Beyond Grade: Provision of Relevant & Timely Information from Blast and Grade Control holes In Open Cut Operations

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**Abstract**

In open-pit mining operations, two critical sets of decisions must be made after blast holes are drilled: optimizing the blasting process and determining ore and waste boundaries for grade control. The quality and resolution of data collected during and after drilling are essential to these decisions. While assay deliver accurate grade information, they suffer from limited vertical resolution and are time-consuming, thus restricting near real-time use. Other conventional sources, such as Measurement While Drilling (MWD) data, are densely sampled but often deliver noisy and incomplete information.

This paper introduces case studies demonstrating the use of BLASTDOG, a multi-sensor logging system, to achieve a more comprehensive and high-resolution characterization of the bench. The near real-time measurements of physical properties of the rock and the hole are integrated with MWD data using advanced estimation and classification techniques to transform the raw data into actionable information. This information provides visibility of the relevant material type domains, rock mass characteristics, and hole conditions, in the appropriate form and time frame required by the relevant operational departments.

This approach equips mine geologists, drill and blast engineers, and geotechnical teams with crucial rock knowledge, enabling better ore/waste classification and more accurate grade control. The methodology significantly improves decision-making regarding blasting practices and downstream processing, optimizing operational efficiency, reducing risk, and enhancing resource recovery.