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A novel tomographic technique for energetic materials C.C. STENNETT, S.E. STENNETT, Cranfield Defence and Security, Cranfield University, Shrivenham, Swindon, Wiltshire SN6 8LA, United Kingdom., CHRISTOPH RAU, Diamond Light Source Ltd, Harwell Science and Innovation Campus, Didcot, Oxfordshire OX11 0DE, United Kingdom., S.A. MCDONALD, Manchester X-ray Imaging Facility, School of Materials, University of Manchester, Oxford Road, Manchester M13 9PL,, N.K. BOURNE, Centre for Matter under Extreme Conditions, School of Materials, University of Manchester, Rutherford Appleton Laboratory, Didcot, Oxfordshire, OX11 0, P.J. WITHERS, Manchester X-ray Imaging Facility, School of Materials, University of Manchester, Oxford Road, Manchester M13 9PL,, CRANFIELD-MANCHESTER COLLABORATION — It is a pressing matter to understand microstructural details within polymer matrix composites with energetic filler particles within. The generation of three-dimensional microstructure, using a noninvasive method of high resolution will advance knowledge in a range of fields. A range of inert composites analogous to plastic bonded explosives (PBXs) with crystalline and amorphous phases have been studied, and X-ray microtomography for microstructural investigation on the Diamond-Manchester I13 beamline. One of the compositions had crystal densities close to the binder and the other very different so that particles could be resolved easily in the one case and with great difficulty, even with phase contrast techniques in the other. Improvements int eh imaging made it possible to adequately define the bulk morphology, to determine the geometry of defects that might lead to sites for accidental ignition within the material and to demonstrate a direct linkage into the finite element predictions of mechanical response. Once demonstrated, the damage in a real loaded HE was assessed and quantified.

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