

## Case Study

### Makuri MAK-HARD Bimetallic Chute Liners in a Stockpile Reclaim Chute

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#### 1 Introduction

Liner life in stockpile reclaim chutes is critical to processing plant performance. Stable stockpile levels are required to ensure stable mill operation, and shutdowns in this area can affect the entire plant.

In this case, Makuri liners were installed in a stockpile reclaim chute that was previously being relined with standard Q&T plate every six months, with some liners simply vanishing between shutdowns & damaging the steelwork underneath.

After 11 months of operation, the Makuri liners were changed as part of routine maintenance, even though the liners showed minimal wear. On many castings, the original cast-in foundry markings could still be seen, suggesting that a life of several years would be possible. While the liners were not run to full life, an average improvement in per-mm wear rates of 8-10x was observed.

#### 2 Product Overview

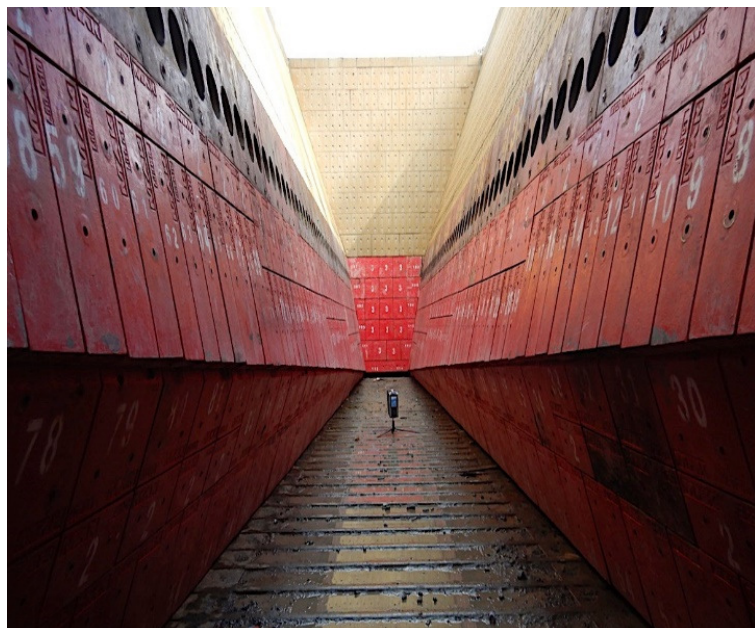
Makuri MAK-HARD bimetallic chute liners are a white iron cast product, bonded to a mild steel backing plate. The wear surface is extremely hard and will often outlast common materials such as quenched and tempered plate by 6-7x and chromium carbide clad plates by 2-3x.

By bonding to a mild steel backing, the impact toughness of the white iron is increased significantly, allowing it to be used in applications that were previously unfeasible for most white irons. The liners can be manufactured to suit any site bolting requirements and can also utilise our MAK-SAFE bolt-from-the-back system that allows for simple installation and condition monitoring.

#### 3 Application Overview

In this case, the liners were installed in a large stockpile reclaim chute feeding a primary crusher. Each chute contains over one thousand individual liners and is normally buried under thousands of tonnes of rock. The logistics involved in clearing this volume of material to access the stockpile are immense and production losses mount quickly, so a long-life solution was requested.

The initial design required the chute to be scanned and remodelled, as as-built drawings were not accurate and had previously caused fitment problems. After remodelling the entire chute, a full assembly was created along with colour-coded packaging and fitment instructions.



#### 4 Testing results

Given the previous liner life was only six months and the Makuri liners were approaching 12 months life, the end user decided to schedule a full liner change to mitigate any risk of failure. When the stockpile was lowered and the liners inspected however, very little wear could be observed.

Nevertheless, the decision was made to change the liners in case production constraints prevented a future shutdown being scheduled at the required time.

After 11 months of service, the cast-on foundry markings many of the liners could still be observed on most liners. These markings are only 3mm thick, and on a liner with 15mm of wear material, the potential available life could be up to five years. In the image below, the casting markings can clearly be seen – indicating that in some cases, the only material that had worn off the liners was the paint.



#### 5 Future developments

Makuri is regularly accumulating further success stories with its MAK-HARD bimetallic materials and is implementing ongoing materials research to improve performance further. In many cases however, these projects are a simple case of designing a liner set to a required life.

Additional gains can be obtained through modelling of material flows through chutes with in-house Discrete Element Modelling, allowing problem areas to be corrected, rather than simply covering them with harder and harder materials.



#### 6 Other Successes

Makuri has achieved similar improvements in a range of other applications, including pebble crushing improvements at a number of gold and copper mines along with massive increases in life of jaw crusher liners and other chute liners at other sites. These are the subject of additional case studies and are available on request.