Refiner Bearing Arrangement with Cylindrical Roller Bearings

FAG

Examples of Application Engineering

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Manufacturer: Metso Paper, Valkeakoski/Finland; Operator: UPM-Kymmene, Kaipola/Finland

The photo shows a TMP Plant with 18 Refiners SD-65 and two Refiners SC-90. In the TMP process (Thermo-Mechanical-Pulp) chipped wood is steamed at about 130 °C and subsequently defribrated under steam pressure in refiners. The entire woodpulp production of the TMP plant at UPM Kymmene, Kaipola/Finland is 1 700 tons per day.

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Machine Design

The “Disk Refiner SD-65” consists of two refiner disks equipped with blades.
The steamed wood chips are fed into the refiner through a hole in the stator disk which opens into the variable gap between stator disk and rotor disk.

Refiner disk diameter	1 700 mm
Gap width	0,1…0,7 mm
Speed (50 Hz)	1 500 min^{-1}
Speed (60 Hz)	1 800 min^{-1}

During the refining process temperatures of up to 160 °C are reached. The steam pressure generated between the disks is 300…600 kPa.

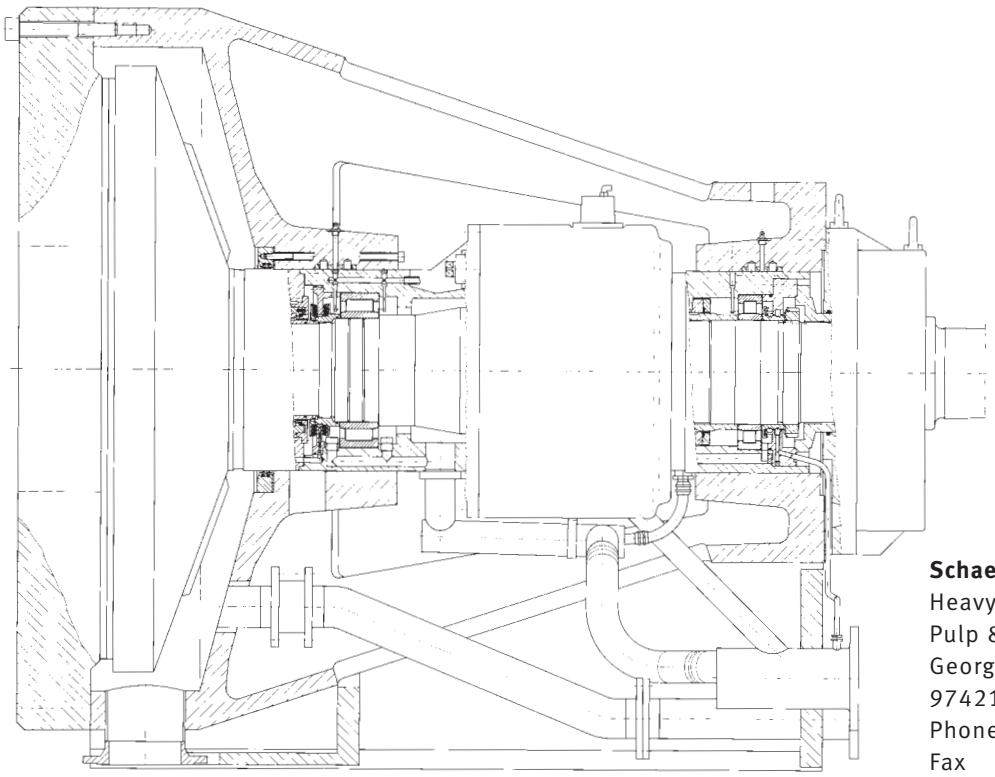
Bearing Arrangement

The rotor disk is radially supported by two cylindrical roller bearings. The disk-end cylindrical roller bearing FAG **Z-563900.NU3056-C3** accommodates a radial load of 65 kN, the drive end cylindrical roller bearing FAG **NU1056-M1-C3** accommodates 10 kN.
The prevailing axial loads - which can be up to 1 000 kN - are accommodated by a Kingsbury sliding thrust bearing positioned between the two rolling bearings.

The length variations of the rotor shaft relative to the bearing housings, which are caused by the high temperatures of up to 160 °C in the refiner disk gap, and the alignment movements between the refiner disks can be easily compensated by the cylindrical roller bearings.
The rollers of the disk-end bearing have a modified line contact. Because of the special roller geometrie and the high speed the bearing was equipped with a machined brass cage.
Double-direction labyrinth seals protect the bearing from water and dirt ingress and prevent the oil escaping from the bearing.

Lubrication

Because of the relatively high speed and the external heat caused by the refining process, the bearing at the rotor disk-end requires a lubrication with oil injected from both sides. At the drive end of the refiner the oil is injected from one side only. The oil CLP68 DIN 51502 is used. By means of this lubrication system the bearing temperature can be held at about 90 °C.
The required oil flow rate is about 7 to 8 or 4 liters per minute. The oil is filtered within the oil circuit and cooled down to 40 °C.
54 Refiners of this type have been taken so far into operation; their operating time is about 8 000 hours a year.



Bearing arrangement for the disk refiner SD-65

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