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On a novel graded areal density solution to facilitate ramp wave generation in plate-impact studies JONATHAN PAINTER, BRIANNA FITZ-MAURICE, MICHAEL GOFF, GARETH APPLEBY-THOMAS, DAVID WOOD, Cranfield Defence and Security, Cranfield University, Shrivenham, Swindon, SN6 8LA, United Kingdom, TOM PINTO, TWI Ltd., Granta Park, Great Abington, Cambridge, CB21 6AL, United Kingdom — Building on a substantial body of work on functionally graded materials in the literature, it has been previously shown that the use of graded areal density impactors, in conjunction with buffer materials, allows generation of ramp-wave loading profiles in impacted targets. Such off-principle-Hugoniot loading paths are of particular interest where control of one or more state variables (e.g. temperature) is desirable during the loading event. Previous attempts to produce suitable graded areal density impactors have focused on rapid protoyping techniques such as 3D printing. While suitable for small-scale production of impactors, such technologies are relatively immature. Instead, here a novel approach to creating graded areal density structures – TWI Ltd's novel surface modification process, SurfiSculpt®, with a nominal surface spike distribution of 1.5 per mm^2, has been employed to produce the required impactors. Initial experimental results are presented highlighting the potential of this experimental approach; further, these results – combined with basic hydrocode simulations – are used to postulated idealised structures which would allow useful loading paths such as the Adiabat to be readily accessed.

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