Bearings for the Flexitherm Roll of an Ecosoft Calender™

FAG

Examples of Application Engineering

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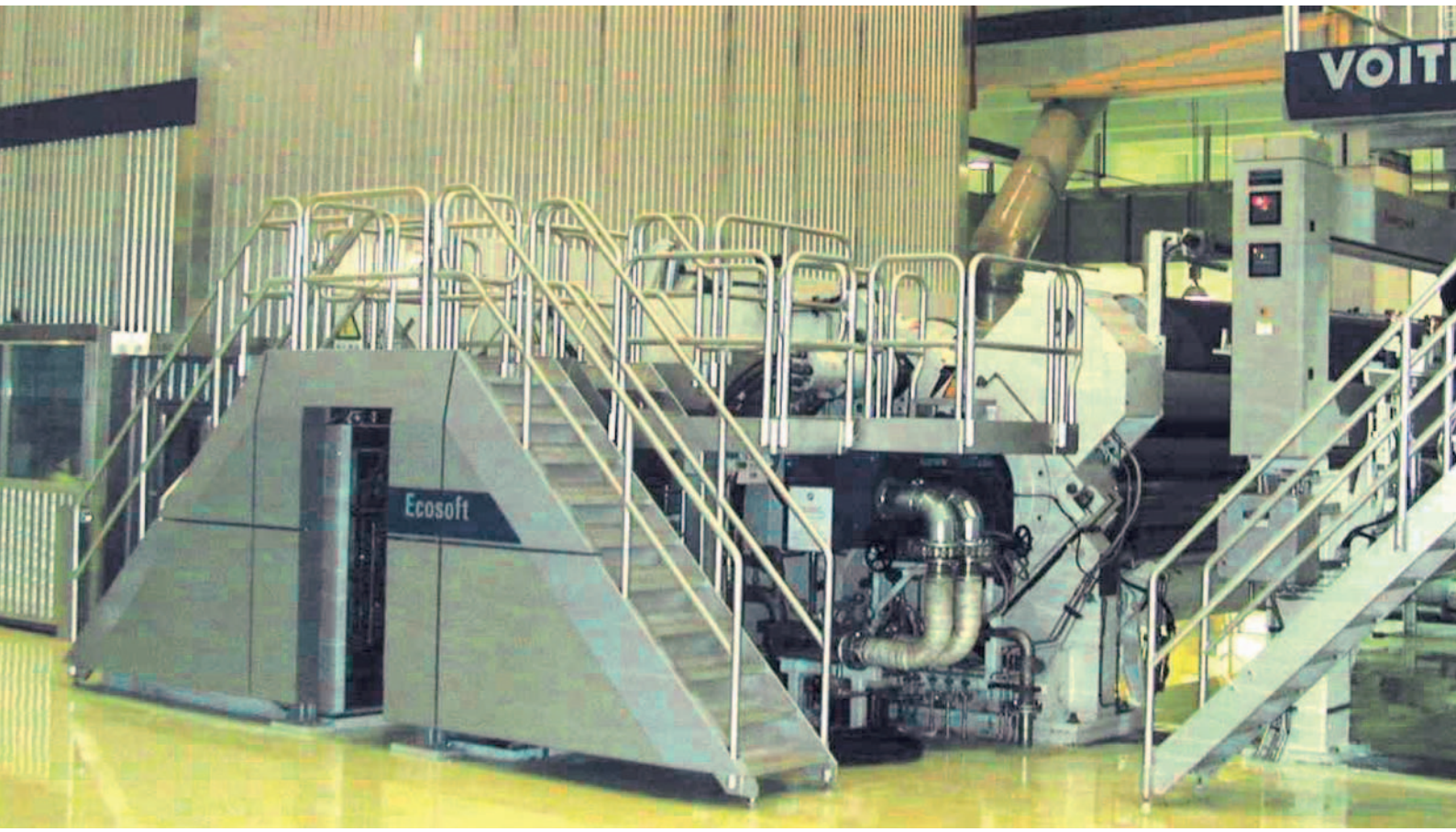


Calender for the new PM10 construction of the Shandong Huatai Paper Group

Courtesy Voith Paper, Krefeld

Function of the calender

Soft calenders, inline-built into paper machines, are used for smoothing the paper surface.
The paper web runs through two press gaps or “nips” each of which has one heated roll (so-called Flexitherm roll) and one non-heated roll (Nipco).
The non-heated roll is designed as an anti-deflection roll which guarantees constant pressure across the whole web width. In each press nip one surface of the paper web is sateen-finished by pressure and temperature. As a result, smoothness, glaze and printability are improved.
The maximum temperatures at the heated roll surface are 200 °C, the maximum pressures up to 450 N/mm.
The paper web speed reaches a maximum of 2 000 m/min.
Two press nips are required in order to achieve the same quality of both paper web surfaces. There is one heated roll at the top and one underneath (see layout).

