

Coated rolling elements to avoid slippage damage in calender bearings



Examples of Application Engineering

WL 13 523 EA



Soft nip calender Manufacturer: Metso Paper, Finland; Operator: Shandong Sun Paper Co. Ltd., Yanzhou City/China

Shandong Sun Paper Co. Ltd was established in 1982, and today it is the largest private paper company in Chinese ownership. The company owns several paper and board machines with a combined annual production capacity of more than one million tons.

The delivery of the PM 19 paper machine from Metso Paper to Shandong Sun Paper came on stream in mid of 2004. PM 19 produces woodfree fine paper grades with an annual production capacity of ~230 000t/y.

The delivery also included an OptiSoft soft calender for matte

grades, which will be installed on-line with the coater.

The selected soft nip calendering provides for better paper surface quality (even thickness and a smooth surface for good printability) and improved strength properties. The most soft nip calenders, installed near the end of the paper machine, are made with two stacks. Each stack is a pair of rolls, touching one another in a line (nip) under high load.

One of the rolls is heated from the inside by thermo – oil. The mating roll is a so-called deflection compensating roll.

In one stack, the heated roll is in the top position, in case of a second stack, it is in the bottom position.

These calenders could create a problem for the bearings. The bearings of the thermo roll in the bottom position carry the load from roll weight and nip load, they are high loaded. The bearings of the thermo roll in the top position carry the difference between load from roll weight and nip load. The resulting load, acting on the bearings is depending on the nip load –the bearings might be subjected to slippage hazard.

Operating conditions and bearing requirements

For the most two stacked calenders, only one replacement for the thermo roll is existent. In case of a roll failure, the entire roll is changed. It means, the roll with one and the same set of bearings must work in the top position and in the bottom position. With a wire width of 5 400 mm, the machine is producing a 4 900 mm wide paper sheet at a speed of 1 300 m/min.

min. load per bearing in top position	$F_{\min} = 26 \text{ kN}$
max. load per bearing in bottom position	$F_{\max} = 720 \text{ kN}$
Speed	$n = 344 \text{ min}^{-1}$
Lubrication	Oil ISO VG320

To avoid any slippage damage, the heated rolls are equipped with FAG bearings:

23276-B-K-MB-C4-J48BB-T52BW-W209B

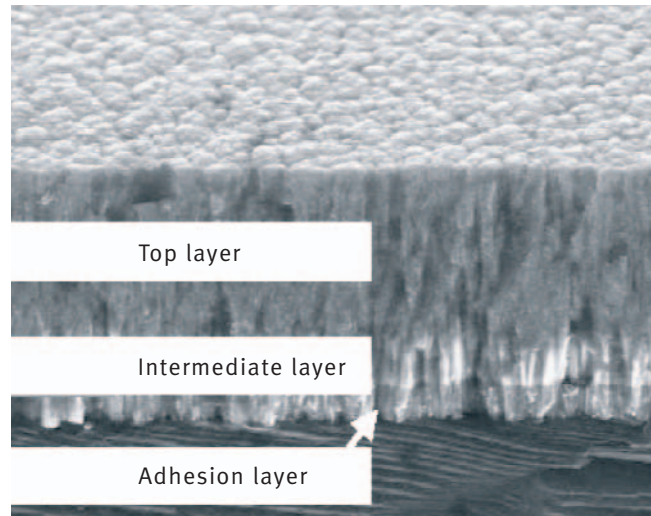
J48BB means a diamond like carbon coating of the rolling elements. This very hard coating prevents damages, even when sliding friction due to slippage occurs.

The bearings also have an increased running accuracy according to P5 (T52BW). The inner rings are case hardened according W209B, in order to avoid journal damage, in case of failures with subsequent fracture of the inner rings.



Spherical roller bearing with TRIONDUR coated barrel rollers

TRIONDUR C layer system



Characteristics and advantages of TRIONDUR coating layer

- Functional anthracite layer
- Micro hardness about $\sim 1000 \text{ HV}$
- Coating thickness 1–4 μm
- Reduction of friction in DLC/steel contact
- Higher wear resistance
- High protection against abrasive wear
- Ideal for applications involving a risk of slippage

Customer benefits

- Long bearing service life due to TRIONDUR coated rollers
- High paper quality by P5 running accuracy
- Reduced risk for inner ring fracture and thus no journal damage
- Standard spherical roller bearings at both ends of the roll
- Reduced and cost-effective inventory

Schaeffler KG

Heavy Industries

Pulp & Paper

Postfach 1260

97419 Schweinfurt (Germany)

Phone +49 9721 91-0

Fax +49 9721 91-3435

E-Mail pulp_paper@schaeffler.com

Internet www.fag.com