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Relationship of mechanical properties of crushed stone source rocks to their technological-mechanical performance

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Decision on suitability of rocks for production of crushed stone and their use in specific constructional activities relies on series of empirically-designed tests which partly simulate certain degradation forces acting during the service of aggregates. Tests for integrity of crushed stone particles subjected to mechanical forces employ several approaches simulating abrasion, attrition, and/or crushing; these can thus be generally designated as technological-mechanical performance (TMP) tests. Design of these tests has nothing to do with testing of mechanical properties viewed as fundamental physical property. However, numerous authors attempted to correlate certain mechanical properties (specifically uniaxial compressive strength data) with TMP of crushed stone source rocks. Unfortunately, relatively low correlation has been generally achieved.

In the recent study, this approach is re-examined by using not only ultimate strength data, but also knowledge on deformational process and on its energetic parameters. The results of laboratory experiments show, that some of the obtained data exhibit much tighter correlation; however, one has to be very careful in selection of proper parameters. Thorough understanding of damage mechanisms of crushed stone particles (i.e. mechanisms of their wear and breakage during service life) makes critical part of this evaluation process.