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**Spall Properties of Aluminum 5083 Plate Fabricated using Equi-Channel Angular Extrusion and Rolling** RICKY WHELCHEL, NARESH THADHANI, THOMAS SANDERS, Georgia Institute of Technology, SUVEEN MATHAUDHU, Army Research Office, LASZLO KECSKES, Army Research Laboratory — The spall strength and Hugoniot Elastic Limit (HEL) of aluminum alloy 5083 (Al 5083) are compared for plates fabricated using equi-channel angular extrusion (ECAE) versus rolling. Al 5083 is a light-weight and strain-hardenable aluminum alloy used for armor plating in military transport vehicles, thus requiring the highest achievable spall strength. The spall strength of strain-hardenable alloys is a function of the grain structure and volume fraction of secondary phases, such as brittle inclusions, in addition to the extent of hardening. Materials processed by ECAE have a highly refined grain structure with little texturing and a large degree of plastic deformation, whereas rolled plates have a textured grain structure that aligns along the rolling direction. The spall behavior of Al 5083 for both forms was measured using plate impact gas gun experiments combined with rear free surface velocity measurements employing VISAR. The spall strength varied with impact orientation for the rolled plate but remained uniform for the ECAE material. Despite large differences in the HEL, the spall behavior for Al 5083 made by both processing techniques was controlled by the extent of brittle particles that acted as nucleation sites for damage during tensile failure.

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