

Special Rolling Bearings in the New Polysius Vertical Roller Mill QUADROPOL

FAG

Examples of Application Engineering

WL 21 507/2 EA



QUADROPOL roller mill with special spherical roller bearings

Courtesy: Polysius AG

Schaeffler KG Schweinfurt, broke new ground with the bearings for the QUADROPOL, a roller mill developed by Polysius AG, Beckum, for grinding the raw material for cement production.

The new roller mill is a significantly more economical solution than the previously used systems at Polysius AG. Even the first mill far exceeded the expected output.

According to the operator of the pilot machine in a German cement plant, the mill is a milestone in the field of material crushing.

The new roller mill has four grinding rollers – hence the name “Quadro” – which are driven with the help of

FAG special spherical roller bearings. The QUADROPOL has four grinding rollers that are arranged evenly around the grinding table.

The bearings supporting the rollers are situated outside the grinding chamber, which means that they are protected from dust and high temperatures. This is a decisive advantage for online mill operation.

As each of the roller units can be driven individually, the mill can switch automatically from 4-roller operation to 2-roller operation. Whenever maintenance work on one roller unit is required during operation, this roller and the roller facing it, including the sealing

frame, can be lifted hydraulically, and the machine can continue grinding with the two remaining grinding rollers, which can handle a large part of the normal throughput.

The bearings – which are produced at the FAG plant in Wuppertal – have to meet stringent requirements.

The largest QUADROPOL roller mill built to date went into operation in Arizona/USA in the spring of 2000. The mill is designed to process 390 tons per hour.

One floating bearing and one locating bearing are installed in each of the four roller units. In order to meet the requirements of this application, the experts from the FAG Mining & Processing department decided to use spherical roller bearings.

The locating bearing **F-804529.PRL** has an outside diameter of 1090 millimeters, weighs 1,6 tons, and has a dynamic load rating of $C_r = 14\,300$ kN.

The floating bearing **F-804530.PRL** has an outside diameter of 1280 millimeters, weighs 2,5 tons, and has a dynamic load rating of $C_r = 19\,300$ kN. To ensure that the bearings withstand the stress caused by

external load and vibrations, they were fitted with a special cage. The cage design accommodates the optimal number of rolling elements, resulting in a greater bearing rigidity and increasing the load carrying capacity of the bearings.

The stress from the grinding process requires a greater aligning capability from the bearings than permissible for standard bearings. This fact was taken into account by

providing extended outer rings for the locating and floating bearings. As a result, the so-called contact ellipse – i.e. the contact area – remains in the raceway so that no edge stressing is generated that can cause premature bearing failure. In the meantime, more QUADROPOL roller mills have been put into operation in various cement plants. The bearings in these roller mills were also provided by Schaeffler KG Schweinfurt.

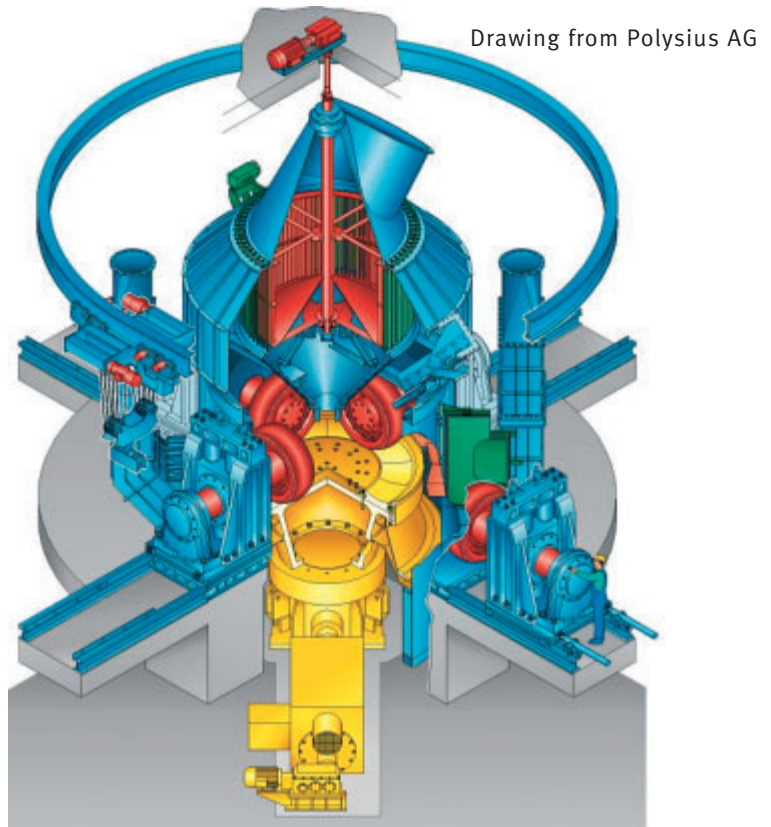
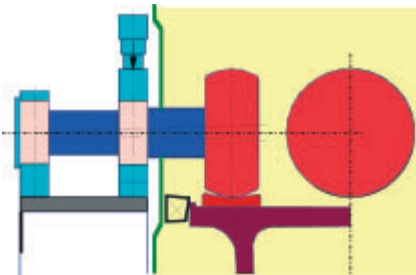
Requirements on bearings and bearing design:

- Greater aligning capability due to extended outer rings
- Utmost load carrying capacity of the rolling bearings due to a maximum number of rolling elements
- The floating bearing effect is ensured by means of a Teflon coating on the outer ring O.D.
- Threaded holes in the outer ring for easier handling, anti-rotation device, vibration pickup and temperature sensor
- bearing life demanded by the operator:
 $L_{h\,10} > 100\,000$ h

Technical data of a roller unit in the QUADROPOL roller mill RM 45/23-4 “RILLITO”

Length of the unit	4 300 mm
Height of the unit (incl. hydr. unit)	4 270 mm
Grinding roller diameter	2 260 mm
Total mass	80 t

Bearing principle



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