Abstract Submitted
for the SHOCK17 Meeting of
The American Physical Society

The Response of Simple Polymer Structures Under Dynamic Loading.[1] WILLIAM PROUD, KAY ELLISON, SU YAPP, CLOE COLE, STEFANO GALIMBERTI, Institue of Shock Physics, Imperial College London, INSTITUTE OF SHOCK PHYSICS TEAM — The dynamic response of polymeric materials has been widely studied with the effects of degree of crystallinity, strain rate, temperature and sample size being commonly reported. This study uses a simple PMMA structure, a right cylindrical sample, with structural features such as holes. The features are added an varied in a systematic fashion. Samples were dynamically loaded using a Split Hopkinson Pressure Bar up to failure. The resulting stress-strain curves are presented showing the change in sample response. The strain to failure is shown to increase initially with the presence of holes, while failure stress is relatively unaffected. The fracture patterns seen in the failed samples change, with tensile cracks, Hertzian cones, shear effects being dominant for different holes sizes and geometries. The sample were prepared by laser cutting and checked for residual stress before experiment. The data is used to validate predictive model predictions where material, structure and damage are included..

[1]The Institute of Shock Physics acknowledges the support of Imperial College London and the Atomic Weapons Establishment.

William Proud
Institue of Shock Physics, Imperial College London

Date submitted: 02 Mar 2017 Electronic form version 1.4