

3. Evaluation of Geological Conditions Ahead of the Tunnel Face Using Image Analysis of Drill Cuttings - Comparison with Drilling Energy and Tunnel Face Evaluation Scores -

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In the construction of mountain tunnels, ascertaining the geological conditions ahead of the tunnel face in advance is critical both for safety and efficiency during construction. One method of making such predictions is drill logging, in which ground properties are evaluated based on indicators such as drilling energy, which is derived from analyzing data including drilling speed and hydraulic pressure obtained from a hydraulic rock drill during ground excavation. Traditionally, assessments of the drill cuttings discharged together with the drilling water have relied on visual and tactile inspections, introducing the issue of evaluator subjectivity.

Therefore, our study assessed the utility of image analysis as a potential alternative, which involved comparing and verifying tunnel face evaluation scores against measurements of particle size and color obtained through image analysis of the cuttings, in addition to using drilling energy data. The results confirm that this is an effective approach for evaluating ground conditions ahead of the tunnel face.

Keywords: drill logging, drill cuttings, image analysis