# Buried riches

By delving deep into its data and processes, Ausenco Rylson helped Australia's Century mine boost its assets' lifecycle value even as they neared decommissioning. **Nick Tompkins** uncovers the story.

*Image supplied with the permission of MMG Century*

**Ausenco Rylson is an asset management, logistics support and engineering services provider to the mining, engineering, water and government sectors globally. Using proven methodologies, the business offers a comprehensive range of services across all aspects of asset management and reliability engineering to deliver world-class outcomes to clients.**

Traditionally clients engaged Ausenco Rylson during the "acquire and utilise/maintain" phases of the asset lifecycle, with a strong focus on delivering risk-based maintenance strategies in line with the asset management strategy and objectives. However, more recent volatility within commodity markets has meant that Ausenco Rylson has seen a shift in priorities for its clients. Mining companies in particular need to be able to react to changes in the marketplace, and refocus their asset management strategy and objectives to maintain competitiveness.

MMG's Century mine is Australia's largest open-cut zinc mine. It began production in 1999 and is located at Lawn Hill in north-west Queensland. The open-cut mine runs a number of truck and shovel fleets complemented by drills, dozers and graders. The Century concentrator is primarily a conventional grinding and froth flotation circuit comprising one semi-autogenous (SAG) mill, two ball mills, 21 stirred mills and 79 flotation cells. A 304-kilometre underground pipeline is used to transfer processed zinc and lead concentrates to Century's port operation at Karumba for shipping.

> **"Century mine had been diligent in their collection of failure data - over 10 years' worth was available for analysis"**

The mine is nearing the end of its life, and in 2013 Ausenco Rylson was tasked with identifying opportunities for cost and risk optimisation within the business' operational expenditure.

After an initial assessment phase, Ausenco Rylson designed a cost and risk optimisation methodology customised specifically for MMG's Century mine. A key tenet of this methodology was to identify high cost drivers where maximum opportunity could be found with minimum risk. A three-stream approach was employed to not only identify improvement opportunities but also support the implementation and ensure any benefit was sustainable for the long term.

Stream 1 focused entirely on reducing the costs associated with preventative and predictive maintenance by understanding failure mode criticality and optimising task frequency as a result.

Stream 2 analysed over 10 years' worth of failure data to accurately assess component risk and optimise component usage and care plans until end of mine life.

Stream 3 focused on work management practices, mentoring, coaching and measuring work management key performance indicators (KPIs) in order to improve execution and productivity.

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Risk-based approaches to the optimisation of predictive maintenance frequencies are quite well-known but not implemented widely. The traditional approach – setting the frequency of the condition-based task at half the potential failure to functional failure (PF) interval – has inherent risk built in. Ausenco Rylson challenges these views by presenting a criticality-based approach to frequency selection.

## Break with tradition

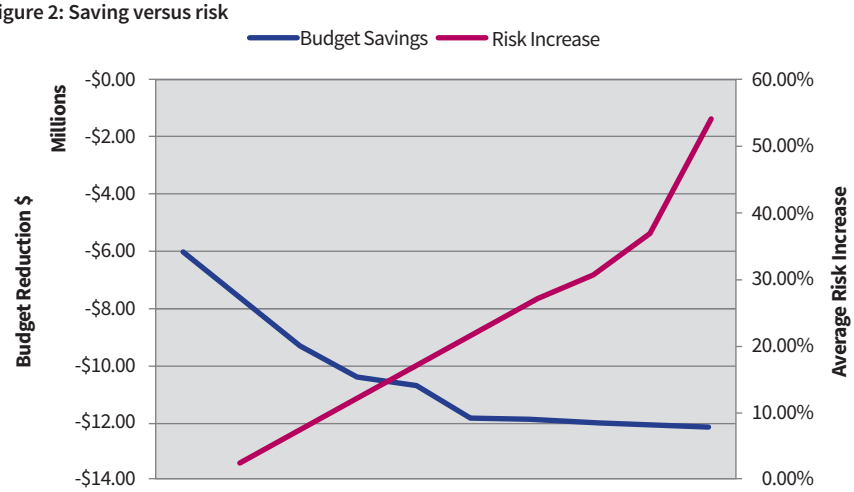
For a highly effective condition monitoring technique – one with a 98 percent probability of detecting the potential failure prior to functional failure, for example – the traditional approach has an inherent risk of roughly 0.05 percent. In other words, by setting the task frequency at half the PF interval we are accepting a probability of failure of 0.05 percent, or 1 in 2,000. We proposed to maintain this level of risk for failure modes with a medium level of risk, and proposed more frequent tasks for high criticality failure modes and less frequent tasks for low criticality failure modes with a maximum risk exposure of two percent (Figure 1).

