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The evolution of bulk strength behind a shock propagating in metals with controlled flaw populations CHRISTOPHER SHEPHERD, The University of Kent, GARETH APPLEBY-THOMAS, Cranfield University, NEIL BOURNE, AWE, DAVID WOOD, Cranfield University, JEREMY MILLETT, AWE — Plastic deformation in metals in the "weak shock" regime occurs by slip in the metals crystalline structure. However, such atomic motions take a finite time. Consequently, coalesce of inherent flaws leading to a macroscopic compressive strain will not occur immediately on shock arrival. In this study the effect of artificially induced flaws in the well-characterised FCC metal Al on strength behind the shock was interrogated. Cold-pressing of two differing particle size/morphology plasma-spray powders to close to bulk density allowed generation of microstructures with inherent flaws on the initial powder-size scale. Inclusion of longitudinal and lateral Manganin stress gauges then allowed the temporal evolution of material shear strength to be monitored at different distances from the impact face. Comparison to the response of bulk material subsequently allowed de-convolution of the influence of the induced flaws in the pressed structures.

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