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The Relationship Between the Magnitude of Impact Velocity Per Impulse and Cumulative Absorbed Energy Capacity of a Rock Bolt

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ABSTRACT

Currently, when the results of a dynamic test are stated, the input energy and estimated impact velocity are stated. The bolts will be tested by either multiple impulses with the absorbed energy, stated as the summation of the energy absorbed during each individual impulse or the sample is subjected to a single larger impulse capable of inducing failure, the energy absorbed prior to failure is stated at the absorbed energy. In some cases, the impact velocity is increased to meet the energy required to induce failure as the maximum drop mass is a limiting factor.

This research, conducted at New Concept Mining using the Dynamic Impact Tester on the PAR1 Resin bolt, manufactured from a single batch of steel; aims to quantify the effect of the impact velocity on the cumulative energy absorption. A total of twenty-five samples were tested in batches of five samples. The input energy was maintained at 11 kJ with the impact velocity varied between 6.4 m/s and 2.7 m/s. The cumulative absorbed energy and the cumulative deformation of the bolt will be compared to determine the effect of the impact velocity on the performance of the bolt.

The aim of the research to be better understand the effect of the input parameters during laboratory-based testing on the performance of the rock bolt. This will improve the ability of designers to extrapolate and compare data sets.