

VOITH

In Operation on All Rails. Voith Complete Wheelsets





Drives for Trams, Metros, Railcars and Locomotives

The advantages of Voith drive systems:

- + Compact design
- + High reliability
- + Complete wheelset from one single source
- + Reduced delivery times
- + Fewer interfaces
- + Increased product quality
- + Lower risk of damage due to fewer transports

From low-floor trams in Helsinki, Metros in Indian megacities, railcars in Europe or Indonesia to 6.6 MW goods train locomotives in South Korea: Voith complete wheelsets are in operation on the rails of the world. The quantities are impressive – for the heavyweight of South Korean Railroad Corporation alone, Voith will be delivering 522 complete wheelsets.

As early as March 2010 Hyundai Rotem ordered the first new EL 8300 goods train locomotives from Toshiba. The new six-axle locomotive has an input power of 6.6 MW. Each of the six axles is driven by the Voith RST RSN 220 complete wheelset with SET-544 gear unit. The new 132-ton electric goods locomotive reaches speeds of up to 150 km/h.

The operator Korail was so impressed by the new engine that he placed a further order at the beginning of 2012. In total 87 such locomotives will be delivered. They are all driven by the largest complete wheelsets ever produced by Voith. The complete wheelset with SET-544 gear unit is designed for an axle load of 22 tons. The wheels have a diameter of 1 250 mm and have been mounted to the wheelset shafts on Voith's own wheelset press.



62 complete wheelsets for railcars in Indonesia

The RST RKS 140 complete wheelsets with SK-KE-456 bevel gear units are designed for the so-called KRDI railcars with axle loads of 14 tons. The diesel-hydraulic vehicles are in service in Java in four-car configurations on tracks with a gauge width of 1 060 mm, and on Sumatra as two-car trains on normal gauge (1 435 mm). Apart from the 62 complete wheelsets, the Voith delivery scope for the seven vehicles also includes turbo transmissions (T 211 re.4 + KB 190), components for the roof-mounted cooling system, cardan shafts, as well as transmission oil heat exchangers and the hydrostatics for the cooling system fan and the generator drive. The vehicles are fitted with 386 kW diesel engines and designed for maximum speeds of 100 km/h.



Voith complete wheelsets for diesel railcars and locomotives

352 complete wheelsets for Indian metros

The metro in Delhi has only been in service for eleven years – quite unusual for a city of this magnitude. Voith has been involved in the project right from the start. The current route network covers 189.63 kilometers. The operator Delhi Metro Rail Corporation (DMRC) intends to expand the network to 413.83 kilometers by 2021 and ordered 68 vehicles from Bharat Earth Movers Limited (BEM). Four wagons of the eight-car trains are driven on all four axles. Automatic Scharfenberg couplers as well as semi-permanent couplers complete the delivery scope. For the vehicles, Voith delivered 272 RST RSB 170 complete wheelsets with SE-344 helical gear units to BEM. The



3

wheelset shaft is designed for an axle load of 17 tons. The wheels for the drive unit are mounted to the wheelset on Voith's own wheelset press.

The decisive difference between the metros in Delhi and Jaipur lies in their gauge width. While the trains of Delhi Metro predominantly run on broad gauge track with a width of 1527 mm, the metro in Jaipur invariably uses normal gauge track with a standard width of 1435 mm. The metro system in Jaipur entered service in November 2010. At the moment, only a part of the planned two lines with a route network of 35 kilometers is operational. A large proportion is still undergoing construction. As with Delhi Metro, BEML will also build further vehicles for Jaipur Metro. The ten trains in question come in four-car configurations, which Voith will equip with 80 RST RSN 160 complete wheelsets with SE-344 helical gear units, as well as 20 automatic front couplers, 40 automatic intermediate couplers and 40 semi-permanent couplers. The complete wheelsets for Jaipur are designed for an axle load of 16 tons.

The Voith project management for both metro schemes is based in the company's Indian location in Hyderabad. For the first time, the location will also build and assemble all of the couplings for the new metro trains in Delhi and Jaipur. This means that the total number of complete wheelsets and SE-433 gear units in India now amounts to 2000.

- 1 A power bundle: Voith complete wheelsets transfer the 6.6 MW input power of the electric Korail goods train locomotive to the rails.
- 2 These diesel-hydraulic railcars are in service on Java and Sumatra.
- 3 A broad gauge train of the first series on Line 1 of Metro Delhi.



The complete wheelsets in the low-floor tram in Helsinki have to cope with climatic challenges.

Voith complete wheelsets – everything from one single source

Voith is the only transmission manufacturer to offer complete wheelsets from one single source. The wheelsets consisting of gear unit, wheelset shaft, wheels, brake discs and wheelset bearings are adapted to the actual operating conditions. Be it for LRV, metros, regional railcars, high-speed trains, locomotives or special vehicles – the individual components of the complete wheelset are always perfectly matched. The Voith wheelset press is designed for gauge widths from 750 to 1676 millimeters and a maximum wheelset mass of 7.5 tons. The 2-cylinder press can assemble wheels at a press force of up to 315 tons. The wheel sides are pressed on consecutively. After a resting period they undergo a back pressure test and are measured.

320 complete wheelsets for Helsinki trams

The demands on Voith complete wheelsets can vary greatly. This does not only apply to special axle loads (the RKS-081-070-100 wheelsets for the Helsinki low-floor trams are designed for 8.1 tons), but also the climatic conditions. In winter, the temperatures in Helsinki quite often drop down to minus 34 degrees Celsius. The consequence: months of permafrost, snow, ice and aggressive salts on the track beds. This is starkly contrasted with temperatures of more than 30 degrees Celsius plus in summer. The new vehicle concept has to be able to cope with these climatic extremes.

Apart from its outstanding robustness the Artic low-floor tram of the operator Helsinki City Transport (HKL) stands out by maximum driving comfort and low life cycle costs. Eight Voith motor-gear units with a continuous output of 65 kW power the 26.7-meter-long vehicles. The intelligent utilization of the braking energy for either heating or feedback into the overhead power line ensures particularly efficient operation.

320 complete wheelsets with Voith motor-gear units will be built for the 40 Artic low-floor trams by 2018. The extended Voith delivery scope also includes EmCon double traction inverters, a drive-related vehicle control system, as well as a diagnosis system and the high-voltage equipment.



Voith complete wheelsets

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