



Eliminating fatal risks in mill relining with RME INSIDEOUT Technology



SITUATION

At a high-throughput copper-gold operation in Indonesia, SAG mills run 24/7 under a safe production philosophy. As part of its continuous improvement program, a filmed hazard analysis identified high-risk tasks during worn liner removal. Crews entered the mill to sling out fallen liners, facing hazards from confined spaces, uneven footing surfaces, suspended loads, and mobile operating equipment—conditions that posed rebound, struck-by, crush, and fatal-risk potential. Guided by “safety first, production will follow,” the site set a clear goal: eliminate fatal risks and enable automated relining to improve productivity.

SOLUTION

Through close engagement with site and reline crews, RUSSELL MINERAL EQUIPMENT® (RME), in collaboration with Bradken®, engineered a safer, more efficient semi-automated solution for worn liner removal—integrating RME’s roboticised Mill Relining System with Bradken’s customised liners for direct wall removal. The solution included:

- RUSSELL 7 Model R *AutoMotion*™ Mill Relining Machine (MRM)
- RME INSIDEOUT™ Technology: bespoke tooling — INSIDEOUT ShellXtract, INSIDEOUT FeedXtract INSIDEOUT GrateXtract, and INSIDEOUT PulpXchange — that enables relining without crew entering the mill
- RME BOLTBOSSTM for external liner bolting
- Bradken mill liners — feed, shell, grate and pulp lifters — compatible with INSIDEOUT Tooling
- Site support to commission the equipment and train local reline crew

Implemented during scheduled shutdowns with no added downtime, the technologies were compatible with the new RUSSELL 7-R *AutoMotion* MRM on-site—supporting smooth change management, crew ownership, and delivering progressive safety and productivity gains, reline by reline.



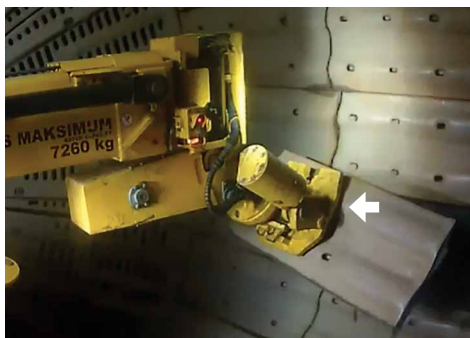
SITE SUMMARY

- **Operation:** Copper-gold mine
- **Location:** Indonesia
- **Grinding Equipment:** 38’ SAG mill
- **Site conditions:** Remote 24/7 production facility

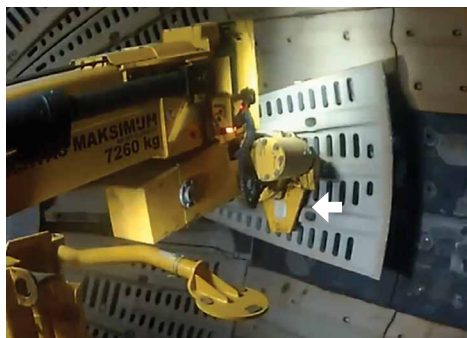


RESULTS SUMMARY

- No crew inside the mill while lifting liners
- 85% reduction in exposure to fatal risks
- Manual worn liner handling removed
- 16% faster worn liner removal
- Staged rollout with no added downtime
- Successful cultural change and crew ownership



INSIDEOUT ShellXtract Tool Kit removing Bradken shell liners



INSIDEOUT GrateXtract Tool removing Bradken super grate liners



INSIDEOUT PulpXchange Tool removing Bradken pulp lifters



RESULTS

The new system made the relining process safer by eliminating exposure to fatal hazards in the mill. This was achieved through remote operation of the RUSSELL 7-R AutoMotion MRM and the use of INSIDEOUT Tools, which enabled direct wall removal of all Bradken liner types without crew on the charge. Hazard exposure inside the mill was reduced by 85% compared to conventional methods, with remaining tasks limited to low-risk activities. This method also protects plant and equipment by preventing worn liners from falling during the knock-in process and damaging newly installed liners below.

The INSIDEOUT Tools also reduced reline duration by enabling direct extraction of all Bradken customised liner types from the mill wall by the mill relining machine without manual liner slinging. This delivered a 16% speed improvement over conventional methods by eliminating several steps, removing manual handling variability, and supporting faster, more consistent cycles. A tray system conveyed by the liner cart held multiple INSIDEOUT Tools, minimising changeover time across all liner types.

The project set a new safety benchmark for worn liner removal, demonstrating how collaborative innovation in mill relining systems and liner design can eliminate high-risk exposure and transform a historically hazardous task into a controlled, low-risk operation.

