

## Case: Kinross Gold Corporation, Minas Gerais, Brazil

# Kinross improves apron feeder production by 20% using Metso technology

Replacing the pans with an optimized version increased the feeder capacity by 20% and is expected to provide a longer service life for the other components. The collaboration also included replacing the stock pile feeders, leading to increased plant reliability.

### The challenge: Limited capacity and excessive shutdowns

Insufficient capacity and excessive shutdown issues were two key challenges facing the Minas Gerais gold mine in Paracatu, Brazil. In 2008, Metso took part in an important improvement project by replacing the pans on the main feeder of the processing line with improved parts. Installed in the Plant II crushing sector, the apron feeder takes in the unprocessed ore and feeds the crusher. Because of its role, the apron is under constant monitoring, and Kinross had already determined that changes were needed. The first change was to increase the apron's production. The second, directly related to the first, was to increase the service life of the return rollers as the sidewalls on the existing pan were very thin, which led to constant shutdowns of the equipment. The challenge was to replace the pans and the other parts as quickly as possible and without affecting the mine's production goals.

### Working together to customize a solution

"The biggest problem was scheduling all the activities. We invested nearly 150 hours of work," explains Alexandre de Oliveira, the Kinross mechanical engineer who coordinated the process. "We submitted to Metso the problems we were having with our equipment and they suggested most of the improvements that were approved," he notes. According to Oliveira, the work was done by in-house personnel with technical supervision by Metso. The replacement operation, designed down to the millimeter, preserved the material of the original pans (manganese steel) but involved a totally new part design, developed specifically for Kinross by Metso, using taller lifting bars and an optimized profile. In order to increase the service life of the return rollers, the design also involved thicker sidewalls of the pans, which provided better pressure distribution on the roller surface. In addition, Metso developed a new return roller made of wear-resistant material, thus offering a longer service life.

### Results: A 20% increase in capacity

The results of the replacement show that the work really did pay off. Presently, with a rated capacity of 7,800 tons/hour, the feed capacity has increased 20% and Kinross is preparing to measure other effects. Since the installation in May 2014, results were largely due to increased performance from improved components, such as the load rollers and pans, that positively impacted equipment availability as compared to availability before the intervention.



### Minas Gerais, Brazil

Founded in 1993, the Canadian company Kinross Gold Corporation operates in eight countries and employs some 8,000 people.

Its open-pit gold mine in Paracatu, Minas Gerais, Brazil, is a success story in itself. As the largest business in the city, it accounts for 10% of the professional jobs and is a major tax base for the city.

Established in 1987, the mine underwent expansion in 2008 to extend the life of the mine. The mine now has an anticipated lifespan to 2032.

**Results from refurbishment:**  
20% increase in production through the apron feeders. Current production is 55 M tons per year.



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In addition to the pans, other changes were also implemented. Among the other modifications, Oliveira cites the change in the angle of the bearing housings, as well as alterations in the design of the hub and the drive shaft assembly. "We have a cooperative relationship whereby Metso introduces and offers to implement the innovations it develops for its products," Oliveira sums up. "We at Metso are constantly improving our products, and the apron feeders are no exception. These innovations lead to various benefits, such as increased reliability and production, as in the case of the improvements applied to Kinross's machine, built in 2007 and upgraded with these innovations in late 2013. Metso is constantly striving to offer its customers such upgrades and to establish mutually beneficial partnerships, such as the one we have with Kinross," emphasizes Henrique Tibagi de Oliveira, Product Chief at Metso Brazil in charge of apron feeder products.

### **Stock pile improvements enable continuous grinding**

Metso participated in another recent project at the Kinross mine, initiated in 2012 and completed in December 2014. The goal was to replace the belt feeders installed under the stock pile of ore; the feeders feed the mine's SAG mill. The stock pile, also known as the buffer pile, ensures the ore fed into the grinding mill is homogeneous and permits scheduled stops in the crushing process without affecting the gold production process.

"We have six machines installed, each with a rated capacity of 1,660 tons per hour," notes Alexandre de Oliveira. "If they do not operate reliably, the feed to the grinding mill is affected, compromising the mine's entire production process," he explains. When the original feeders started to require more and more repairs due to tearing of the belt, it became obvious that a change-over was necessary. "We decided to replace the conveyor belt system with apron feeders built with manganese steel, which has a much longer working life," he notes. In his opinion, two crucial factors led them to choose Metso as a partner for the project. First, the company's experience in the manufacture of apron feeders, and second, it was Metso that had supplied the original equipment.

Once the choice was made, Kinross divided the project into two stages, one that took place in 2012 and the other that was completed in December 2014. Initially, four feeders were replaced, which was enough to ensure equipment availability to deal with the increase in crushing capacity. In the second stage, the remaining machines were replaced.

### **Metso Apron Feeder refurbishment opportunities:**

- Drive upgrades and head shaft refurbishments
- Tail wheel assembly upgrade
- Replacement cast manganese pans
- Sealed and lubricated track (SALT) chains
- Replacement modular top carry rollers
- Full line of removable tail, snip nip, drive and other guarding to ensure safe operation of the feeder

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