Abstract Submitted
for the SHOCK05 Meeting of
The American Physical Society

Frictional Force Behavior in the Elastic Regime P.J. CRAWFORD, P.M. RIGHTLEY, Dynamic Experimentation Division, Los Alamos National Laboratory, J.E. HAMMERBERG, Applied Physics Division, Los Alamos National Laboratory — The friction force between materials in explosively driven events is an important constitutive relationship, even though defining the friction coefficient in the presence of large bulk deformations is difficult. Measuring the force at an interface near deformations, without significantly modifying the interface in the process, proves difficult as well. Few studies (the pressure-shear plate experiments originally performed by Clifton et al. being one) have investigated the nature of the friction force at the small time-scales and the very high sliding speeds and pressures involved in explosive events. In order to approach the study of such combinations, we have developed a novel experimental apparatus (the rotating barrel gas gun, or RBGG) that gives us independent control of sliding speed and pressure at the interface while keeping the impact elastic, allowing us to make measurements away from the interface and to interpret the results without resorting to a simulation. We measure the axial and torsional strain in an annular target rod produced by the impact of a spinning, translating annular projectile. Experiments performed using Cu/Cu, Cu/Stainless and Cu/Al tribopairs provide some insight into the kinetic coefficient of friction behavior at various sliding speeds and loads.

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Date submitted: 08 Apr 2005 Electronic form version 1.4