

AEL looks to safety with Vertical Drop Emulsion Delivery System

The Vertical Drop Emulsion Delivery System shrinks miners' explosive footprint, boosting safety and efficiency.

Johannesburg-based AEL Intelligent Blasting is a proud member of the JSE-listed AECI Group. For over 100 years AEL has continuously responding to the industry's needs in challenging underground mining environments. AEL does this by providing products, delivery systems and equipment that meet these requirements with a key emphasis being on safety.

The company has pioneered the world's first Vertical Drop Emulsion Delivery System, (Vertical Drop). This integrated system delivers the non-detonable base emulsion and sensitiser required directly to a storage facility. These storage facilities can be designed to be in close proximity to the underground production areas. This is achieved through pipes installed in a borehole from the surface, leading to an underground storage bay. This unique delivery system enables the large scale implementation of AEL's Underground Bulk Emulsion System.

According to AEL, Vertical Drop was designed to shorten the logistical leg of base Underground Bulk emulsion deliveries. This is conducted from the surface storage facility to the underground working areas. Delivery is now achieved through the partial, or preferably total, elimination of conventional underground transportation of materials.

The Vertical Drop Emulsion Delivery System reduces the flow of materials and chemicals in the main arteries of the mine. This ensures efficiencies in transport, higher levels of security and more control over chemicals and explosive precursors.

The conversion to AEL's Underground Bulk Emulsion System, combined with Vertical Drop, also eliminates the traditional difficulties and constraints associated with explosive deliveries. These required explosive deliveries at fixed times, strict shaft and tramming schedules. In addition, the clearance of the shaft head and infrastructure was required during explosives movement. Underground, the requirement was for the storage, under the mine's authority, of explosives that require comprehensive legal control of a large inventory of explosive products.

AEL says the system not only impacts hugely on financial savings and efficiency. Reports suggest reductions of 14% in the total monthly Mobile Charging Units' (MCUs) engine hours combined with an approximate 12% reduction in monthly MCUs' fuel consumption. The system also significantly reduces the time and manpower required to be spent transporting these materials down shaft, decline and roadway systems.

Manual handling of any materials is an ongoing safety risk. If this is eliminated, significant safety and productivity benefits can be realised. With Vertical Drop, the multiple potential interfaces with traditional explosives, are reduced. AEL's Underground Bulk Emulsions are sensitised at the working face during charging.

The non-detonability of AEL's base emulsion and this unique delivery system also lessens the risk of explosives theft. This is achieved as the bulk emulsion displaces traditional explosives and is not in itself an explosive (until sensitised).

Vertical Drop was designed to balance material delivery flow rates, with the technical considerations required for deep drops. AEL says this is necessary to prevent unnecessary shear of the emulsion products delivered. This shear thickens the emulsion and can lead to crystallisation, both undesirable events.

In the delivery of each Vertical Drop, AEL partners with top engineering firms. This ensures expert engineering technology is used during the design, fabrication and installation of each Vertical Drop System. These considerations enable a robust, repeatable and efficient transfer system for each delivery.

The Underground Bulk Emulsion System is a technology that AEL considers to be one of its on-going success stories. AEL comments that its technology continuously evolves through the introduction of fit-for-purpose emulsion formulations. These formulations are augmented by its bespoke delivery systems.

Underground bulk emulsion explosives consist of a base emulsion and a sensitiser. These are classified as non-detonable and non-explosive, respectively. From a safety perspective, an explosive is only created in the blast-hole once the sensitiser is added to the base emulsion and mixed / sheared.

Delivery and sensitisation occurs in the blast-hole through the use of AEL's series of Mobile Charging Units or the latest Portable Charging Units.

The base emulsion and sensitising agents are stored separately on these manufacturing units and are only mixed during charging of the blast-hole.

AEL believes safety is a priority for all its products, thereby supporting and promoting the mining industry's drive to reduce the number of incidents.

With mining, particularly in the gold and platinum sectors, going ever deeper and deeper, there is an increasing requirement for technology that promotes and enhances safety. Compared with conventional explosives, there are fewer people involved in AEL's Vertical Drop delivery process. This

reduction in manual handling, combined with the non-detonable characteristics of AEL's Underground Bulk Emulsions in their base form, means that fewer people are exposed to explosives, and that less personnel are involved in general handling and transportation. These factors contribute to the improvement in the safety and logistics of this aspect of mining.

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