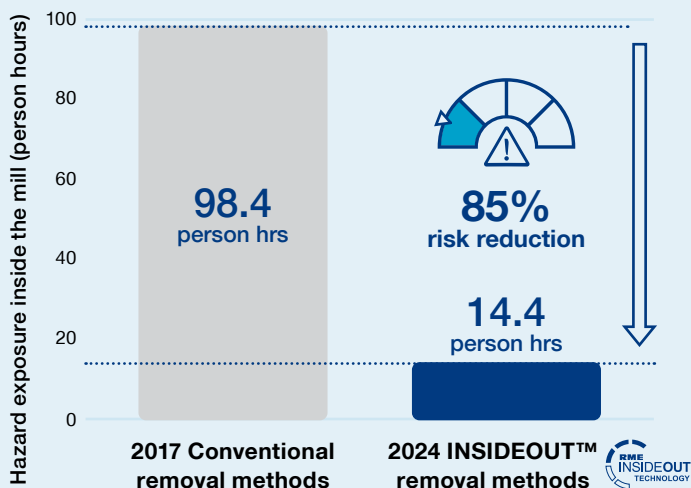


BEFORE: Crew exposed to multiple hazards during manual liner slinging

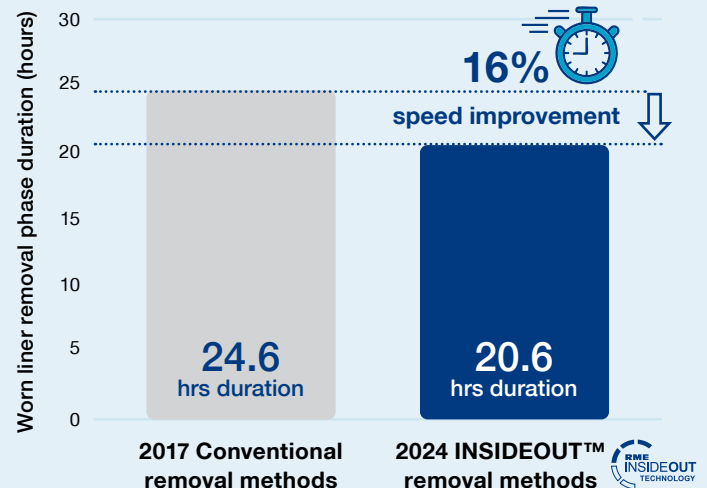


AFTER: Worn liners removed from the mill wall without crew inside

SAFETY RESULTS Reductions in hazard exposure inside the mill for a 38' SAG mill.



PRODUCTIVITY RESULTS Reductions in worn liner removal time for a 38' SAG mill.



Implementation results draw on time-and-motion studies from multiple filmed relines. Case study data is illustrative only. No advice or liability is assumed.

LEARN MORE ABOUT RME INSIDEOUT TECHNOLOGY™

- ✉ sales@rmeGlobal.com
- 📞 RME Regional Service Centre
- 🌐 rmeGlobal.com



Our goal was simple: get people out of the line of fire. With the right technology, processes, and training, we've done that—engineering out hazards once accepted as part of the job. We'll keep working with our partners and reline crews to drive ever-safer relining practices.

Manager, Concentrating



RUSSELL
MINERAL EQUIPMENT

RME delivers innovation to the world

RUSSELL MINERAL EQUIPMENT (RME) is the global leader in the manufacture and supply of grinding mill relining technologies, services and support.

RME operates across 12 international Sales and Service Centres with a global reach of over 440 mine site locations.

RME's commitment to industry is to visibly, defensibly and sustainably improve our Customers' concentrator performance. We enable our Customers to remove fatal risk through innovative solutions.



HEADQUARTERS

Toowoomba

149 Hursley Road
Glenvale, Toowoomba
Queensland 4350 Australia
p: +61 7 46 989 100
e: sales@rmeGlobal.com

REGIONAL SERVICE CENTRES

Toowoomba

149 Hursley Road
Glenvale, Toowoomba
Queensland 4350 Australia
p: +61 7 46 989 100

Perth

Unit 3, 73 Discovery Drive cnr Tidal Way
Bibra Lake
Western Australia 6163 Australia
p: +61 7 46 995 712

Panama City

Torres De Las Americas,
Torre B, Piso 3, Oficina 301 Panama
Republica de Panama
p: +50 76 674 6101

Johannesburg

22 Spartan Road,
Spartan, Kempton Park
Gauteng 1649 South Africa
p: +27 87 809 2830

Santiago

Las Garzas 950, Galpón G-H
Quilicura
Santiago, Chile
p: +56 2 2963 7860

Salt Lake City

4303 South 590 West
Murray
Utah 84123 USA
p: +1 801 871 0500

REGIONAL SALES CENTRES

Toowoomba

2 Russell Street
Toowoomba City, Toowoomba
Queensland 4350 Australia
p: +61 7 46 989 100

Lima

Calle Las Orquideas 585, Edificio Fibra
Piso 13, Oficina 1316
San Isidro, Código Postal 15046
Lima 27 Peru
p: +51 914290694

Antofagasta

General Borgoño 934,
Piso 2, Of. 202
Antofagasta, Chile
p: +56 2 2963 7860

Accra

C/- Regus, Private Mail Bag
(PMB), CT 460
Cantonments
Accra p, Ghana
p: +233(0)307010963; Ext. 721

Vancouver

777 Hornby Street, Suite 600,
Vancouver
BC V6Z 1S4, Canada
p: +1 250 682 2815

London

10 John Street
London WC1N2EB UK
p: +44 787 396 5558

fast, reliable, safe

rmeGlobal.com