

The Effect of Geological Factor in Penetration Rate in Core Drilling

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Abstract

Core drilling is one of the most important processes in geotechnical and mining projects, and accurate of the factors affecting its efficiency is importance role in advancing the project. In this study, the effect of geological factors of Nakhlak mine samples has been investigated and their effect on drilling penetration rate has been evaluated. According to the researches on four rock types from Nakhlak mine, about 35 thousand meters of core drilling, it has been determined that by reducing sorting (well grading), unite weight and rock engineering properties (strength, durability, Seismic waves velocity ...) increase and the amount of porosity and water absorption decreases. This causes the decrease penetration rate of rocks. The amount of quartz mineral in the rock is also an important factor in reducing the penetration rate. Dolomitic matrix of rocks can increase porosity and penetration rate. One of the most important factors affecting on penetration rate in rock mass is the density of joints and RQD. The results show that the penetration rate increase as 160% in exchange RQD index from 60% to 80%.

Keywords: *Core drilling, Penetration rate, RQD, Sorting.*

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Extended Abstract:

1. Introduction

Core drilling in rocks for geotechnical engineering study is one of the most importance activity in project so that determination coasts of projects. Core drilling of jointed rocks are very challenge and expensive, so that study of geological condition such as texture, mineralogy and joint spacing are very important.

2. Materials and methods

Nakhlak mine in Isfahan province one of the oldest mines in central Iran. Geological condition such as mineralogy, texture and rock mass properties have very importance effect on drilling penetration rate (P.R). Physical and engineering properties of four type lithology (Lime sandstone, Dolomitic sandstone, Biopacstone and Micro conglomerate) are analysis in this study. This study shows that, lime sandstone has higher maturity (dense grain) and well grading and hither unite weigh and lower porosity therefore have higher uniaxial compression strength (UCS) and P wave velocity and other engineering properties.

Rock mass properties such as joint spacing and RQD have very important role in penetration rate. The Biopacstone because of higher RQD and lower hardness, have hither penetration rate (1.5-2.7 m/h).

3. Conclusion

Rock texture as a primary structure in intact rock have important role on unite weigh, porosity. As the same time mineralogy (Quartz and Dolomite content), have important rule in decrease of penetration rate. Well grading of rocks grain (textural factor) and high Quartz content and low cement (grain filling), cause lower penetration rate.

High joint spacing and RQD (Rock Quality Designation), cause higher penetration rate (P.R) because of discontinue impact is decrease and workability of drilling bitt is increase. Increase of RQD from 60% to 80%, increase P.R about 164%.

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