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Additive Manufacturing of Linear Shaped Charges for Curved Penetration JASON HO, CODY LOUGH, PHILLIP MULLIGAN, CATHERINE JOHNSON, Missouri University of Science and Technology — Linear shaped charges (LSC) are typically manufactured in continuous lengths and formed into an inverted "V" and use explosive force to cut through a target with a straight blade, typically in the demolition industry but there is significant interest in cutting a circle with an LSC for military and breaching applications. While some curved LSCs do exist, there are limitations for the curve due to the manufacturing process; additionally depth of penetration is reduced as the blade is formed at an angle due to varying inside and outside dimensions of the LSC. Additive manufacturing allows for geometric complexity not possible in other manufacturing techniques. In this work, selective laser melting (SLM) with a Renishaw 250 system was used. LSCs were printed with varying density gradients along the outside tamping portion of the LSC. By varying the density stepwise along the outside edge and adjusting the confinement while keeping the internal liner consistent, a curve can be achieved while not affecting the penetration depth. LSC performance was evaluated by the depth of penetration and curvature in the cut compared to traditional liners. The aim of this work is to show the potential for curving the blade of an LSC by applying a density gradient throughout the liner through SLM.

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