OUTOTEC® POLYMER HSB TECHNOLOGY HELPS CUSTOMER AVERT BALL MILL BEARING FAILURE

Bearing failure and significant ball mill damage avoided due Polymer HSBs at customer site

Background

With grinding mills at the 'heart' of many mineral processing plants, unplanned mill shutdowns can expose mines to substantial production losses. Unfortunately, bearing and bearing lubrication system failures are common causes of stoppages and typically result in costly damage to the mill itself.

Development of grinding mill bearings has been largely stagnant over the last 40 years with Spherical Roller Bearings (SRB) and either bronze or white metal faced hydrostatic and hydrodynamic bearings being the norm. In the years spanning 2000 to 2013, bronze faced Hydrostatic Shoe Bearings (HSB) were the staple on all Outotec shell supported grinding mills and scrubbers and all Outotec trunnion supported grinding mills with installed power greater than 3MW.

Innovative design-Outotec® Polymer HSB system

Over the years, Outotec has continued to innovate and develop its HSB technology. In 2019 the Outotec® Polymer HSB system, which utilises an advanced polymer bearing material in lieu of the conventional bronze, was officially launched.

Outotec Polymer HSBs are more durable than bearings featuring conventional materials, providing superior ability to operate under adverse conditions that would otherwise

CHALLENGES

Bearing failures & damage due:

- sub-optimal maintenance of mill and auxiliary equipment
- unforeseen component failures

SOLUTION

- Outotec® Polymer HSB (Hydrostatic Shoe Bearing) system

RESULTS

- Avoided bearing failure and significant mill damage
- Mill restarted, trunnion bearings still operational
- Mill operational, no adverse signs to Polymer HSB system

damage a conventional bronze or white metal bearing. The Outotec Polymer HSB system eliminates the requirement for emergency oil lubrication systems, such as accumulators, and requires less bearing oil flow, thereby reducing operating costs. The result is a bearing system which virtually eliminates unplanned shutdowns due to bearing failures (or emergency oil delivery system failure), thereby maximizing mill availability.

How does the Polymer HSB work?

The Polymer HSB system's state-of-the-art self-aligning capability ensures that the pads are always precisely aligned with the mill journal. This facilitates best-in-class load measurement using bearing pressure and ensures bearing loads are evenly distributed across the mill journal.

The self-aligning capability is achieved through detailed design of the bearing oil galleries and an oil pressure supported spherical bearing. This optimised design provides both unparalleled flexibility for the bearing to align with the journal as well as automatic real time adjustment of the alignment.

The oil gallery and distribution setup are maintenance free and require no adjustment over the lifetime of the mill. The polymer bearing surface is extremely robust and offers self-lubricating properties, allowing operational excursions such as bearing to journal contact or oil contamination, without damage to the bearing or mill journal.

Field proven - site avoids bearing failure with Polymer HSB system

Outotec has been supplying Polymer HSB systems as standard on all new Outotec HSB supported grinding mills, and as a modernisation solution to existing Outotec HSB supported grinding mills, since 2013.

In 2017 a set of polymer bearings were installed as an upgrade to an Outotec ball mill on a customer's site. Months after installation, an event took place which required the mill to be stopped immediately using an emergency stop (E-stop). The E-stop is designed to stop the main mill motor as well as all auxiliary systems, including the bearing lubrication system.

When the E-stop was pressed at the customer's site, all auxiliary equipment was stopped. However, the main mill motor circuit breaker failed to open and cut power to the motor. This was due to a pre-existing and undetected fault within the circuit breaker assembly. The result was the mill continued to rotate for approximately 10 minutes without any oil being supplied to the Polymer HSB bearings.

Following stoppage of the mill, the circuit breaker was repaired, the lubrication systems restarted, and with no signs of bearing damage or loss of performance observable from the mill instrumentation, the mill recommenced operation. Typically, in situations such as this, the damage would be substantial and result in extended downtime.

As of March 2020, the mill continues to operate without any sign of adverse effects to the Polymer HSB system.

Suitable for new mills and retrofits

The Outotec Polymer HSB system is standard on all new Outotec grinding mills featuring hydrostatic bearings. The Polymer HSB system can also be supplied for existing Outotec mills with bronze faced HSB bearing systems as a complete kit, including the parts needed to decommission accumulator systems.

Retrofits of other hydrostatic and hydrodynamic type bearing designs, including non-Outotec grinding mills, can be offered on a case-by-case basis.

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