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Influence of Temperature Effects on the Dynamic Tensile Extrusion of Molybdenum CARL TRUJILLO, GEORGE GRAY III, MICHAEL BURKETT, ELLEN CERRETA, DANIEL MARTINEZ, VERONICA LIVESCU, Los Alamos National Laboratory — The Dynamic Tensile Extrusion experimental technique was developed at Los Alamos National Laboratory (LANL) to evaluate tensile response of materials when subjected to large plastic strains at elevated strain rates. Using this technique, molybdenum specimens were accelerated up to 550 m/s and at temperatures of 21C and 275C before extrusion through a high strength die and recovered. A combination of in-situ diagnostics including: High Speed Imaging, Photon Doppler Velocimetry (PDV) and High-Speed Infrared Camera, were used to capture dynamic extruded material topologies, extrusion velocity history and specimen surface temperature. Post mortem microscopy measurements were used to compare the original and extruded material microstructures to assess the deformation process and the plastic strains realized during the process. Experimental data was used to validate hydrocode strength and damage evolution models. Post-test metallography characterized the plastic instabilities resulting in particulation and damage evolution during the dynamic tensile extrusion process. Quantitative examination of the influence of temperature, texture, and extrusion velocity will be presented. .

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