

Seal Retrofit Yields U.S. \$1 Million/Year Revenue Increase for Ore Processor

SLM-6200W Mixer Seals Eliminate Gland Water Dilution for 10% Gain in Nickel Slurry Throughput

The Challenge: The filter presses handling copper and nickel ore-processing slurries at a mine site in Sudbury, Ontario, were performing poorly. Water lubricating the packed agitator stuffing boxes was leaking into the filter tubs at a very high rate. Water dilution of the nickel slurry negatively impacted slurry densities, throughput rates and profits. The water leakage was also creating housekeeping and safety issues.

The Solution: Working in conjunction with the ore-processing operations team, Flowserve engineers analyzed, evaluated and created a sealing solution to replace their packed bottom agitator stuffing boxes with an engineered double cartridge canister mechanical seal for each end of their four filter press tubs. Dual water flow meters were also installed per each set of mechanical sealing assemblies. These meters visually detect and monitor leakage of pressurized barrier fluid water entering into the filter press and causing upset operating conditions.

The operational process of reducing copper and nickel ore to a refined mineral requires the reduction of the ore in slurry to a putty-like substance. A critical part of this process is at the disc filter press. To keep the suspended solids in solution, an agitator is constantly operating in the bottom of the press. The shaft on the press agitator is packed at both ends to contain the slurry in the tubs. The packing, however, requires a considerable and constant quantity of water for lubrication, which inevitably leaks into the filter tubs diluting the slurry and onto the plant floor, causing worker safety and health concerns.



Figure 1: Disc filter press

Recommendations

The packing was removed from the four disc filter press agitator assemblies. The agitator shafts were then prepared to accommodate two specially designed SLM-6200W dual-balanced cartridge seals with integral steady radial load bearings. One stubbed and flanged agitator shaft was fitted with a sleeve to increase its diameter to the standardized diameter of 70 mm (2.75 in); the other three agitator shafts were machined new by the ore processor and required no shaft sleeves.

- Adapter plates were added to strengthen the tub walls and handle agitator shaft loads resulting from high run-out and solids in suspension.
- Four sets of SLM-6200W double-cartridge canister mixer mechanical seals were installed — one set for each of the four filter presses. All seals included a “Greased for Life Bearing Assembly” in their design to accommodate any rotating shaft deflection or possible shaft run-out.
- Two dual water flow meters were supplied for each of the filter presses. This provided effective barrier fluid control for proper operation and support of the seals. Further, it eliminated water leakage/dilution of the ore slurry.

Results:

The total cost of the seal retrofit project was approximately U.S. \$240 000, or U.S. \$60 000 per filter press agitator.

Plant superintendents estimate:

- 10% higher throughputs of pure nickel slurry
- Increase in slurry densities from 62%–65% solids to 72%–75% solids, approximately a 15% gain
- U.S. \$1 million annual increase in revenue



Figure 2: Plant area before the seal retrofit

Figure 3: Plant area after the seal retrofit

The bottom line:

- The ore processor has received a 300% ROI after the first year.
- The seals have operated flawlessly since their March 2012 installation and have a projected MTBR of 2–3 years.
- The safety and housekeeping issues have been eliminated.

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