Case Study

Bradken Composite Liners - Bolts

Location	Southern Peru
Platform	Ball Mill Ø26’ x 40.5’
Conditions	High Abrasion/Copper Processing
Solution	Bradken Linings® Composite Liners (Polywear SCL) Bradken LMF+ Bolting (Copper State Bolting)

Situation

A customer in Southern Peru, operating a 26' x 40.5' ball mill for copper processing, faced several operational challenges and approached Bradken for a solution. Previously, their mill was lined with a six-ring Cr-Mo design supplied by a competitor. The site operates two ball mills with identical feed materials and agreed to test Bradken’s solution in one mill while retaining the competitor’s Cr-Mo design in the other.

The customer sought to:

- Extend the liner life by 50%, aiming to increase the shell liner lifespan from 12 to 18 months, aligning it with the lifespan of the mill heads.
- Resolve deflection issues in the central structure of the shell.
- Reduce the frequent breakage of bolts, averaging ten per month, which was attributed to mechanical problems.

Solution

The Bradken team developed a customised solution using Bradken Linings® Polywear SCL product. This composite liner solution integrated wear-resistant rubber, wear-resistant steel, and white cast iron inserts. To ensure the effectiveness of the design, several iterations were simulated using Discrete Element Modeling (DEM) analysis. The optimal design, featuring a double cord, double wave configuration, was selected. This innovative design reduced the number of rings from six to four and extended the shell liner length to three meters. The design minimised weight and reduced pressure on the PADs, effectively resolving the deflection issue and preventing bolt breakage. In addition to these design improvements, Bradken LMF+ Bolts were implemented to monitor and control torque, thereby enhancing the overall reliability of the installation.

Results Summary

- 50% Increase in lifespan (12 to 18 months).
- 23.94 MTP (+11% of goal)
- 31% Lighter.
- 25% Saving in installation hours.
- 33% Less liner parts and fasteners.
- 9.8% Increase in cylinder capacity.
- 0 Broken bolts.

Composite liners installed in operation

Liners removed after 18 months

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Case Study

Bradken Composite Liners - Bolts

Location	Pilbara Region, WA, Australia
Platform	Ball mill Ø26' x 40.5'
Conditions	High Abrasion/Copper Processing
Solution	Bradken Linings® Composite Liners (Polywear SCL) Bradken LMF+ Bolting (Copper State Bolting)

Results Summary

- 50% Increase in lifespan (12 to 18 months).
- 23.94 MTP (+11% of goal)
- 31% Lighter.
- 25% Saving in installation hours.
- 33% Less liner parts and fasteners.
- 9.8% Increase in cylinder capacity.
- 0 Broken bolts.

Results:

The Bradken Linings® Composite Liners successfully lasted the full 18 months, with projections suggesting it could endure an additional two months. During this period, both mills processed nearly the same quantity of ore, with the Bradken-lined mill achieving a total of 23.94 million tonnes, exceeding the guaranteed throughput by 11% (21.5 million tonnes).

The installation time for the Bradken Linings® Composite Liners was 25% shorter compared to the competitor's liner, and the number of liner pieces was reduced by 33%. This not only improved safety during installation but also reduced the exposure time for personnel during the relining process.

The deflection problem was completely resolved, and no bolt breakages occurred throughout the campaign, thanks to a 31% reduction in liner weight and a 3% reduction in PAD pressure.

Furthermore, the total cost of ownership per month for the Bradken Linings® Composite Liners solution was 13% lower than the competitor's liner solution.

Composite liners installed in operation

Liners removed after 18 months

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