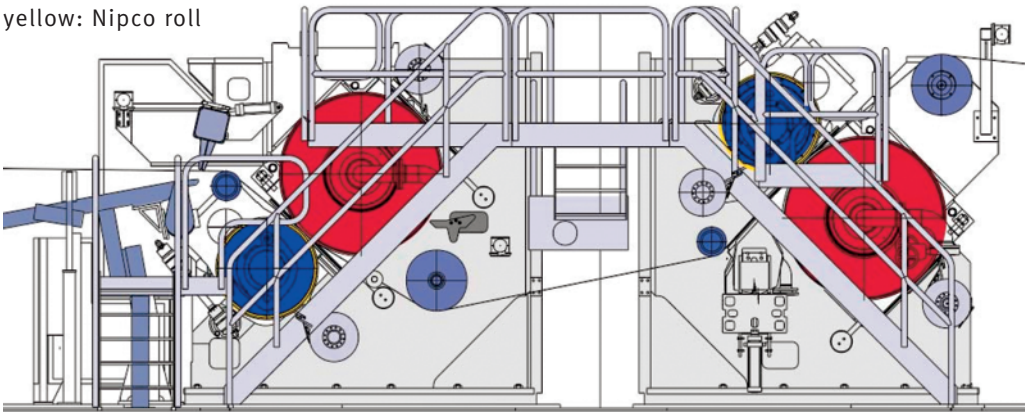
Technical data

Operating width	7 100 mm
Design speed	1 800 m/min
Output	280 000 t/y of newsprint/LWC

Design of the calender

Scheme: Huatai EcoSoft™ Delta, 2x2 Rolls

Roll arrangement in a soft calender
red: Flexitherm roll
yellow: Nipco roll



In modern soft calenders the rolls are not arranged vertically, but the connecting lines between the centers of the two rolls are inclined under a certain angle to the vertical line.
The pressure acts onto this connecting line, whereas the roll weight acts vertically downwards.
With strictly vertically arranged rolls, weight and pressure would act exactly opposite to each other in the case where the Flexitherm roll is mounted in the upper position. At certain nip pressures this might result in bearings of the heated roll having no load thus leading to slippage hazard.
Due to the inclined arrangement the bearings are constantly loaded by a certain amount of the roll weight so that slippage is excluded.

Bearing selection, mounting

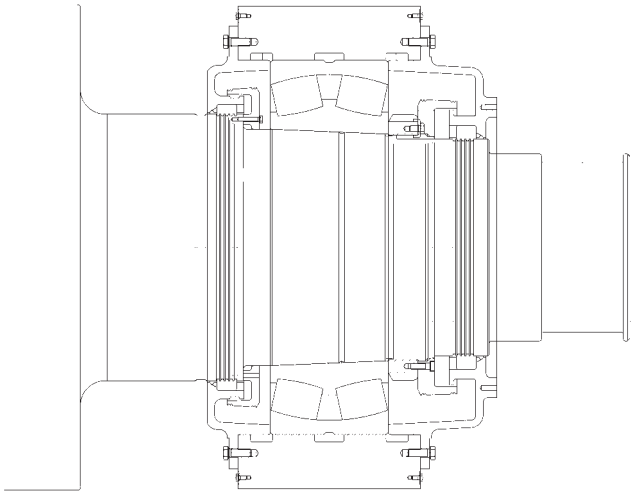
Flexitherm rolls have to be mounted on bearings with self-aligning properties, in this case they are supported by spherical roller bearings:
231/600-K-MB1-T52BC-C4-J26C-M15KC

J26C marking of the highest radial runout of the rings
M15KC with measuring report
T52BC P4 runout for the inner ring

The inner ring running accuracy corresponds to P4 which guarantees utmost paper quality. At a maximum load of 980 kN and a speed of 425 rpm, this results in an adequate service life.
The inner ring of this bearing does not have to be case hardened since the bearing heat-up is just moderate due to the roll journal insulation.
The bearings are seated in solid housings which are supported in the load direction over two wedges in the calender frame.
The position of the wedges has been thoroughly calculated so that the resulting housing deformation is favorable for the spherical roller bearing. Moreover, the selected calender frame design ensures minimum stresses.
The bearings are lubricated by oil circulation.
In view of the expected bearing temperatures a synthetic oil to viscosity class ISO VG 220 is used.

Customer benefits

- High paper quality by P4 running accuracy
- Long bearing life due to optimized housing design.
- Standard bearings at both ends: cost-effective stockkeeping.



Section drawing through a bearing housing (locating bearing)

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99/01/07 Printed in Germany by Druckhaus WEPPERT GmbH