

Record Setter: 4 536 000 Kilometers Self-Aligning Cylindrical Roller Bearing with an Extreme Mileage

FAG

Examples of Application Engineering

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Lenzing paper mill, Austria
M.G. cylinder in the dryer section of a paper machine

Photo: Courtesy of Schaeffler Austria GmbH

The paper mill in Lenzing produces cellulose fibers and paper. The range of products made on the Escher Wyss machine, which was built in Ravensburg in 1978, primarily consists of recycling paper, one-side coated poster paper and woodfree envelope papers.

PM1 has an annual output of 85 000 tons. The paper machine has a heated M.G. cylinder for smoothing the surfaces of the papers by applying pressure and heat. This process compresses the surface of the papers and improves their printability.

Requirements on the bearings

Paper mills are complex, expensive installations. To ensure profitable operation, a high level of plant availability is of fundamental importance. This high level of availability is also taken into account in the design of the bearings. They must have a theoretical bearing life of at least 100 000 h.

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Technical data of the paper machine in Lenzing

Distance between bearing centers:	6,0 m
Machine speed:	500 m/min
M.G. cylinder mass:	ca. 100 t.
M.G. cylinder diameter:	5,5 m
Central oil lubrication:	ca. 7 l/min
M.G. cylinder speed:	ca. 26 min ⁻¹

At the floating bearing end, a self-aligning cylindrical roller bearing FAG **547581-K-C5** ran for 18 years without causing any problems. That corresponds to a mileage of ca. 4 536 000 km.



After suffering fatigue damage, it was replaced with a double-row self-aligning cylindrical roller bearing FAG **Z-565681.ZL-K-W209B-C5** with a brass cage. The new design has been changed from N to NU, has an optimized internal design and a casehardened inner ring.



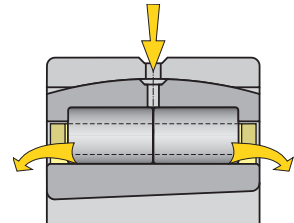
The self-aligning FAG cylindrical roller bearing - a perfect floating bearing

FAG has developed the self-aligning cylindrical roller bearing as a floating bearing especially for heated cylinders in paper machines. It can accommodate misalignments of up to ca. $\pm 2^\circ$ and at the same time ensures compensation of length variations without thrust loads.

Both effects are independent from each other and are exactly defined. Lubricant is supplied through holes in the middle of the outer ring. This ensures a symmetric temperature distribution within the bearing, and it can be mounted into housings for spherical roller bearings without modifications.

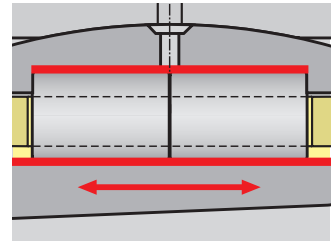
1) Optimized lubricant supply

Like spherical roller bearings, self-aligning cylindrical roller bearings are lubricated through holes in the middle of the outer ring, but lubricant supply from the side is possible as well.



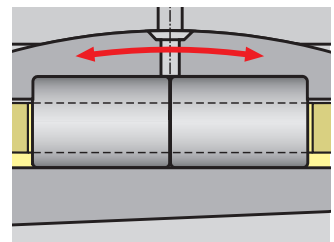
2) Displacement without thrust loads

The tightly fitted inner ring permits expansion of the M.G. cylinder without thrust loads between inner ring and rolling elements even during heat up.



3) Geometrically determined self-alignment

Self-alignment is effected in a spherical area whose center coincides with the center of the bearing. Thus the bearing always revolves around its own center.



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