

Big Steps, Smaller Footprints

Orica's blasting technology may not be the silver bullet environmentalists seek, but it's a step in the right direction – and it offers miners more buck for their bang.

These are boom times for the explosives manufacturers that enable miners to blast rock. Australia, however, faces conflicting pressure: the country is highly dependent on coal as a primary export and electricity source, but it also eagerly awaits the outcomes of the government-sponsored 2008 Garnaut Climate Change Review (a review set to endorse moves towards an economy with lower carbon emissions).

The good news is that the world's leading supplier of commercial explosives is providing alternative blasting methods to help miners take bigger steps, with smaller carbon footprints. Orica Mining Services is the world's largest explosives manufacturer, and most of the company's explosives are produced for the mining industry.

"Miners are stuck in the invidious position of chasing ore bodies and coal and having to go increasingly deeper to get them," explains Geoff McKellar, Global Manager for Orica Blast-based Services. "The deeper you have to go the more energy you use, and the more energy you use the more carbon you emit."

More value

Whilst no one product, service or technology provides "the answer" to this problem, Orica has developed a range of technologies that make it possible to achieve step change and meaningful improvements in the intensity of energy and emissions in the mining industry.

"We have a process for working in close partnership with our mining customers on this issue. It involves the use of a computer model to help quantify the energy and emissions intensities in a range of mining processes. We then identify how intensity improvements can be made, by applying specific technologies developed for our Blast Based Services."

McKellar explains that conventional mining methods use a step-by-step process involving a

number of separate blast events. For each individual blast the surface must be cleared after excavation of the prior blast, followed by a round of surveying and marking the hole locations for subsequent rounds. Holes are then drilled, explosives/initiators loaded and then the next blast is fired. This requires substantial time and resources and affects a mine's productivity.



*Geoff McKellar,
Global Manager,
Orica Blast-based
Services*

In contrast, Orica's Blast Based Service offering 'Stratablast' combines geological expertise and a unique electronic blasting system, with field-proven high-performance explosive products, to eliminate some of the traditional steps in a conventional blasting process. As a result, miners get more value for their operations.

"With Stratablast you're not doing all those separate cycles, and you can actually execute the multi-layer blasting all in one massive blasting event," McKellar explains.

Less impact

Using the same, and in some cases less, explosives to recover more coal plays a big hand in helping to minimize environmental impact. McKellar uses the term 'intensity improvements', meaning that for the same amount of energy employed (which emits carbon dioxide) a miner can recover more coal. "So if it's about 100kg of carbon dioxide that's emitted by a mine to extract each tonne of coal out of the ground, a 5-10% improvement in coal recovery will in turn reduce that intensity level." Such technologies, when combined with improved throw blasting, can facilitate

intensity improvements of up to 15%.

In the global arena, Orica believes its services are in a league of their own. "Stratablast is a revolutionary new blasting method without precedent," explains Orica's Principal Mining Consultant and Stratablast creator, Tapan Goswami. "The use of conventional blasting methods generally result in coal losses of 5-25%," Goswami says. "By contrast, Stratablast generally has a coal recovery rate in the vicinity of 96-97%."

What's more, Stratablast has set a new international standard in preventing coal dilution (when the coal is crushed with the other rock layers and becomes degraded) by protecting the coal seam throughout the blasting cycle. In 2005, Stratablast was used at the Ensham mine in Queensland's Bowen Basin, and following the success of the initial blast the technology was routinely implemented.

Good timing

Using the Stratablast methodology requires incredible precision and timing. This is not feasible with conventional initiators as their timing is too erratic. This is where Orica's highly sophisticated electronic blasting system, i-kon® Digital Energy Control, comes in. The electronic technology controls the way each of the explosions interrelate, with delays ranging from a few milliseconds up to several seconds. Each layer is blasted with an individual design to achieve a specific blast result – aided by specialized computer modelling and geological understanding.

Predictive computer modelling is not new to the industry, but McKellar says it has really picked up within the past five years. Such computer modelling allows for in-depth strata analysis, unique layer-by-layer positioning of the explosives and precise design of the detonation time of each explosive charge.

McKellar likens the nature of the Stratablast process to that of an oceanic wave. "Through the



i-kon® electronic technology controls the way a series of explosions interrelate, with precisely timed delays ranging from a few milliseconds to several seconds

principles and outcomes of precision blasting we build a wave of energy and momentum going in one direction to provide a 'throw blast' [which throws all the overburden material out]. Once the initial throw blast 'wave' has settled, a second blast underneath breaks the remaining layer of solid rock that has provided protection to the coal seam. It's the i-kon system's precision and timing control that enables us to do this."

These technologies provide another advantage by also allowing material to be strategically blasted to a specific muck pile shape, thereby minimizing excess energy and digging. And the Australian mining industry is realizing the benefits of Orica's blast based services. In 2005, Stratablast and i-kon were used in a blast conducted at a large open cut coal operation in the Hunter Valley, New South Wales. The blast exceeded expectations and recovery of the coking coal seam exceeded 90%. Coal recoveries with Stratablast continue to be exceptional as it is increasingly being adopted by mines in New South Wales and Queensland.

Drive for change

An infectious awareness of the need to maximize productivity and minimize carbon emissions is creeping through the Australian mining industry.



Stratablast technology has been routinely implemented at the Ensham mine in Queensland's Bowen Basin since 2005

The upside, according to McKellar, is that many Orica customers who previously turned to these technologies solely for economic benefits, now obtain additional value through emission reductions.

"In the future, mines will have to be more aware of their carbon footprint and how they manage it," McKellar says. "There will be a lot more scrutiny on blasting practices, mining practices and associated methodologies. There is a drive for change coming across the whole industry."

Orica feels compelled to assist miners in meeting this challenge. "We know that by reducing coal losses we can help miners increase productivity," McKellar says, "and at the same time we can reduce their measure of intensity by a factor of up to 5-15%. We're not trying to 'greenwash'. This technology is not the cure-all and it's not the silver bullet." It is, however, leaving a footprint that's heading in the right direction.

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