways.

We implement individual solutions and, apart from providing the electric know-how, utilize our comprehensive experience with transmissions.

The interface transmission-motor is perfectly adapted and allows dynamic drive characteristics at all operating conditions. The motor-gear units are particularly reliable and allow easy maintenance. Due to their compact design, they can be easily installed and removed.

Service across the entire product life cycle
Voith assumes the complete engineering of the motor-gear unit from systems design, calculation of the operating cycle and systems specification to construction, verification, testing and integration into the vehicle bogie. In addition, we carry out the service and the maintenance of the units, for which Voith is the sole contact rather than several different suppliers.

Motor-gear unit for urban railways
### Artic low-floor tram
Motor-gear unit MGU65-SV-KSH216

<table>
<thead>
<tr>
<th>OEM</th>
<th>Transteck / Škoda, Finland</th>
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<tbody>
<tr>
<td>Operator</td>
<td>Helsinki City Transport, Finland</td>
</tr>
<tr>
<td>Maximum speed</td>
<td>80 km/h</td>
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<tr>
<td>Axle load</td>
<td>8.1 t</td>
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<td>Ratio</td>
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### Diesel-electric regional railcar
Motor-gear unit MGU142-SV-SZH455

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<th>OEM</th>
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<td>Operator</td>
<td>Ghana Railways, Ghana</td>
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<tr>
<td>Maximum speed</td>
<td>80 km/h</td>
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<tr>
<td>Axle load</td>
<td>12.5 t</td>
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### Manchester tram
Motor-gear unit MGU120-SV-SZH418

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<th>OEM</th>
<th>Consortium Bombardier Transportation and Vossloh Kiepe, Germany</th>
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<td>Operator</td>
<td>Manchester Metrolink, UK</td>
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<tr>
<td>Maximum speed</td>
<td>80 km/h</td>
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<tr>
<td>Axle load</td>
<td>11 t</td>
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<tr>
<td>Ratio</td>
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Designed for maximum performance
Gear units for any application

We offer gear units that are optimally adapted to individual axle loads, speeds and tractive efforts for all rail vehicles – urban railways and trams, metros, regional railcars, locomotives, high-speed trains and special rail vehicles.

Gear units from Voith are operating reliably all over the world. They are weight and noise-optimized and allow speeds of over 400 km/h. The reduced weight comes from the housing designs in aluminum and the patented bionic toothing.

High-performance components for any drive
Our gear units for transversal or longitudinal drives excel by quality, reliability, high power density and proven design. Voith offers single and double-stage helical and bevel gears. They are available in axle mounted and, for extra protection of vehicle and track bed, also in fully sprung design.
### Diesel-hydraulic shunting locomotive
#### Gravita 10 BB
- **SK-630 gear unit**
- **OEM**: Voith Turbo Lokomotivtechnik Germany
- **Operator**: Panlog Switzerland
- **Maximum speed**: 100 km/h
- **Axle load**: 22.5 t
- **Ratio**: 5.023

### Metro RS6
#### SE-344 gear unit
- **OEM**: BEML India
- **Operator**: Delhi Metro Rail Corporation India
- **Maximum speed**: 90 km/h
- **Axle load**: 17 t
- **Ratio**: 6.65

### EMU BR 440
#### SZ-400 gear unit
- **OEM**: Alstom
- **Operator**: DB
- **Maximum speed**: 160 km/h
- **Axle load**: 20 t
- **Ratio**: 5,555
Voith offers a wide range of different transmission types for highly diverse rail vehicle application profiles. They differ by type, number and arrangements of gears, motor position, as well as by coupling design.

**Single-stage helical gear (SE)**
Transversal drive, axle-mounted

**Single-stage helical gear in common box design (SET)**
Transversal drive, axle-mounted

**Double-stage helical gear (SZ)**
Transversal drive, axle-mounted

**Double-stage helical gear (SZH)**
Transversal drive, fully sprung
Double-stage helical-bevel gear (SK)
Longitudinal drive, axle-mounted

Double-stage helical-bevel gear (SZH) in gauge-change design
Transversal drive, fully sprung

Double-stage helical-bevel gear (KSH)
Longitudinal drive, fully sprung

Single-stage bevel gear (KE)
Longitudinal drive, axle-mounted