

FAG Transmission Bearings in the Hamburger Hochbahn

FAG

Rolling Bearings

Examples of Application Engineering

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**Hamburger Hochbahn (Aerial Railway) type DT4: Designed and built by ALSTOM LHB
and BOMBARDIER TRANSPORTATION**

The DT4-type, three-phase driven underground trains consist of four non-separable carriages. Each vehicle is equipped with 4 motor and 2 trailer bogies.

The vehicles offer a high degree of travel comfort and very high safety standards.

Used as rail vehicles in Germany, they are equipped with sprinklers.

Besides their high technical level, the environmental standards of the new DT4-trains are unique worldwide.

In addition to the wheelset bearings, FAG supplies all rolling bearings for the wheelset reduction gear.

Transmission

The ZF HSH10-310 transmission is a two-step reduction gear with parallel shafts. The hollow output shaft is connected to the wheelset through a cardan shaft with universal joint couplings.

Requirements:

- Total gear ratio $i \approx 1:11$
- Maximum input speed 6.000 rpm
- Light weight design
- Minimum noise level

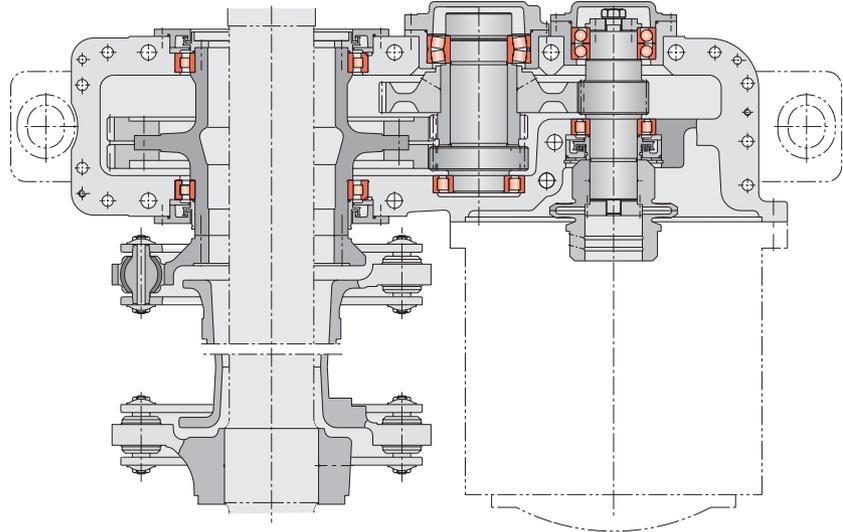
Rolling bearings / Input shaft

One NJ215E cylindrical roller bearing mounted as floating bearing

Two 7215B face to face arranged angular contact ball bearings are fitted in an angle sleeve made of steel. This guarantees that the bearing clearance is not adversely affected by the different heat expansion coefficients of steel and light metal.

The bearings accommodate high speeds with close axial guidance at the same time.

Output hollow shaft Intermediate shaft Input shaft



Rolling bearings / Intermediate shaft

One 22218E1 spherical roller bearing

One NJ2216E cylindrical roller bearing

The outer ring of the spherical roller bearing is also fitted in a steel angle sleeve. This bearing accommodates the thrust loads as well as axial gravity forces, acting on the intermediate shaft through the input shaft and the double helical gearing.

Rolling bearings / Output hollow shaft

Two NUZ1848.573221 cylindrical roller bearings (Dia 240 x 300 x 28 mm)

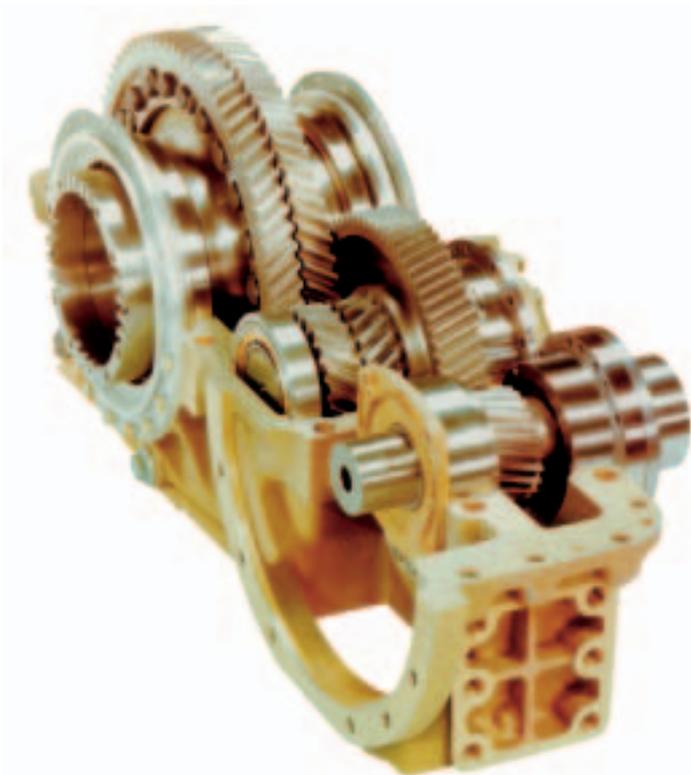
The double helical geared spur gear on the output shaft is supported by two NUZ-type cylindrical roller bearings. The extended inner ring raceway allows a large axial displacement of the hollow shaft. This guarantees an optimum and smooth transmission of the drive torque to the output driven gear and through the cardan hollow shaft to the wheelset.

Lubrication, sealing

The transmission is oil-bath lubricated.

All the bearings are lubricated by the oil circuit of the gearings.

The shaft passages are effectively sealed by gap-type seals with grooves and oil return channels in the covers.



ZF HSH10-310 transmission

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