Abstract Submitted
for the SHOCK19 Meeting of
The American Physical Society

Temperature Effects on Dynamic Response of a Simple Polymer Structure[1] WILLIAM PROUD, Institute of Shock Physics, Imperial College London, DAVID SORRY, Institute of Shock Physics and Faculty of Medicine, mperial College London, GARETH TEAR, Institute of Shock Physics, Imperial College London, THE ROYAL BRITISH LEGION CENTRE FOR BLAST INJURY STUDIES, IMPERIAL COLLEGE LONDON COLLABORATION — The temperature dependance of polymers is well known. From the 1950s onward semi-empirical relationships such as the Williams-Landel-Ferry (WLF) have been used to predict flow and, by extension, strain rate properties of polymers. Group Interaction Modelling, from the 1990s onwards, has been increasingly used to predict a range of static and dynamic properties from knowledge of the chemical structure. In a series of parallel developments the analysis of loading systems such as the Split Hopkinson Pressure Bar (SHPB) has moved from the application of analytic relationships to the use of complete modelling of the loading system and the sample. In this paper a simple structure, a tubular polymer specimen is loaded over a range of stresses, strain rates and pulse shapes in a SHPB. The sample temperature is varied from that which results in brittle response to a flow response. Changing the diameter of the central hole in the sample shows the effect of the structure on the response. Overall this study gives insight into how the polymer failure envelope changes with temperature and strain rate.

[1]Imperial College London, AWE and the Royal British Legion are acknowledged for their support of this research

William Proud
Imperial College London

Date submitted: 28 Feb 2019 Electronic form version 1.4