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The Effect of Case Fracture on Blast Impulse MICHAEL HUTCHINSON, AWE, Imperial College — The initial velocity of casing fragments from bombs, shells etc. was first calculated by R.W. Gurney in 1943. This derivation was based on a reasonable simplification of the casing and gas dynamics. Subsequently, Gurney's wartime co- worker, U. Fano, issued a further report on the blast equivalence of cased explosive charges, i.e. the blast impulse they deliver as a fraction of the impulse from the same charge uncased. Fano claimed to have calculated the proportion of kinetic energy remaining with the explosive gases following energy partition with the casing. This presentation will show that Fano's equation for cased charge blast equivalence is inconsistent with Gurney's reasonable physical model, as is a further equation by Fisher. The presenter will draw attention to an equation recently published, which gives similar predictions to that of Fisher, while being consistent with Gurney's original derivation. Furthermore, it will be shown that Gurney's kinetic energy equation can be combined with G.I. Taylor's equation for case fracture strain to provide a casing-gas energy balance at fracture. This provides for the first time a widely applicable equation for the blast equivalence of cased charges, dependent only on the relative masses of the casing and explosive charge and their respective material or energetic properties. Bearing in mind possible experimental shortcomings, predictions are reasonably in accordance with blast impulse data so far available.

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