Heavy Rolling and Plain Bearings in the “London Eye”

Examples of Application Engineering

WL 34 501 EA

The London Eye, British Airways England

Early in 2000, the great moment had come: After a one-year development and construction period, the Millennium Wheel – also called The London Eye – the biggest and heaviest Ferris wheel in the world, was put into service. It was designed and built by the Dutch company Hollandia on behalf of the operator, the airline British Airways.
The Ferris wheel is 135 meters high, has a circumference of 424 meters and a total weight of 2 100 tons.
Its 32 capsules carry up to 25 passengers each. The wheel revolves at a speed of 0,26 meters per second, corresponding to a duration of ride of 30 minutes for one full revolution.
The wheel revolves smoothly thanks to the large FAG spherical roller bearings, each of them with an outside diameter of more than 2 meters and weighing several tons.
The two spherical roller bearings were mounted in a locating/floating bearing arrangement in the hub on the axle of the Ferris wheel. The floating bearing is an 804543 whereas the locating bearing is an 804544.
The wheel’s safe foothold is ensured by two large maintenance-free ELGES spherical plain bearings GE 440 DW.

SCHAEFFLER GROUP
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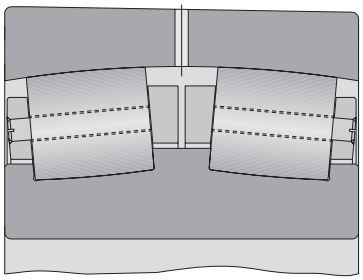
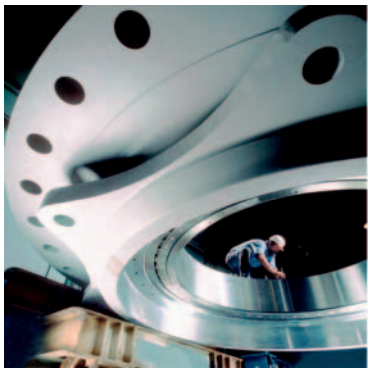
Hub bearings

Floating bearing: Spherical roller bearing
F-804543.PRL
(ø 2100 × ø 2625 × 400 mm)
Mass: 6253 kg

Locating bearing: Spherical roller bearing
F-804544.PRL
(ø 2040 × ø 2660 × 400 mm)
Mass: 5185 kg



According to specifications, the bearings were to have a life of more than 50 years. Therefore the FAG engineers decided to use FAG spherical roller bearings with through-bored rollers and pin-type cages. These cages incorporate the largest possible number of rolling elements per row, i.e. more than standard cages, and guarantee a high radial load carrying capacity.



Mounting and dismounting

For easier mounting, tapped holes were provided in the faces of the bearings inner rings and outer rings into which eye bolts can be screwed.
To save time and cost when replacing the bearings some time in the future, the FAG experts came up with a clever idea: The floating bearing has a larger bore and a smaller outside diameter than the locating bearing so that it can be dismounted through the mounting space of the locating bearing.

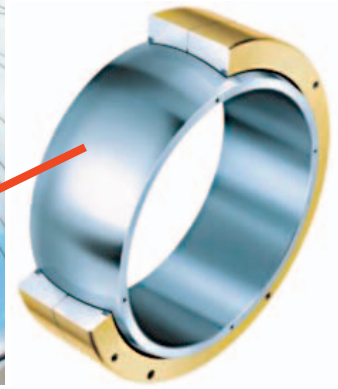
Lubrication and maintenance

The two big hub bearings are lubricated, in accordance with the operating conditions, with “Mobil SHC 007” grease.
As the bearings are considered safety-relevant components, FAG recommends regular inspections at two-year intervals. During each inspection, one pin of the pin-type cage – the so-called check pin – is dismounted and checked for signs of damage, especially for wear on the outside diameter of the pin and in the bore of the barrel roller.
In addition, grease samples are taken near each pin which are to be examined for rubbed-off metallic particles.

Erection of the Ferris wheel with the help of large ELGES spherical plain bearings

The two large ELGES spherical plain bearings **GE 440 DW** were essential for slewing the wheel from its horizontal mounting position across the Thames into its vertical operating position (slewing angle of more than 90°) with a resulting contact pressure in excess of 450 N/mm^2. Since then, the spherical plain bearings have had the task of compensating for wind-induced micromovements that would otherwise have an adverse effect on the comparatively stiff steel construction.
Thanks to ELGOGLIDE, a PTFE sliding layer developed by ELGES, the large INA-ELGES spherical plain bearings are maintenance-free and can accommodate extremely high loads with low moment levels. This guarantees long life even with contact pressures of 362 N/mm^2 that are very high for radial spherical plain bearings. If it hadn’t been for large ELGES spherical plain bearings, a totally different static design would have been required so that the wheel would probably look much less elegant today.

ELGES GE 440 DW
Bore ø = 440 mm
OD = 600 mm
Width = 218 mm
Mass = 194 kg



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