Admixture use in cemented rock fill

J.O'Brien[1], *B. Roache*[2] *and M. Gray*[3]

1.Geotechnical Engineer, South 32, Brisbane QLD 4000. Email: j.obrien2@hotmail.com
2.Global Geotechnical Manager, Mining One Consultants Pty Ltd, Melbourne VIC 3000. Email: broache@miningone.com.au
3.Technical Services Superintendent, Evolution Mining, Sydney NSW 2000. Email: matt.gray@evolutionmining.com.au

ABSTRACT

Admixture use in cement products is commonplace in the construction and mining industries. Many Australian mines have an operational concrete batch plant and stock hydration control and water reducing admixtures. The benefits of admixture use, especially in shotcrete is understood and well documented.

Cemented rock fill (CRF) is used to fill stope voids and create stable vertical and undercut surfaces at some Australian mines. These mines generally mix rock fill with a slurry of cement and water without the use of admixtures. Recently published work on optimisation of CRF mixes has mainly focused on the strength increases associated with changes to the mix grading proportions by the addition of fines, but not focusing on the potential benefits of admixture use. Admixture use in CRF may be the simplest CRF optimisation method, as the admixtures will often be added by the push of a button at the batch plant.

A CRF testing program was undertaken to test the benefits of admixture use in terms of strength gain, using hydration control additives (HCA) and high range water reducer (HRWR) admixtures. Rock fill gradings were strictly controlled in the test process to allow clear definition of the difference admixtures provide in compression at 28 days. The testing results define admixture associated strength gains in a 6 % general purpose (GP) cement by dry weight CRF mix (131 kg of cement/m^3). Costings have been developed to allow a mine operator to understand the cost benefits of admixture use in CRF due to reduced operating costs. Operational efficiency advances and a suggested admixture implementation plan for CRF optimisation is offered.