

## Mill relining automation: Applying lessons learned

*S. Gwynn-Jones<sup>1</sup>, D. Groves<sup>2</sup>, J. Bohorquez<sup>3</sup>, J. Norley<sup>4</sup>, J. Walton<sup>5</sup>, C. Kramer<sup>6</sup> and S. Smith<sup>7</sup>*

1. Global Applications Engineering Manager, Russell Mineral Equipment, UK. Email: [Stephen.gwynn-jones@rmeglobal.com](mailto:Stephen.gwynn-jones@rmeglobal.com)
2. Advanced Technology Lead Engineer, Russell Mineral Equipment, Toowoomba, QLD, 4350. Email: [dgroves@rmeglobal.com](mailto:dgroves@rmeglobal.com)
3. MRD Engineering Team Leader, Russell Mineral Equipment, Toowoomba, QLD, 4350. Email: [Joel.Bohorquez@rmeglobal.com](mailto:Joel.Bohorquez@rmeglobal.com)
4. Applications Design Engineering Team Leader, Russell Mineral Equipment, Toowoomba, QLD, 4350. Email: [Jake.Norley@rmeglobal.com](mailto:Jake.Norley@rmeglobal.com)
5. Product Development Engineering Manager, Russell Mineral Equipment, Toowoomba, QLD, 4350. Email: [Joshua.Walton@rmeglobal.com](mailto:Joshua.Walton@rmeglobal.com)
6. Product Manager THUNDERBOLT Products, Russell Mineral Equipment, Toowoomba, QLD, 4350. Email: [Christian.Kramer@rmeglobal.com](mailto:Christian.Kramer@rmeglobal.com)
7. Group Manager - RME Optimised Relining Solutions, Russell Mineral Equipment, Toowoomba, QLD, 4350. Email: [ssmith@rmeglobal.com](mailto:ssmith@rmeglobal.com)

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### ABSTRACT

Replacing worn mill liners constitutes between 2-5% of lost annual mill availability, making it one of the most expensive maintenance tasks. In critical commodities like copper, declining ore grades mean mill operators are requiring larger diameter mill sizes (e.g. 36-40') to achieve sufficient throughput. The value for a 36-40' SAG mill can be between US\$ 80k to 200k per hour based on LME prices of contained metal in ore.

Automating mill relining removes personnel from high-risk activities and allows faster machine movements to be applied, consistently and repeatably, to reduce concentrator downtime. If automation can deliver a 1% improvement (or 87 hours) in annual mill availability for a mill-constrained plant, it could generate an additional US\$ 9m-18m in production value per annum.

Leveraging its global OEM experience, RME is automating mill relining in close collaboration with early adopter customers, liner suppliers and third-party reline crews. It's been a significant program, no less than because of the infrequency of relining events, typically occurring 2-3 times annually, which limits opportunities for introducing improved processes and technologies. Additionally, in some cases, existing liner inventory must be depleted before suitable liners can be implemented.

Consequently, RME has taken a modular, systems engineering approach and focused on the roboticisation of field-proven relining technologies. This materially reduces implementation risks and costs for mill operators compared to unproven prototype equipment. Early adopter brownfield and greenfield sites have now completed over 30 relines using a range of RME's automated technologies.

This paper will provide an update on the progress of automating mill relining and share quantitative safety and efficiency results achieved. Site data has been captured using video and analysed using time and motion studies combined with discrete event simulation technology. This paper will also share promising upcoming developments in automated relining technology that overcomes common implementation challenges.