

Rolling Bearings in KHD Humboldt Wedag Roller Presses



Examples of Application Engineering

WL 21 506/2 EA



KHD Humboldt Wedag roller presses

Courtesy of KHD

Since 1984, roller presses – also referred to as grinding rolls – have increasingly been used for crushing medium-hard and hard materials. Today, they are used in the coarse grinding, hybrid grinding and fine grinding of limestone, cement clinker, ores, coal and other mineral material. The advantages of a roller press over conventional size reduction machines, e.g. tube mills, include a considerably higher efficiency and a higher material throughput. This saves energy cost in the order of ca. 40 %, e.g. compared with a ball mill.

During the development of the high pressure roller presses it became clear that the operating conditions and mounting conditions place extremely high demands on the bearings' capacity.

The development partnership between the machine manufacturer and FAG yielded an unusual concept for the bearing mounting that offers a high degree of operational reliability and economic efficiency and was designed to meet the basic requirements described in the following.

High radial load carrying capacity

Four-row cylindrical roller bearings with through-bored rollers and pintype cages can accommodate the highest possible number of rollers in each row and guarantee a high radial load carrying capacity.

Optimal utilisation of the bearing cross section

Four-row cylindrical roller bearings offer more than twice the radial load carrying capacity of spherical roller bearings of the same section height. This means that four-row cylindrical roller bearings permit a more compact machine design than spherical

roller bearings with the same load carrying capacity.

Angular alignment and pressure distribution

The required angular alignment is transmitted from the bearing to the bearing housing. At the same time, an optimal pressure distribution in the bearing is achieved by means of a new housing concept which ensures that the rings are supported where it is made necessary by the loads acting on them.

Selection of bearings for machine type RP 16

A four-row cylindrical roller bearing **Z-517680.01.ZL** was selected as radial bearing:

outside diameter $D = 1000 \text{ mm}$

mass $M = 1,8 \text{ t}$

dyn. load rating $C_r = 23\,200 \text{ kN}$

Floating bearing end:

Z-517680.01.ZL

Locating bearing end:

Z-517680.01.ZL

+ 2 spherical roller thrust bearings

29284-EA-MB

Long bearing life

The values calculated with the FAG method for determining the "attainable life" L_{hna} correspond to ca. 1,5 times the nominal life L_{h10} . This method takes into account practical experience with the factors that influence a bearing's life, i.e. load, temperature, lubricant type, viscosity and cleanliness. The results confirm that the utilisation of four-row cylindrical roller bearings in the application described, i.e. in state-of-the-art roller presses, is a suitable and proven alternative to spherical roller bearings. The bearing life is positively influenced by the utilisation of lubricating oil (ISO VG 460 or 680).

Lubrication, sealing

The oil ensures that all contact areas of the cylindrical roller bearings are

Locating and floating bearing function

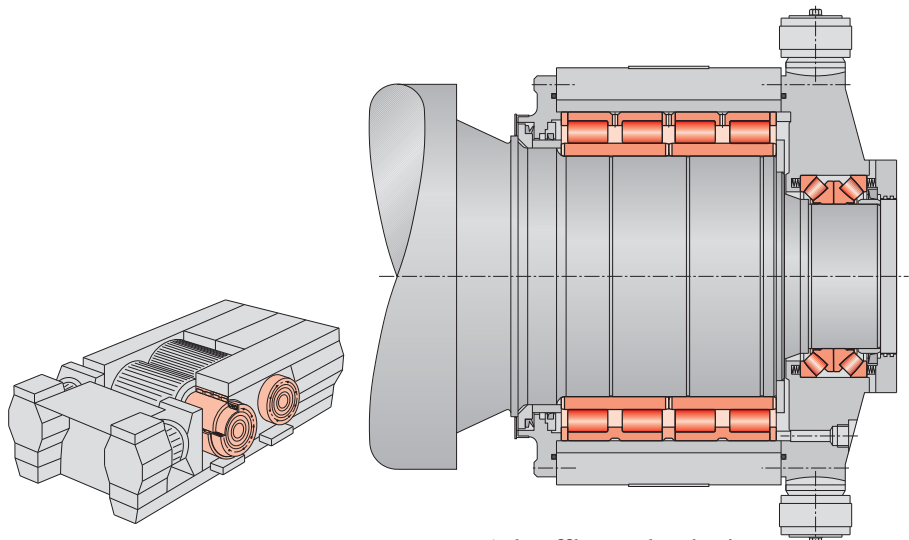
In the cylindrical roller bearing type used, length variations are smoothly compensated between inner ring and rolling elements.

Two spherical roller thrust bearings mounted in X arrangement at one roller end act as locating bearings in both directions and transmit the thrust loads from the grinding process. The housing washers are radially relieved and spring-adjusted.

With this overall roll support concept a clear separation between the transmission of radial and thrust loads is achieved.

Easy mounting, dismounting and diagnosis

The separability of the cylindrical roller bearings permits easy mounting, dismounting and inspection of the raceways in the bearing rings.



supplied with constantly filtered lubricant.

However, oil lubrication requires a more elaborate sealing of the rolling bearings to prevent the ingress of contaminants. This applies especially to roller presses that are used, for example, in cement mills.

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