

FAG Special Split Cylindrical Roller Bearing with Triple Split Inner Ring

FAG

Examples of Application Engineering

WL 21 515 GB-D



Maintenance and repair on a Tenova TAKRAF bucket wheel excavator Nochten Lignite Mine, Germany / Vattenfall Europe

As part of Tenova based in Milan, one of the leading suppliers of products and services for the metallurgic industry as well as material handling plants, Tenova TAKRAF looks back on more than 250 years of experience in the fields of

- open cast mining equipment,
- bulk materials handling equipment,
- port handling equipment.

At the end of the 1990s, Tenova TAKRAF designed a new generation of bucket wheel excavator gearboxes.

Currently some 20 of those gearboxes are operating in mines all over the world - the largest ones with a drive power of $2 \times 1\,250$ kW.

The specifications of this largest gearbox are:

Drive power:	$2 \times 1\,250$ kW
Output torque:	6 600 kNm
Mass:	80 000 kg
RPM:	990 / 3,6 1/min

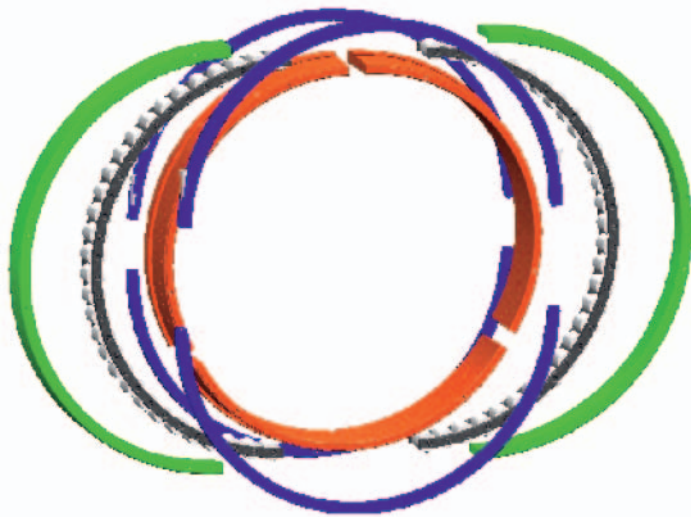
In May 2005, one of the two bearings on the output shaft was exchanged on a machine operating in the Nochten Open Cast Lignite Mine (Vattenfall Europe). To save time and costs, the gearbox should

neither be transported into the workshop nor should the gearbox be opened. To meet these requirements, FAG supplied a split cylindrical roller bearing with a triple split inner ring.

The bearing was designed using BEARINX® – the Schaeffler Group's bearing calculation tool.

Schaeffler Group Industrial supplies all bearings for the Tenova TAKRAF $2 \times 1\,250$ kW bucket wheel excavator gearbox.

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3D-View:
FAG split cylindrical roller bearing
with triple split inner ring
(FAG F-809095.ZL)

- Triple split inner ring
- Cage halves with rollers
- Clamping ring halves
- Outer ring halves

Bearing specifications

The bearing is based on the FAG split cylindrical roller bearing FAG Z-531338.ZL. It has a regular dual split outer ring and cage, but a triple split inner ring. The inner and outer rings are made of through-hardened steel. To withstand the rough environmental conditions in mining operation and to maximize load capacity, the bearing has a pin type cage with case hardened rollers. The bearing has a mass of approximately 910 kg and a dynamic load rating of $C = 5\,400\text{ kN}$. The main dimensions are:

Bore diameter	1 400 mm
Outside diameter	1 700 mm
Width	225 mm

For better handling of the bearing parts additional tapped holes were provided in the faces of the inner ring segments.



FAG and Tenova TAKRAF fitters mounting one of the cage segments

Mounting

Time and space available for dismantling the old bearing and mounting the new one was restricted. All work had to be done within a few days during a planned downtime of the bucket wheel excavator. To ensure the methodical execution of all steps, FAG and Tenova TAKRAF engineers started to work together at an early stage of the project. A special dismantling and mounting sequence was defined and some special tools were prepared. To remove the inner ring segments of the old bearing from the housing, they first had to be split into more pieces. To this end, Tenova TAKRAF manufactured a hydraulic tool using the know-how of FAG. Another special tool was designed to tighten the screws of the clamping ring on the inner side of the bearing.

The first step of the mounting sequence was the positioning of the three inner ring segments. After that, the inner side clamping ring was tightened. The first outer ring segment was placed into the housing bore. Before mounting the cage segments, the shaft was aligned carefully. With both cage segments in their positions, the second outer ring segment was put in place. The last step was to mount the clamping ring on the front.

Schaeffler and Tenova TAKRAF fitters successfully worked together on site. After only two and a half days the job was done: The old bearing had been replaced by the new one directly in the mine and without opening the gearbox. Thus, downtime was minimized - resulting in substantial cost savings for the customer.

Schaeffler KG

Heavy Industries
Mining & Processing
Georg-Schäfer-Strasse 30
97421 Schweinfurt (Germany)
Phone +49 9721 91-0
Fax +49 9721 91-3435
E-Mail mining_processing@schaeffler.com
Internet www.fag.com www.ina.com