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Relationship between resistance to fragmentation and brittleness of crushed stone source rocks: towards evaluation of crushed stone mechanical performance from experimental stress-strain curves

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Brittleness is generally considered to be inverse to ductility; expressing materials ability to tolerate larger inelastic deformation. Although brittleness measurement has not been standardised yet, several approaches were proposed in the past – specifically usage of indirect tensile strength and uniaxial compressive strength data. Alternatively, brittleness estimates based on the product of pre- and post-peak moduli were proposed as well. However, none of these approaches brought satisfactory correlation with other rock properties. It has been shown previously that resistance of a rock to fracturing can be also estimated from energetic parameters (i.e. total input energy during testing required for rock damage under certain test conditions) of deformational process: encompassing elastic energy (energy stored by specimen without any brittle damage) and fracture energy (energy required for the development of new microfractures in the respective stress field). By employing this latest concept of fracture energy, the experimental rock mechanical data were processed and compared with empirically derived mechanical-technological performance test data.