“Ideal floating bearing” for high load calender roll

FAG

Examples of Application Engineering

WL 13 524 EA

Soft calender – Manufacturer: Metso Paper; Operator: UPM-Kymmene, Kaipola, Finland

UPM is one of the world’s leading producers of printing papers.
The five main business areas are:

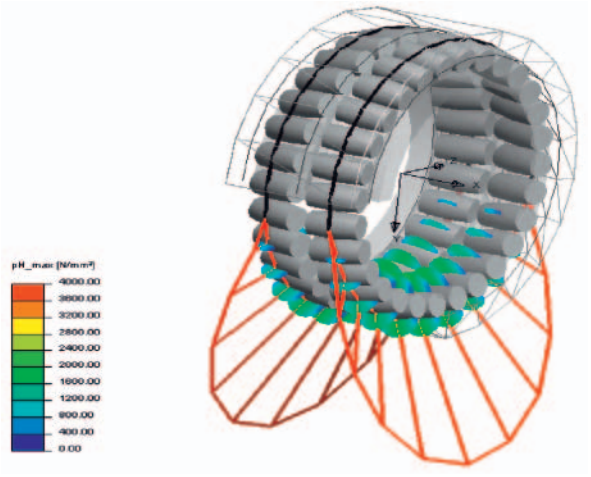
- Magazine Paper Division
- Newsprint Division
- Fine and Specialty Papers
- Converting Division
- Wood Products Division

The Kaipola plant is producing 705 000 tons/year magazine, newsprint and directory papers. To give the papers a smooth surface and even thickness, they are using online calenders.
These calender rolls, bearings and bearing housings are assembled at normal ambient temperature. During start up of the calender, the thermo rolls are heated up by thermo-oil with a temperature in the range of 200 °C.
Due to this heat influence, the rolls are expanding axially for several millimeters and a very good floating bearing effect for the operating site is necessary. The bearings in the bottom position can be high loaded by the roll weight and the sometimes very high nip load.
For this reason, only a small additional axial load acting on the bearings is acceptable.

Soft Calender at UPM Kaipola, PM4
Operating conditions

Roll weight	56,8 tons
Nip load	280 kN/m
Nip width	7 300 mm
Thermo-oil temperature	up to 210 °C
Bearing load radial	1 300 kN

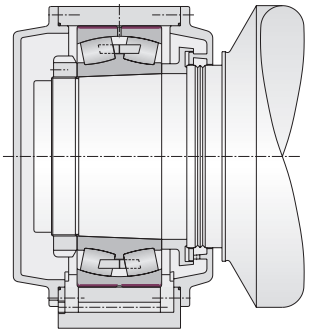
The floating bearing in this arrangement is a spherical roller bearing. The floating effect is realized by a moving outer ring in the housing.
Soon after start up of the machine, problems occurred with premature failures. One aspect, which contributed to failure, was the axial load. Thus, the axial load on the bearings was measured. The result of the measurement was a too high axial load that caused an unequal loading of the two rows of rollers, contributing to premature failures.



Load distribution in floating bearing without axial load

As a counter measure, a FAG spherical roller bearing with the following designation was installed:
232/500-K-MB-J47AA-T52BW-C4

Suffix J47AA means a PTFE coating of the outside of the outer ring. In high loaded contact areas, PTFE provides for good sliding properties and for a very low coefficient of friction.

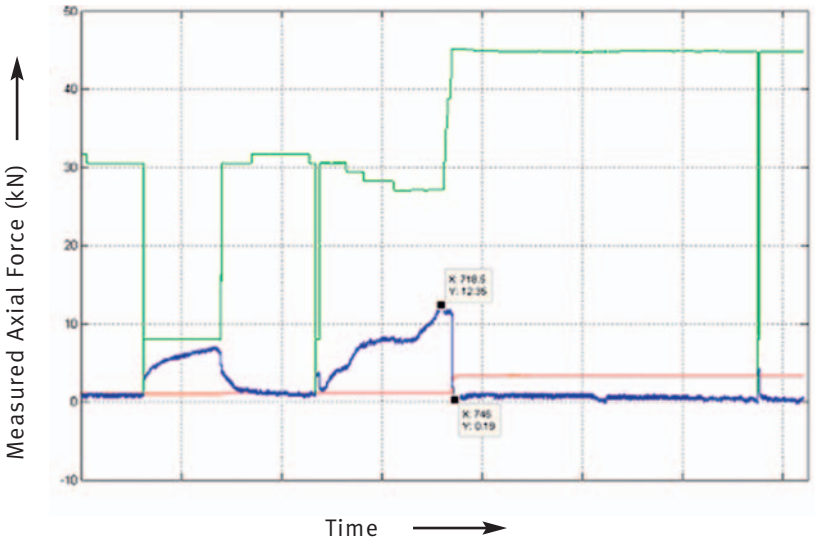


PTFE-Coating at OD

The measurement of the axial load was repeated and the coefficient of friction was reduced by more than 85%.
The axial force on the bearings was only approx. 13% of the axial force before and the problem was solved.

Customer benefits

- Long bearing service life due to minimized thrust loads
- High paper quality by P5 running accuracy
- Standard spherical roller bearings at both ends of the roll
- Reduced and cost-effective inventory.



Coefficient of friction during a period of 3 weeks at heating up and cooling down and varying nip loads and temperatures permanently << 0,05 !!!

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