The relationships between Drilling Rate Index (DRI), physico-mechanical properties and specific cutting energy for some carbonate rocks

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ABSTRACT: In this study, the relationships between Drilling Rate Index (DRI) values and the Specific Cutting Energy (SCE) were investigated by experimental work for twelve different carbonate rocks which are produced as natural stones in various regions of Turkey. Physical and mechanical properties of rocks were determined on rock samples in excavation laboratory prior to determining the DRI values of each rock type. In order to determine the SCE of the rocks, the samples were prepared in compliance with the testing standards. Cutting tests were carried out on prepared rock samples using the equipment having a circular saw. The relationships between the DRI values and physico-mechanical properties of rocks were investigated by using simple regression analyses, which yielded relationship equations with meaningful correlation coefficients of 0.81–0.94 between the DRI and physical properties of rocks whereas the relations between the DRI and mechanical properties of rocks yielded as well significant correlation coefficients ranging between 0.79–0.87. A high correlation coefficient of 0.91 between the DRI and SCE may suggest that the SCE of rocks be a useful tool in estimating the value of the DRI of rocks and vice versa.