

Abstract Submitted
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A novel graded density impactor RON WINTER, MATTHEW COTTON, ERNEST HARRIS, AWE, Aldermaston, UK, DANIEL EAKINS, DAVID CHAPMAN, ISP, Imperial College, London, UK — Ramp loading using graded-density-impactors as flyers in plate impact experiments can yield useful information about the dynamic properties of the loaded material. Selective Laser Melting, an additive manufacture technique, was used to fabricate a graded-density flyer, termed the “bed of nails” (BON). A 2mm thick x 100mm diameter solid disc of stainless steel formed a base for an array of tapered spikes of length 6mm and spaced 1mm apart. Two experiments to test the concept were performed at impact velocities of 900m/s and 1100m/s using the 100mm gas gun at The Institute of Shock Physics, Imperial College, London. In each experiment a BON flyer was impacted onto a copper buffer plate which helped to smooth out perturbations in the wave profile. The ramp delivered to the copper buffer was in turn transmitted to three tantalum targets of thicknesses 3, 5 and 7mm, mounted in contact with the back face of the copper. Heterodyne velocimetry was used to measure the velocity-time history, at the back faces of the tantalum discs. The wave profiles display a smooth increase in free surface velocity over a period of about 2.5 microseconds. The measured profiles have been analysed to generate a stress vs. volume curve for tantalum.

Ron Winter
AWE, Aldermaston, UK

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