The Fourth Australasian Ground Control in Mining Conference 2018

Paper Number: 19

Design and testing of high capacity surface support

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ABSTRACT

Steel wire weld mesh is a common industry standard surface support used in underground mining traditionally installed with mining drills during the bolting cycle. As underground mining depth and stress increase, mining methods and their sequences at these depths place challenges on conventional surface support options. These challenges have provided a need for high capacity surface support options that improve development efficiency, reduce the need for secondary ground support installation and is easily installed with current mining equipment. A 5m² mesh testing machine was built, suspending a 9500kg concrete slab, designed with multiple hold down points to test varying bolting patterns. Mesh load and displacement is accurately measured using a data acquisition system which pushes against the restrained mesh module with an available 600kN load and 1200mm displacement capacity. A testing program comparing conventional surface support, straps and combinations of both were tested for baseline results. New module designs incorporating existing mesh types and new design concepts were manufactured to allow for single pass installation during a bolting cycle. Eleven mesh types, mesh/strap combinations and new mesh module designs were compared using the same test method. Based on these results, two high capacity mesh module types are produced. This paper will detail the test program, load and displacement results and underground mesh module performance, describing the two high capacity mesh modules function within the development cycle and in situ performance.

Keywords: surface support, high capacity, development efficiency, mesh module, ground support