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Technological-mechanical performance of crushed stone source rocks based on rock mechanical tests: theoretical consideration and experimental approach

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Testing of technological-mechanical performance of crushed stone relies on series of empirical tests which design attempts to simulate some of the forces that act on the individual particles during service. Despite their relative simplicity and uniformity world-wide, the results of these tests are often difficult to interpret by using basic principles of mechanics and cannot be therefore simply correlated to basic rock mechanical parameters such as strength or modulus of elasticity. However, in our view, the technological-mechanical performance of rocks used as a crushed stone cannot be fully solved without detailed understanding their physical properties (namely mechanical behaviour in the brittle field) and petrographic characteristics (namely quantitative rock fabric data). The challenging task of ongoing research project is to find which of the rock mechanical parameters can be satisfactorily correlated to technological-mechanical performance of crushed stone source rocks.
Potential of current approaches in experimental rock mechanics will be discussed giving special attention to the advanced processing of stress-strain behaviour of rocks by computing the so-called energetic parameters of deformational process, known as modulus of resilience and/or modulus of toughness. By using a highly simplified explanation, the meaning of these parameters is that material can absorb only such amount of energy that is limited by its stress-strain behaviour. It is expected that energetic parameters of deformational process of rocks can be also used for the explanation of technological-mechanical performance of crushed stone more faithfully than previously used trials on correlation between ultimate strength of rocks (determined namely in uniaxial compression but also in tension) and their technological-mechanical performance.