

Abstract Submitted
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Dynamic Crack Tip Opening Displacement (DCTOD) as governing parameters for material fragmentation NICOLA BONORA, ANDREW RUGGIERO, GABRIEL TESTA, University of Cassino and Southern Lazio, GIANLUCA IANNITTI, Techdyn Engineering, DOMENICO GENTILE, University of Cassino and Southern Lazio — Fragmentation in metals can be approached either by Mott statistical or by Energy-based fragmentation theory. Recently, Grady showed that the two theories can be reconciled showing that the material parameter that drives tendency to fragmentation and fragment size is the dynamic fracture toughness. Experimental data do not completely agree with these conclusions. In this paper, the dynamic CTOD – crack tip opening displacement – is proposed as fracture parameter which can account for plastic deformation occurring prior fracture. Here, an experimental procedure for determining the DCTOD is presented. Two sample geometries, namely 1/2” compact tension C(T) and circumferential crack bar tension CCB(T), have been investigated for their use with tensile Hopkinson bar testing equipment. The respective calibration functions in the dynamic range were determined via FEA. DCTOD was measured using both high speed video recording with digital image correlation (DIC) technique and clip gauge at the crack mouth. The proposed procedure has been used to investigate dynamic fracture resistance of 316L stainless steel and high purity copper (99.98%) and to correlate with available fragmentation data..

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