

Abstract Submitted
for the SHOCK09 Meeting of
The American Physical Society

Determining Material Strength in Ramp Loading Experiments¹

TRACY VOGLER, Sandia National Laboratories — A material's deviatoric (strength) behavior is typically more important under ramp loading than shock loading. Measuring strength remains a challenge, but the method of Fowles [1961] is particularly attractive because of its simplicity. It involves comparison of a measured longitudinal stress under shock or ramp loading with the expected hydrostatic pressure for the same density and temperature. The difference between the pressure and longitudinal stress is then proportional to the strength. The temperature along an isentrope can be calculated using thermodynamic relationships, but additional heating is created by the plastic work that occurs during compression of a material with strength. This heating must be accounted for in order to make a valid calculation of the strength, with the correct strength being lower than might otherwise be expected. Since the plastic heating is cumulative, it can lead to temperatures significantly hotter than the isentrope and large errors in the strength calculated for high compression levels.

¹Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

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Date submitted: 13 Feb 2009

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