The Fourth Australasian Ground Control in Mining Conference 2018

Paper Number: 21

Single pass drill, install and inject self-drilling resin bolt application in poor ground

G Watt¹, T Roberts², D Faulkner³

- 1. Geotechnical Manager, Oyu Tolgoi LLC, Mongolia
- 2. Hard Rock Geotechnical Manager, Jennmar, Australia
- 3. Vice President Research and Development, Keystone Mining Services, USA

ABSTRACT

Traditional mechanised resin rock bolting in hard rock underground mines requires the installation of resin capsules into a pre-drilled hole prior to the rock bolt being spun into a hole to mix the resin and set the bolt in place. In poor rockmass conditions, especially at depth or in highly altered faults and shears, the condition of the holes often deteriorates as the poor ground around it unravels and falls into the hole. This results in partially or fully blocked holes that either damages the resin capsule when they are being inserted into the holes or prevent it entirely until the hole is continuously cleaned of debris. This deterioration of the hole condition, and continuous need to clean and re-drill holes, also increases the diameter of the hole which in turn affects the continuously mechanically coupled anchorage mechanism of the rock bolt to the rockmass as there is simply not enough resin in the hole to fill the annulus between the bolt and the rock. This results in a large increase to critical heading cycle time and, more importantly, results in the rock reinforcement not performing as per design specification and increases the risk of instability. To overcome the quality control issues with resin bolt installation in poor ground, a single pass drill, install and inject self-drilling resin bolt application was designed and implemented for use in such conditions. This system allows the operator to inject a premixed two part polyester resin through a self-drilled hollow bolt to fully encapsulate the rock reinforcement. The self-drilling bolt allows for post injection of the hole after the bolt has been installed into the rock and gives the operator manual or automated control on the amount of resin used in the hole to ensure complete encapsulation and continuously mechanically coupled anchorage to the rock. This allows the reinforcement to work as designed and provide the Geotechnical Engineer extra quality control confidence in these conditions. The implementation of this single pass resin bolting system resulted in significant decreases to the resin bolting cycle time and rock bolt quality control failures. In this paper the design, implementation and embedment into the development cycle will be discussed and the in-situ quality control checks used to validate the increase in rock bolt installation quality will be shared.