

Abstract Submitted
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A new versatile conductive/radiative heating device for gas gun targets in the 300 K – 500 K range. Capability illustration for analyse of initial temperature influence on shock induced yielding and phase transitions. GILLES ROY, GAEL LANIER, CHRISTOPHE VOLTZ, CEA Valduc, France, FRANCOIS BUY, PATRICE ANTOINE, CEA Valduc — For off-Hugoniot shock loading purpose using existing gas guns, a temperature controller system has been designed to cover the range from 300 K to 500 K for various metals including some featuring low strength or poor thermal conductivity. The heating coil powered by low voltage drives from the impact face the bulk temperature of the target sample typically a few millimetres thick and 40 to 50 mm in diameter. The stainless steel heavy target holder is heated the same way, acting at the periphery as a thermal capacity to limit the thermal losses within the sample. Consequently front and rear sample interfaces remain free for full diameter impact and complete Doppler instrumentation. Typical measurements include DLI and VISAR velocity probing either at free surface or at a LiF window interface. Requested temperature is achieved within 1.5 hour, with an overall gradient better than 5 degrees. Some current applications are illustrated including analyse of temperature effect on TA6V alloy shock induced yielding and tin allotropic phase transition. The associated issue of LiF properties evolution up to 500 K is also addressed analytically.

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