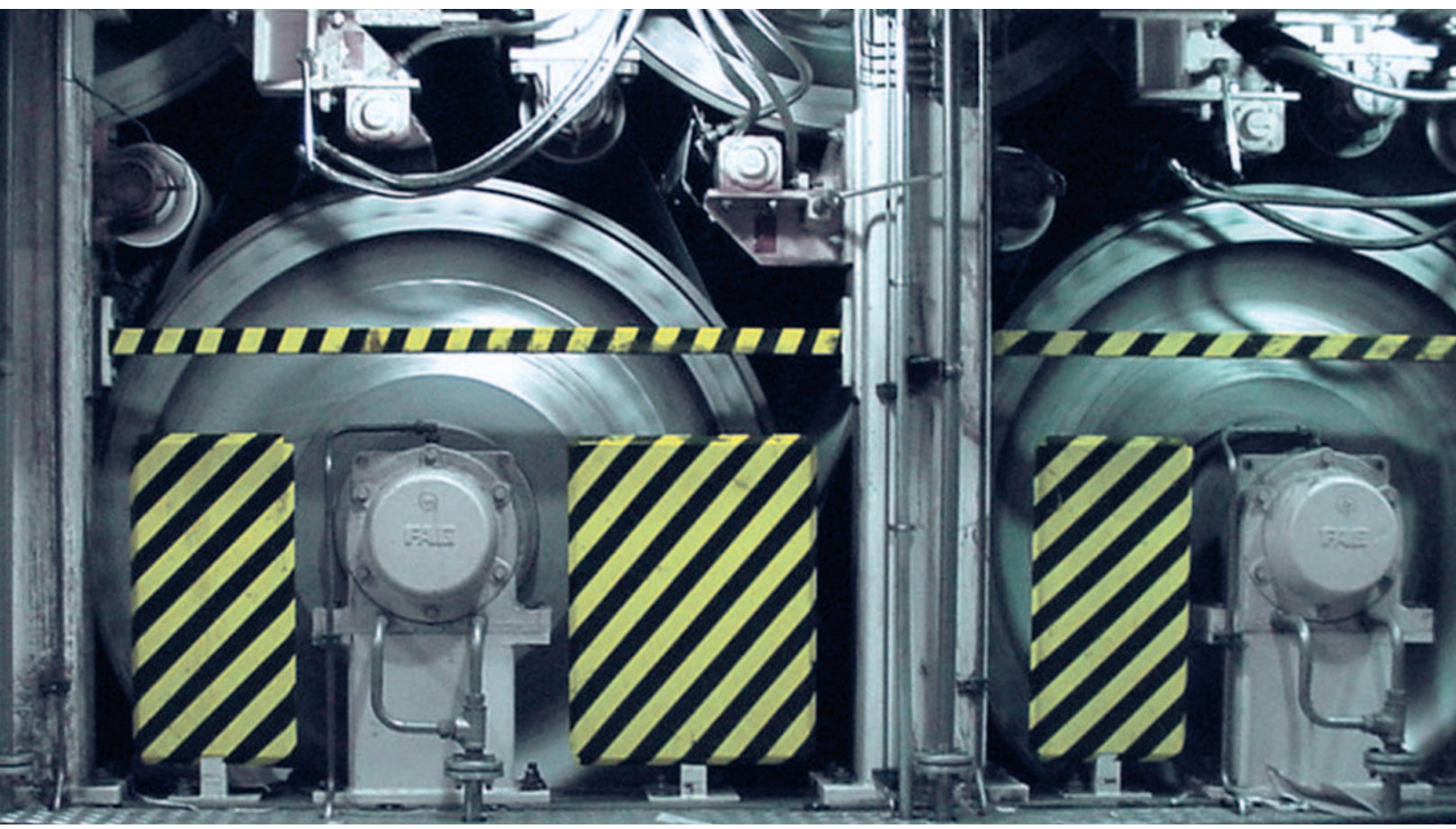
Self-Aligning Cylindrical Roller Bearings in the Dryer Section of a High-Speed Paper Machine

Examples of Application Engineering

WL 13 515 GB-D



Paper machine PM1 at the former GmbH, Frohnleiten/Austria. Rebuilt by Voith Paper, St. Pölten/Austria

The former Roman Bauernfeind Papierfabriken AG nowadays belongs to Mondi Packaging; the group produces corrugated case material from 100 % waste paper, approx. 150,000 t at the production site in Frohnleiten, Austria, alone.
The purpose of the rebuild of the PM 1 was a reorientation of the com-pany's paper production to enable it to respond to the general trend toward smaller-flute cardboard products (better printability, greater strength).

After the successful rebuild of the press section in the summer of 1998, Voith Sulzer Papiertechnik received a follow-up order in February 1999 to rebuild the other components of the PM 1.
Since November 1999, "Wellenstoff Light" from 90 g/m² has been produced successfully on the new PM 1. By doubling the operating speed to 800 m/min, the production of corrugated base papers, in spite of the reduced basis weight, was increased 2 to 3 times, depending on the paper grade.

