Optimised bearing arrangement stops premature bearing failure in ”Spectro Screen 23D“ pressure screen

Examples of Application Engineering

WL 13 518 EA

“Spectro Screen 23D” pressure screen, Voith Paper, Germany

Courtesy: Voith Paper

Spectro Screen pressure screens built by Voith Paper are used in waste paper processing for cleaning the water/fiber suspension in the medium stock consistency range.

The cleaning is effected by means of a vertical screen cylinder.

The suspension runs into the screen cylinder, and the fibers that pass through the screen (“accepts”) con-tinue down the processing line. Impurities such as staples, stones or broken glass cannot pass through the screen and are removed from the machine separately.

In order to prevent the screen from getting clogged, a rotor inside the screen cylinder generates currents that keep the screen clear.
The machine is vertical to ensure e easy mounting and dismounting of screen cylinder, rotor and rolling bearings.

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Operating data

Machine throughput	300 t/day at a stock consistency of ca. 3%.
Drive power	90 kW
Rotor speed	460 min^{-1}

Previous bearing arrangement

The rotor hub is mounted at the upper end of the vertical shaft, and a V-belt pulley is mounted at the lower end.
Lower bearing location: A spherical roller bearing **22319-E-C3** above the belt pulley fixture serves as the locating bearing.
It axially accommodates the weight forces of shaft, rotor and belt pulley as well as forces from the currents inside the machine, and it is also takes up radial loads from the belt pull.
Upper bearing location: A cylindrical roller bearing **NU217-E-M1** serves as the floating bearing which accommodates the radial forces, i.e. the counterforce to the belt pull and the rotor imbalance forces.

Bearing problems

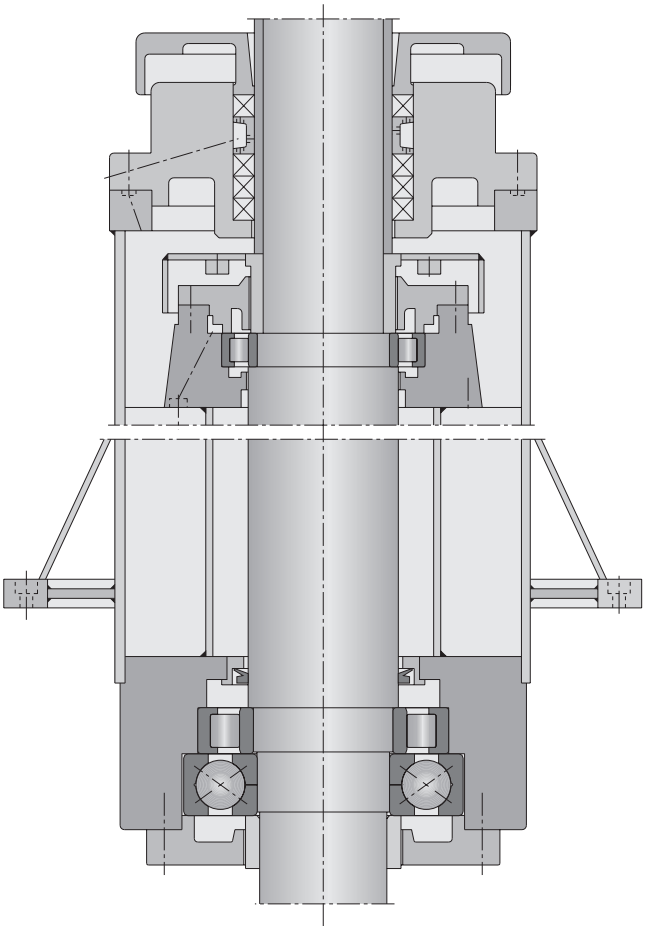
At a paper mill owned by Visy Paper, Australia, the bearings in a Spectro Screen 23D were damaged.
The ingress of water into both bearings impaired the lubricating conditions. And the lower roller row in the spherical roller bearing was subjected to very high loads whereas the upper roller row was unloaded (slippage). These two problems repeatedly caused the bearing to fail prematurely.

Solution

The problem was solved by rebuilding the locating bearing end. The spherical roller bearing was replaced by a cylindrical roller bearing **NU220-E-M1** and a four point bearing **QJ319-N2-MPA** (see drawing).

New bearing arrangement

The radially relieved four point bearing has a 35° contact angle and is very suitable for accommodating the axial forces. As the bearing incorporates only a single ball row, all balls are evenly loaded. In this way, slippage – as occurred in the unloaded roller row of the vertically installed spherical roller bearing – is ruled out.
The cylindrical roller bearing installed directly beside the four point bearing provides the radial shaft guidance and accommodates the radial forces from the belt pull.
Particular care was taken during the assembly of the bearings to ensure that all seals and O-rings had the right size and were installed correctly.



New bearing arrangement for the “Spectro Screen 23D”

Lubrication

Both bearings are lubricated with grease, as is common practice with waste paper treatment machines.
The bearings must be relubricated periodically.

Economic benefit for customers

- No shutdown and production losses due to the necessity to replace bearings prematurely
- The new bearing arrangement has been running without problems for more than two years.

This saved costs – just by preventing production losses – in the order of more than Euro 150 000.

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