Processing Solutions

An Eriez trommel magnet mounted on this SAG mill protects downstream pebble mills from tramp metal at the Newmont Jundee mine's Nimary gold plant near Wiluna, W.A. Installation of the magnet has reduced power and maintenance costs associated with tramp metal damage, according to mine management.

Trommel Magnet Protects SAG Mill Circuit

Protecting equipment, cutting power consumption and reducing reoccurring maintenance cost were prime considerations leading to Newmont Jundee's decision to integrate trommel magnet separation technology as part of their Nimary Gold Plant's new scats crushing circuit installation.

Nimary plant management, along with engineering consultants Ausenco, had initially contemplated installation of a pair of conventional self-cleaning, suspended electromagnets to remove the worn iron mill balls and ball chips that exit the SAG mill grinding circuits in the trommel screen oversize fraction. Suspended electromagnets work to remove the waste iron exiting the mill to minimize the damage to downstream pebble crushers. The plan required two magnets arranged in series. One was to be placed before and the other after a belt-to-belt transfer station carrying the oversize material. This arrangement would improve the iron removal process by exposing the large ball fragments that had been buried at the bottom of the burden to the second suspended electro-magnet.

Additional precautions were also taken as the crusher equipment setting on the closed side is often less than 15 mm, meaning extra-strength electromagnets would be needed to ensure the iron deep in the conveyor burden is removed--yet, even so, separation was not 100% assured. Even with a pair of properly sized magnets, the oversize fraction can swell when extra hard rock is encountered.

Finally, electromagnets are not inexpensive. Their operation requires a significant amount of power, and ongoing maintenance of self-cleaning belts can be considerable.

A trommel magnet, by comparison, uses permanent magnets which require no power to operate, and their maintenance needs are no more expensive than that of a self-cleaning magnet. The trommel magnet is designed to be fitted at the trommel screen discharge area of the mill to remove tramp metal and ball fragments from the discharge flow. The magnet mounts to the mill's discharge trunnion and consists of an arc of permanent magnets partially surrounding a blind trunnion. As the mill rotates, the powerful magnet attracts and holds the worn steel balls and chips to the inner surface of the trunnion extension. The ball fragments are carried to the top, where the magnetic arc terminates, and fragments fall into a discharge chute.

After careful consideration, the management team opted to equip the mill with a high-efficiency trommel magnet from Eriez Magnetics and a manually cleaned suspension magnet positioned downstream. The trommel magnet was expected to do the bulk of the work while the secondary suspended magnet remained for safety considerations. This magnet, placed just ahead of the crusher, was left to back up the trommel magnet and remove any iron that might have dropped onto the conveyed ore after the mill.

After the decision was made to install the trunnion magnet and following several months of operation, the mine reported that the trommel magnet has consistently removed the majority of the waste iron at the mill discharge, with only occasional pieces of iron being collected by the downstream. Plant management cited several factors that contributed to the effectiveness of the trommel magnet. They include the fact that:

- Tramp iron is agitated (tumbled) as it is presented very close to the face of the magnet where the field intensity is highest.
- Gravity aids separation rather than working against the magnet attraction, as with a suspended magnet.
- The trommel magnet uses in-motion, induced lifters together with the stationary permanent magnet.

Control Systems for Improved Mill Performance

ABB has introduced an expert system for comminution process improvement. According to the company, its "Optimize IT Expert" control strategy maintains an adequate grain size distribution inside the comminution circuit and guarantees an optimal balance between the inflow of coarse material and the outflow of product. The system achieves these objectives by joining multivariable control, fuzzy logic, and neural networks techniques. In operation, says ABB, Optimize IT Expert Optimizer's strategy resembles the actions of an experienced operator.

ABB claims a number of benefits that have been recorded in mills controlled by Optimize IT Expert Optimizer, including:

- Lower specific energy consumption: By continually monitoring the loading of the mill and the balance of the material flows through the system, it is possible to identify situations when the feed to the mill and the output can be increased while the product quality remains in the specified bandwidth. Lower specific power consumption is automatically achieved.
- Consistent quality: Continual monitoring of mill loading and adjustment of the feed and dilution water results in reduced variations in product grain size. The control strategy is designed to respond to disturbances in the process but still achieve quality consistency, eliminating both over and undersize product.
- Stable material flow: By continuously introducing small changes in the process inputs, as opposed to fewer but larger ones, smooth and stable material flow is achieved. The result, says ABB, is better product quality, less plant downtime, and longer equipment life.
- Reduced consumption of grinding media.

New High Loading, Easy-to-Strip Copper Solvent Extraction Reagents

Cognis has developed a new series of custom blended copper solvent extraction reagents that it claims combine the properties of high copper transfer with ease of stripping. The reagents apply to copper leach solutions having a relatively high pH and/or high buffering, and are said to be especially useful when the plant operator wants to realize the benefits of operating the tankhouse with a sulfuric acid concentration as low as 150g/l while still maintaining high copper recovery and high copper net transfer.

According to Cognis, the new reagents complement the recent introduction of its low viscosity (LV) line of copper extractants designed for concentrate leach solutions.