The rolling bearings for the dryer section were developed and designed by FAG Schaeffler KG with the assistance of Voith Paper.
For the bearing arrangement of dryer rolls and guide rolls in the dryer sec-tion were supplied by FAG:

- **Self-aligning cylindrical roller bearings with PMD housings**
- **Spherical roller bearings with PMD housings**
- **Spherical roller bearings with SNV housings** (for the guide rolls)

SCHAEFFLER GROUP
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Technical Data

Machine type	PM 1
Production	85 000 t/year
Paper grade	Wellstoff Light (0.6...1.6 mm) with a basis weight of 90 - 120 g/m²
Wire width	2 950 mm
Speed	$v_{operating}$: 800 m/min (v_{design}: 1 000 m/min)

Bearings

Great thermal stressing in the dryer section requires rolling bearings with the following properties:
· Compensation of length variations and misalignments.
· Isotemp heat treatment.
(dimensionally stable up to 200 °C).
· Case-hardened inner rings.
(to Technical Specification W209)
· Increased bearing clearance.
· Optimale lubrication supply and high oil viscosity.
Dryer rolls at the operator's end, double-row, self-aligning FAG cylindrical roller bearings (SACR) **Z-566487.ZL-K-W209B-C5** with a tapered bore serve as floating bearings. They were installed in FAG plummer block housings **Z-175211.PMD3140-AF-L**. Housings of series PMD were especially designed for dryer roll bearings.
The bearings easily compensate for length variations be-tween rollers and inner ring raceway. A plain spherical bearing's seating ring with an oil-lubricated sliding surface ac-commodates possibly arising misalignments or deflections.
At the drive end, FAG spherical roller bearings **23140-B-K-MB-W209B-C4** with a tapered bore in FAG plummer block housings **Z-175211.PMD3140-BF-L** serve as locating bearings.
Guide rolls both locating and floating bearings are:FAG Spherical roller bearings 2313-E-K-C3 in FAG plummer block housings **SNV140-G944FD-G944PA-G970A** with a felt seal **FSV216-G600** and steel end cap **DKVT140-G948AA**.

Machining Tolerances

The bearing inner rings have to accommodate a circumferential load and are pressed directly onto the tapered roll journal by means of the hydraulic method.
Roundness tolerance IT5/2 (DIN ISO 1101)
Taper angle tolerance AT7 (DIN 7178)
Bearing seats in the housing bore to G7.

Lubrication

The bearing housings in the dryer section are connected to a central oil circulation lubrication system that constantly sup-plies the dryer roll bearings with oil via centrally arranged feed ducts. In this way the cooler oil gets to the contact ar-eas, contaminants are flushed out, and heat is removed from the bearings. Due to the central feed oil supply, the oil can be carried off at both sides of the bearings so that the risk of oil retention and leakage is considerably reduced.
The bearings are lubricated with Mobil DTE BB PM 220 oil that was tested by FAG and has proved to be suitable for the application.
The bearings supporting the guide rolls are constantly sup-plied with fresh grease by a central grease lubrication system.

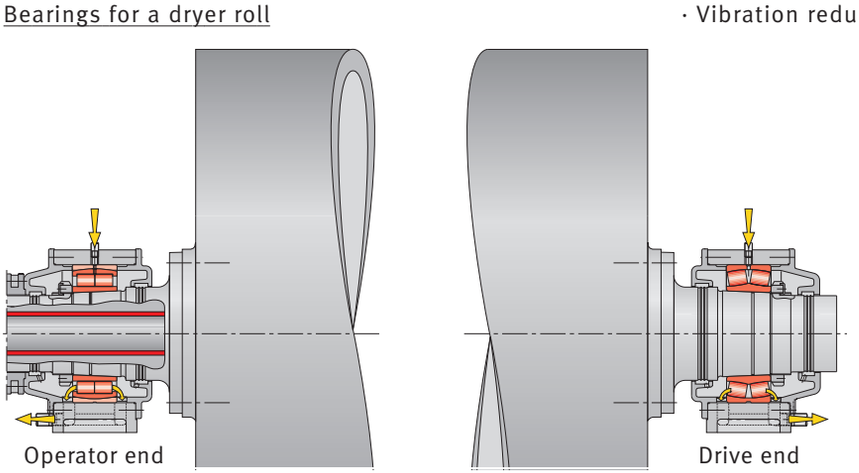
Sealing

Non-contact, maintenance-free gap-type seals prevent oil from escaping through the journal passages and cover pas-sage bores. In the case of the dryer roll bearings, the oil is thrown off via splash grooves and oil collecting chambers and flows back through return holes to the two oil cavities at the bottom of the housing.
Cover seals (O-rings) make the housing oilproof.

Customer benefits due to conversation:

· An increased product quality
· A greater strenght of thr product
· An increase in production up to 7 000 t/month/rising
For dryers at front side:
· Smooth axial expansion
· Optimized oil supply and drainage
· Vibration reducing design

Bearings for a dryer roll



Schaeffler KG
Heavy Industries
Pulp & Paper
Georg-Schäfer-Str. 30
97421 Schweinfurt (Germany)
Telefon +49 9721 91-0
Telefax +49 9721 91-3435
E-Mail pulp_paper@schaeffler.com
Internet www.fag.de

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