Drillability prediction using regression analysis for some Egyptian rocks


Abstract:

Abstract Drilling and blasting operation are an essential and integral part of mining cycle/process. They are almost employed in all mining methods (e.g., surface and underground works) as well some civil engineering projects (e.g., dams, roads construction and tunnel excavation). In feasibility studies (e.g., planning and preliminary cost estimation), the rock penetration rate (e.g., drillability) is used as a tool to predict the rock mass strength properties/characteristics. This paper examines the relationship between strength properties of selected rocks in Egypt and their drillability. Six natural rock types; were selected from different locations in the country, and another five artificial rocks; prepared in the lab with different composition, were tested in the laboratory for uniaxial compressive strength, tensile strength, shear strength, hardness (e.g., point load strength and impact strength) and rate of penetration. The regression equation is then established from the relationship between strength properties of rock and the penetration rate. The results revealed that strong correlation exists between penetration rate and compressive and tensile strength with correlation coefficient of R² ≥ 0.75 for both exponential and logarithmic functions. For Barazilian tensile strength, the correlation coefficient was of R² ≥ 0.7. The relationship between specific energy (SE) and rock strength properties are also presented and discussed in this study, where the results showed strong correlation.

Keywords:

Keywords: Drillability, Rock Strength Properties, Specific Energy (SE), Regression Analysis.

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