

Abstract Submitted
for the SHOCK17 Meeting of
The American Physical Society

Study of flow stress and spall strength of additively manufactured Ti-6-4 alloy AMITAY COHEN, VITALY PARIS, ARNON YOSEF-HAI, Nuclear Research Center Negev, ELI GUDINETSKY, Israeli Atomic Energy Commission, EITAN TIFERET, Nuclear Research Center Negev and Rotem Industries LTD — The use of additive manufacturing (AM) by Electron Beam Melting (EBM) or Selective Laser Melting (SLM) has extensively grown in the past few years. A major goal in AM is to manufacture materials with mechanical properties at least as good as traditionally manufactured materials. In this work we present results of planar impact tests and Split Hopkinson Pressure Bar tests (SHPB) on Ti-6-4 manufactured by EBM and SLM processes. Results of planar impact tests on SLM samples display slightly higher spall strength compared to EBM while the stress at Hugoniot elastic limit (HEL) is practically the same. Stress strain curves based on SHPB measurements at two different strain rates present similar plastic flow stresses for SLM and EBM processed Ti-6-4 alloy, while the flow stress is about 20% higher than reported for commercial reference material. The strain to failure of both materials shows considerable strain rate sensitivity. The results of post-mortem analysis of spall fracture will also be presented.

Amitay Cohen
Nuclear Research Center Negev

Date submitted: 23 Feb 2017

Electronic form version 1.4