An added benefit of this approach was to identify condition monitoring techniques, particularly rudimentary inspections, which added little value and could be removed from the maintenance program. Optimisation of predictive and preventative maintenance practices reduced the overall maintenance budget by between five and seven percent. Figure 1 shows the acceptable probability of failure increases exponentially as the failure mode criticality is reduced. The PF interval divisor (n) to calculate the frequency of inspection is a function of the probability of detecting a failure and the acceptable probability of failure.

Century mine had been very diligent in their collection of failure data and over 10 years' worth of data was available for analysis of component lives and failure patterns. This data allowed Ausenco Rylson to map the risk profile of the high-cost components within the business and optimise the care plans of specific items which were due for replacement, so they would instead last until the end of the mine's life.

As demonstrated in Figure 2, we identified AU$6 million in savings that would have a minimal impact on the business's risk profile. Working with MMG, we were able to agree on improvements of close to AU$10 million by not exceeding baseline risk by more than 10 percent. This analysis alone was one of the key contributors to the business achieving overall lifecycle cost reductions in the order of 17 percent.

**Figure 2: Saving versus risk**

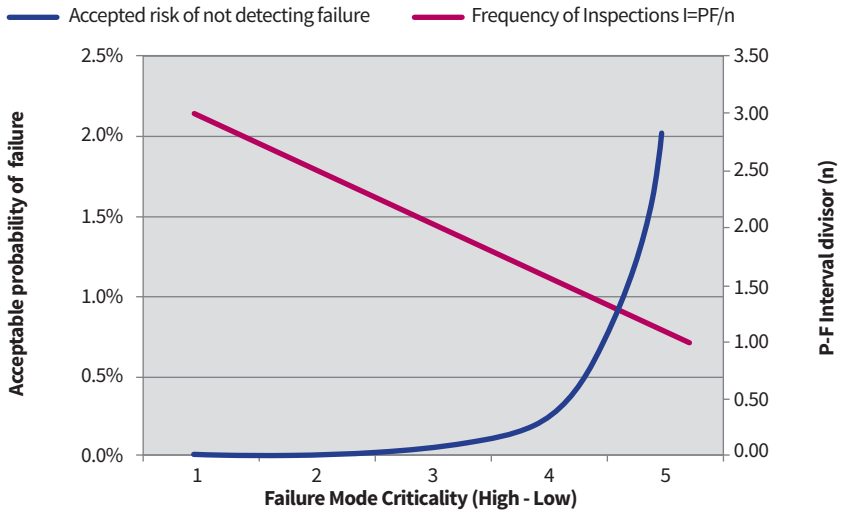



## Mentoring and monitoring

A key learning from previous projects was the risk of the client not implementing the identified opportunities and harnessing the savings. MMG and Ausenco Rylson worked very closely together to ensure buy-in from both Corporate and Site stakeholders. The Ausenco Rylson team managed the implementation for the client while up-skilling the onsite reliability and planning teams to deliver the new plan. Dedicated work management mentors worked with the workforce to embed best practice while closely monitoring key performance indices such as schedule compliance and planning accuracy. With any change to strategy it is important that the work is executed as per the plan and these mentors ensured that the transition went flawlessly.

The results far exceeded the original goal of the project to reduce lifecycle costs by 10 percent, with overall savings in the order of 17 percent. The project was completed over a nine-month period inclusive of implementation.

**Figure 1: Predictive maintenance frequency optimisation**




**Author's biography**

**Nick Tompkins is Ausenco Rylson's Technical Manager. A degree in mechanical engineering, plus extensive and varied experience in engineering, asset management, asset maintenance, production, business management and people management characterise Nick's strong background and genuine interest in asset maintenance and asset reliability.**

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