

Mining industry set for a more challenging tomorrow

The 'easy stuff' is long gone. What does that mean for the industry's future?

Simon Hanrahan FAusIMM,
Principal Consultant, SRK Consulting



Exploration
Mining Camp

Is there a new norm in mining? That is the question being raised as the commodities cycle takes another turn. To get a sense of the answer, we need to look closely at the challenges and complexities facing new and ongoing mining projects and operations in a changing resources industry landscape.

Technical challenges

Several large-scale surface mines are nearing the end of their economic life, and with mineralisation often continuing at depth, there is sometimes a business case to transition to a large-scale underground operation.

The typical transition lead time (approaching 20 years) is often underestimated and globally there are at least two open pit mines discovering this to their detriment, having to continue with yet another cutback when going underground could potentially provide more value. A common theme is deeply entrenched surface mining mindsets, leading to a preference for continuing in the same fashion until it is too late.

It takes considerable effort and cost to acquire the significant amount of knowledge required for an orebody at depth. Without this orebody knowledge, the underground expansion may carry unresolved challenges and potentially unacceptable risk.

An ever-increasing number of new large-scale deposits

will be mined by underground methods rather than by surface mining methods, which presents numerous challenges going forward.

It is not uncommon to see depths reaching 2000 metres, virgin rock temperatures of up to 85°C and associated hot groundwater conditions, with the added complexity of weaker rock mass conditions. Coupled with this is an increasing number of mines needing deeper large-diameter raise boreholes for ventilation. A number of these holes are experiencing ground and/or reaming failures, both of which are impacting project timeframes.

While the above points speak to major new underground projects, Western Australia has examples of existing, previously shallow, underground mines that are marching ever deeper and into more challenging rock stress conditions. These conditions will not be forgiving if not extracted correctly, particularly if they encounter potential seismicity issues.

Similarly, existing open pits are also going ever deeper and require a very good understanding of the geotechnical and hydrogeological parameters to ensure long-term slope stability. Slope failure examples demonstrate that not fully understanding these conditions can generate unexpected and significant production interruptions.

These, along with other technical challenges, are expected to become more prevalent in the industry.

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Socio-political challenges

On a more macro level, profound socio-political change continues to shift the markers as project owners negotiate approval paths.

An increasing number of jurisdictions are now modifying (or talking about modifying) their tax regimes, specifically targeting resource-related projects. These modifications tend to target low-hanging fruit and are viewed as a quick win for governments to enhance their revenues.

This behaviour is effectively curtailing investment and restraining commodity supply.

The industry's social licence to operate is under pressure from many angles in parts of the world.

A recent example in Chile highlights that water sources are under increasing pressure and miners can no longer rely on water rights that impact the local community water supply.

Due to some poor past behaviours and outcomes in the resources sector, social licence support has decreased from those outside the industry. The reality is that even the best operators are judged by the lowest common denominator operator.

This has created an increasing need to address the extent to which modern lifestyles are reliant on commodities, particularly the required rate of ongoing extraction to meet demand, while at the same time mining

sustainably and in line with community expectations.

These core challenges are in addition to the myriad of challenges across other technical areas, such as geology, mining, metallurgy, groundwater, and waste/tailings management and disposal.

Brief examples given here are an indication of the ever-increasing complexity associated with new projects, and it is not clear that the impact of the complexities and how they interact with each other is always well understood.

It is currently not uncommon to see projects experience multiple materially-challenging areas that require resolution prior to demonstrating a project's viability.

Looking beyond the project challenges, the industry also needs to foster a greater collaboration between companies and industry bodies to continue the drive towards technology and innovation, as well as doing more to encourage the younger generation to stick with the industry and use the original thinking they will bring.

Where is this all leading?

During the recent downturn, the supply-demand balance was negatively impacted. While demand generally continued unabated, the supply chain, particularly exploration, for some commodities has lagged and hence it can be argued that a supply shortfall is now inherent in the supply-demand equation in those sectors. ▶

■ A more challenging tomorrow

Take gold for example. Globally there has been no new major discovery beyond those projects already under development. A common statement heard these days is that 'it is cheaper to buy ounces than to discover ounces.'

Given that most of the relatively easily mineable near-surface deposits have been discovered, there is an increasing reliance on yet-to-be-discovered deposits, the majority of which will be under cover, leading to longer project discovery and development timelines.

The latest downturn has been particularly challenging, and as an industry, we have experienced a loss of personnel across the ranks. This is exacerbated by the significant drop in new students entering resource-related tertiary subjects – which is in part a reflection of the recent challenging market conditions.

While it is commonly recognised that more needs to be done to attract and retain new entrants into the industry, the messaging and execution are often contradictory.

Companies often espouse mentoring programs, for example, but these have been seen to unravel on site, where line management is not aligned or does not have the required skills to implement the corporate aspiration. The result is the loss of aspirant scientists and engineers. Hence, the skills shortfall is, to some extent, self-inflicted.

During the downturn, many doors slammed shut on recruitment across mine operators and service providers alike.

In the drive to maintain viability, the imperative to reduce costs and improve cashflow was passed down the value chain necessarily, but not always fairly. It was not uncommon to see several months' effective delay in payment terms for suppliers and service providers, while ironically payments for the commodities produced or shipped were often received several months earlier.

The net effect was no one in the value chain could afford to take on additional entry level staff, further exacerbating the skills shortage.

It is of interest to note that as mining activity increases, major companies are now looking to hire significant numbers of tertiary graduates, while the number of students graduating has dropped. If major mining company employers are facing this challenge, what does this mean for the rest of the industry?

Towards a solution

To work towards resolving some of these challenges, we need to consider the broader setting of the current resources industry landscape. If the supply-demand balance is out of kilter in certain commodities, then commodity prices will eventually catch up and provide an incentive for developing new projects.

But many are yet to be discovered and evaluated, and exploration processes need to continue to innovate for deposits that are under cover, followed by downstream studies that are more robustly evaluated to ensure the viability of those projects can be demonstrated and funding can be secured.

This is particularly relevant to projects outside of the major mining companies where the supply of capital is more constrained.

A key aspect for the industry's success will be increased collaboration – up and down the value chain – to ensure better resourcing, retention and knowledge transfer.

The international underground caving community is a shining light in how collaboration promotes thinking differently about complex issues.

There is a high degree of connectivity and networking that benefits all caving operations and projects through a willingness to share lessons and experience in what is arguably the most technically challenging mining method on the planet. Nurturing 'knowledge communities' to share ideas, resources and promote innovative thinking should be the way forward.

In the consulting world, there is a push to avoid pigeonholing the next generation of consultants too early. Providing them with a broader skill set allows people to think differently about problems and more actively engage across disciplines to meet needs of complex projects.

As an industry, we would be lost without our people, even with increasing levels of automation that will need to be applied selectively across projects and operations. Collectively, we need to establish a more united front in terms of attracting and retaining people in the broader industry. When there is threat of increasing taxes, the mining industry bands together, but this cohesion is not always evident when it comes to attracting, developing and retaining the labour pool needed to service the market.

If the mindset and approach to sourcing people does not change, competition for human resources will become more aggressive, to the detriment of the industry.

Contending with growing complexity across all types of mining projects and operations will require a collective commitment to communication, collaboration and empowerment across the value chain.

And so, with the pace of change increasing and complexity growing, a 'new norm' is taking shape.

This will bring new challenges and new approaches, as well as a level of uncertainty.

It will be interesting to see how it all plays out. **5**