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Clearing the air

Komatsu and EnviroMist's dust suppression collaboration is delivering underground safety gains for Australian operations.

There are many times in mining where the hurdles to achieving operational successes are smaller than what meets the eye. Sometimes, literally.

Dirt and dust are natural by-products of mining minerals, and keeping this airborne uplift suppressed is key to ensuring peak visibility, safety and machine operator performance standards.

Komatsu and the EnviroMist team had a mutual agreement that this hurdle needed to be overcome – with the deployment of its dust suppression system at an Australian mine, fitted to a 12CM30 continuous miner,

where site observation and monitoring indicated an immediate reduction in airborne dust levels.

The EnviroMist industrial dust suppression system provides micro-mist dust suppression and dust control for both above and below-ground mining operations.

Komatsu regional manager for New South Wales Mitch Campbell said EnviroMist understood it had a “unique technology” that could solve long-standing dust suppression issues in the Australian mining industry.

“In the initial, early stages of development, EnviroMist dealt directly with the mines or through

third-party mining services suppliers,” Campbell said.

That changed in 2016, when EnviroMist and the University of Wollongong were awarded the Australian Coal Industry Research Program (ACARP) research funding to develop improved dust suppression within underground coal mining applications.

Trials on Komatsu's 12CM series continuous miners and longwall roof supports followed, with underground tests of the new high-energy micro-mist dust suppression systems, which were positively received by participating customers.



EnviroMist's unique dust suppression system has been installed on Komatsu's 12CM30 continuous miners as part of their collaboration.

Images: Komatsu

Campbell said the goal from Komatsu's perspective was to reduce airborne respirable dust exposure by targeting finer particles that conventional large-droplet spray systems had long left behind.

"The collaboration also targets a complete system outcome, enabling better dust capture with more controlled water usage, so mines can improve conditions without increasing water on the ground or creating downstream moisture issues," he said.

The technology at the heart of the system is EnviroMist's water atomisation process. Conventional spray systems produce large droplets that wet surfaces and cool equipment, with EnviroMist's nozzles designed to produce high-energy water droplets with average sizes similar to the average dust particle itself, typically under 40 microns in diameter.

The benefit, EnviroMist managing director Vitold Ronda said, is that fine droplets increase the probability of a dust-to-droplet impact, causing particles to bond and become heavy enough to drop from the air without significantly adding moisture – contributing to improved workplace conditions for workers underground.

"If you can atomise water into the droplet size range that best interacts with respirable dust and deliver it to the right zones, you can materially improve dust capture," he said.

When used at the mine site, the system was first installed as a retrofit on an overhauled 12CM30 continuous miner, where monitoring indicated an immediate and measurable reduction in airborne dust during the cutting sequence.

Twelve months later, the mine commissioned a new-build 12CM12-D continuous miner supplied by Komatsu, this time with the EnviroMist system fully integrated at the design stage.

The installation comprised six face-mounted sprays, four throat sprays, two tunnel sprays, two under-



EnviroMist's nozzles produce high-energy water droplets with average sizes similar to the average dust particle itself.

mesh carrier sprays and two tail and discharge-mounted sprays, all operating independently from the conventional spray blocks traditionally fitted to Joy continuous miners.

This, Campbell noted, made a meaningful engineering difference. Rather than retrofitting components into an already space-constrained machine layout, Komatsu engineers were able to build in mounting points, hose routing, controls and testing provisions from the outset – making the dust suppression system a coherent part of the machine rather than an addition to it.

This outcome was confirmed by those using the machinery, where, following the initial system optimisation to suit site-specific conditions, site monitoring indicated a significant reduction in airborne dust exposure events during the mining cycle.

The 12CM12-D has since operated daily with substantially reduced airborne dust levels and with no significant faults reported as being attributable to the EnviroMist system.

According to EnviroMist, independent testing at an underground coal mine identified respirable dust exceedances in 10 of 20 monitored locations. Following installation of a replacement spray system designed by EnviroMist, subsequent testing by the same technician at the same locations reported no exceedances under the conditions tested.

This, Campbell said, points to the importance of partnership in accelerating safety innovation.

"I believe these collaborations enable problem-solving because safety outcomes depend on how the machine and operating practices work together, not just in isolation," he said.

With EnviroMist's technology applicable across iron ore, hard rock and coal operations, Komatsu and EnviroMist see the potential reaching well beyond continuous miners.

"The challenge of respirable dust is not unique to mining, and the tools to address it are only getting sharper," Campbell said. **S**