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Liner optimization improves life and reduces downtime

Background and objective

Changes in the geology and mining practices at a West African gold producer had resulted in a more challenging run-of-mine (ROM) feedstock (greater hardness) for its gyratory crusher. This was causing higher rates of wear on the crusher lining system. In addition, the mine experienced uneven wear of the crusher liners due to:

- A single-side dump hopper, which fed material asymmetrically into the crusher, and led to uneven wear of the concaves.
- A tendency for fines to stick together and not be free flowing, particularly when wet, leading to packing of the crusher.

When FLSmidth visited the site to assess the situation, the concave liners were only lasting an average of 2.75 million tonnes, while the mantle liners had an average lifespan of just 0.75 million tonnes. As a result, liners needed replacing more frequently than they had in the past. This extended the time the crusher was out of service for maintenance and impacted the mine's productivity.

On top of this, the mine wanted to increase throughput of its SAG mill. This placed additional demands on the crusher to deliver an optimal feedstock to the mill. A new

crusher lining solution was therefore required. The solution we proposed would more than double the lifetime of the liners, and ultimately help to raise annual production at the mine. This not only strengthened the mine's financial performance, but also brought important sustainability and health and safety benefits.

Changes to ore geology were causing operational challenges with the liners of a West African gold mine. In response, FLSmidth provided a customised wear solution that boosted liner life, optimized crusher performance, and resulted in an overall increase in mine throughput.

Defining the project

FLSmidth worked with the customer to define their goals and understand the crusher operating conditions. This included an analysis of the feed material, crusher performance and operating parameters. As a result, the following aims for the new wear solution were identified:

- Improve wear life of the concave and mantle liners.
- Minimise downtime and improve reliability.
- Reduce the size of crusher output material, while maintaining current power draw, to support the targeted increase in SAG mill throughput.

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The solution

Results were achieved over two design phases. In the first phase, we recommended a new concave and mantle liner profile to operate at a smaller open side setting (OSS). This reduced the size of the feed going through to the SAG mill, and meant that mill throughput could be increased, even with the more challenging ore. To compensate for the smaller OSS, crusher capacity was lowered to ensure sufficient available power in the motor to achieve a smaller product size. This ensured the process stayed within safe operating parameters and did not shut down due to high power draw or high pressure.

In the second phase, we recommended a different concave liner metallurgy to increase liner lifespan. This required an adjustment to the mantle liner replacement schedule, with two additional mantle rotations added per concave. As a result of these changes, the downtime needed for liner maintenance was significantly reduced.

The results

- The new liner design exceeded the objectives for the project:
- Concave liner life more than doubled to 5.99 million tonnes.
 - Mantles life increased by 60% to 1.2 million tonnes
 - Downtime was reduced by 30%.
 - Sizing of the SAG mill feed was optimised.

“Despite the difficult operating conditions faced by the mine, we were able to create a custom solution, more than doubling the lifespan of the lining, and optimising crusher operating conditions to support higher SAG mill throughput,” concluded Trevor Kupstas. “This was a huge success for FLSmidth and for the mine, which was able to increase production as a result of this work.”

