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Expanding rings of stainless steel 304L using a gas gun RUSSELL AMOTT, ERNEST HARRIS, AWE, DAVID CHAPMAN, DANIEL EAKINS, Imperial College London — An intrinsic material property of interest is fail under rapid tensile loading. Expanding cylinder experiments using a gas gun have been successfully used in the past to generate high fidelity failure data but were limited to one data point per experiment. By re-designing the expanding cylinder geometry it was instead possible to expand a series of rings. By comparison, large numbers of rings can be launched in a single experiment (with each ring achieving a different radial velocity) generating fragmentation and failure strain data across a range of different radial strain-rates. This new geometry has recently been used to expand rings of stainless steel 304L at radial strain-rates of between 103 and 104 s-1 with precise measurements of a rings expansion velocity and failure strain using a combination of high speed photography and Het-V. The increased amount of data that was collected using the new expanding ring technique enabled a dependence of failure strain on radial strain-rate to be observed. In addition a novel soft recovery system was fielded on a series of identical experiments to enable metallographic analysis on how failure affects the materials micro-structure.

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None

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