

FAG Wheelset Bearings in Automated Subway Trains in Nuremberg/Germany



Examples of Application Engineering

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Subway train in Nuremberg, developed and built by Siemens AG, Germany

Starting in 2006, a generation of new automated, driverless trains will be put into service on the newly built metro line U3 in Nuremberg. Unlike its predecessor, the DT3 type features a panorama section instead of a driver's cab as well as a gangway between the two halves of the two-car units.

The higher investment costs for automated operation pay off in the form of reduced energy consumption, a higher safety level thanks to a variety of measures as well as a

more flexible and demand-based deployment of the fleet of trains. Conventional trains can run at minimum headways of 200 seconds. Automated operation permits headways of 100 seconds and deployment of additional trains during rush hours within a few minutes. A permanent exchange of data between trains and track ensures safe train operation. Video surveillance of the trains and stations enable the control centre to react quickly.

A world first will be the transition period, scheduled to last until the end of 2007, during which conventional and automated trains will be sharing one common section of track.

The wheelset bearings (rolling bearings and housings) for the bogies of the DT3 cars will be supplied by FAG Kugelfischer AG.

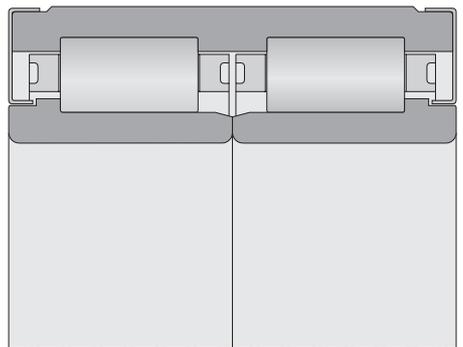
Technical data of the bogie

Designs: Motor bogie/carrying bogie	
Standard travelling speed	80 km/h
Continuous rating per wheel set	140/190 kW
Distance between wheel pairs	2,100 mm
Track gauge	1,435 mm
Wheel diameter (new/worn)	850/770 mm
Axle load	13 t
Mass	6.6/5.0 t

Rolling bearings

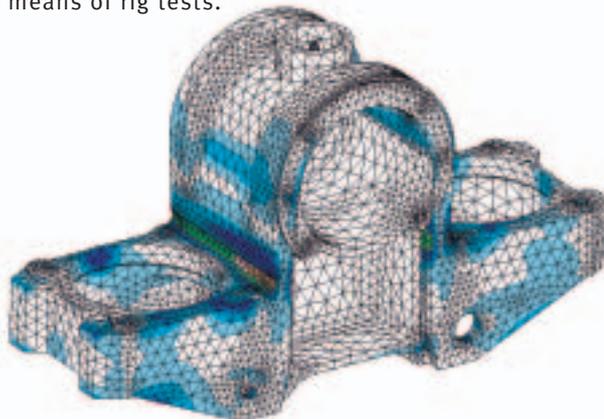
The double-row cylindrical roller bearings **FAG 808246** (\varnothing 120 x 200 x 130 mm) are greased for life and require maintenance only after six years or a mileage of 1.2 million kilometers.

A special coating on the inner ring bore surface prevents damage to the axle journals during mounting and dismounting.



FEM calculation

The wheelset bearing housings are subjected to extreme stresses resulting from the design of the primary suspension and from the demand for a split design. This means that material and design have to meet stringent requirements. Developing an optimal solution – which ensures the required weight reduction and high safety standard – was possible only thanks to the combined use of FEM calculation and 3D design. The results of the FEM calculation are verified by means of rig tests.



Installed wheelset

Wheelset bearing housings

The housings are of split design, permitting the axle to be removed easily from the bogie for the necessary maintenance work by dismounting the base.

Another special feature of the housings is the material used. The lightweight housing of austempered spheroidal graphite cast (ADI) offers a high strength and ductility. It was this material that made this compact, weight-optimised housing design possible in the first place.



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