## Abstract Submitted for the SHOCK13 Meeting of The American Physical Society

Sample Preheating Capability for Dynamic Material Studies<sup>\*+</sup> J.L. WISE, D.G. DALTON, R.J. HICKMAN, Sandia National Laboratories, M.I. KAUFMAN, S.A. LEFFLER, M.J. JONES, National Security Technologies, LLC, J.J. LYNCH, A.C. BOWERS, Raytheon Ktech — Coordinated analysis, design, software development, hardware fabrication, and testing activities have vielded a new control system and experimental load design for dynamic material studies on specimens heated to temperatures exceeding  $650^{\circ}$ C prior to high-rate compression on a pulsed-power (e.g., Z machine) or gun platform. A proportional integral derivative controller supplies power for up to 16 resistive cartridge heaters mounted in a load assembly containing one or more test samples. The electrical output from this LabVIEW-based controller to each heater is continuously adjusted using feedback from thermocouples embedded in the load and in each heater. Experiments confirm steady temperature regulation to within  $+/-2^{\circ}C$  of the selected set point, as well as adequate surge protection from built-in electromagnetic pulse isolation circuitry. ANSYS thermomechanical simulations have guided the refinement of load design to minimize sample temperature gradients and thermal distortion. Improved thinfilm coatings for the sample/window interface are being developed to ensure the viability of velocity interferometry measurements on preheated samples. \*Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the U.S. Department of Energy's National Nuclear Security Administration under Contract DE-AC04-94AL85000; +This work was done by National Security Technologies, LLC, under Contract DE-AC52-06NA25946 with the U.S. Department of Energy.

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