Abstract Submitted
for the SHOCK15 Meeting of
The American Physical Society

Initial isentropic compression experiments on the MACH facility[1]

S.N. BLAND, K.H. KWEK, K. OMAR, S. STAFFORD, J. WINTERS, Institute of Shock Physics, Imperial College London, G. WANG, Institute of Fluid Physics, China Academy of Engineering Physics — We report on the first isentropic compression experiments performed on the MACH – Mega Ampere Compression and Hydrodynamics – facility at The Institute of Shock Physics. MACH is based around a 2MA, 400ns, "dry air" Linear Transformer Driver, which can be readily expanded to higher currents and drive voltages. In these initial experiments strip line loads of varying geometries were used to optimize both the peak magnetic pressure exerted on a target and the uniformity of the drive across samples. The use of a novel "2 part target" design was explored to reduce costs; and the ability of the machine to operate without insulator material – using just 'magnetic insulation' in vacuum – was examined. In all cases multiple point frequency shifted Het-V, and/or line VISAR measurements were used to analyze the results. In a set of proof of principle experiments, the strength of different copper alloys is being explored, and we will then use MACH to examine the effect of micro-structure on the strength of NiTi alloys. We will discuss future experimental plans, including the use of hard X-rays generated by a portable X-pinch driver to perform in-situ diffraction measurements of samples under pressure.

[1]This work was supported by AWE Aldermaston

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Date submitted: 30 Jan 2015 Electronic form version 1.4