

Abstract Submitted
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New Phenomena Observed in Plate Impacts onto Alumina Bars

TIM BENO, STEPHAN BLESS, Institute for Advanced Technology — Steel flyer plates were used to impact alumina bars at about 300 m/s. A manganin gauge was used to monitor the stress waves in the bar. The geometry of the impact was varied in an attempt to extend the gauge record. High-speed photos were also obtained. In Mod-1, the target alignment and mounting was improved. In Mod-2, “Pillows” were placed on the projectile impact surface, and Mod-3 consisted of the impact face being confined. Mod-1 had the biggest improvement in gauge records. It was established that after reaching a peak stress of 3.5 GPa, the stress relaxed to a plateau of 2 GPa. This apparently is the strength of material after failure in 1-D stress. The 1-D stress failure was largely by axial splitting. Later failures were by transverse faulting. Mod-2 resulted in less informative stress gauge signals. Mod-3 resulted in much higher peak stresses—some exceeded 5GPa. Explaining how such a high stress can occur in a 1-D stress environment is a severe challenge for the present conceptual framework of ceramic strength.

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