Use of Strength, Hardness and Abrasion Parameters to increase Orebody Knowledge and Material Characterisation

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ABSTRACT

Possessing a detailed understanding of the Strength, Hardness and Abrasion parameters of high grade materials in large scale open pit mining operations are key factors in optimising mine plans and maximising operational and maintenance efficiencies. Traditional approaches to determining material hardness in iron ores focus on gathering a limited range of strength data from diamond cores often collected as a by-product of other drilling related activities. Calculating overall deposit hardness via this method can lead to a miscalculation of the impact of the physical properties of the material on the processing infrastructure and inefficiencies in mining operations.

Roy Hill Iron Ore has undertaken a comprehensive sampling, testing, modelling and data validation programme where 11 strength, hardness and abrasion parameters for the main high grade iron ore material types were determined. Data were obtained via dedicated sampling campaigns referencing the Roy Hill Materials Classification Scheme whereby rocks representing the main high grade Mineralogical, Hardness and Texture (MHT) groupings were collected.

Rocks were then cored with the specific intention to represent the true physical properties of the material. Testing was undertaken on the core where the resultant data was compiled, validated then statistically applied to the vast Ore Definition MHT logging data set. This data was then coded into the geology and mining models to provide input data into mine planning and operational schedules.

By using this approach to collect, model and schedule hardness related information it becomes possible to run specific production schedules focussing and/or constraining on the physical properties of high grade materials. In this way system related bottlenecks can be identified and mitigated at life of mine/medium term mine horizons, rather than remaining unidentified until short term/grade control practices highlight handleability or hardness related issues.

Keywords

Strength, Hardness Abrasion, Characterisation