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USING ADDITIVE/SUBTRACTIVE PROCESSING IN THE FREEFORM FABRICATION OF BI-METALLIC COMPONENTS

Abstract

Additive manufacturing (AM) is a rapidly developing technology that is finding application in a wide variety of engineering disciplines. In AM, parts are built by adding material successively to achieve the desired shape. AM's usefulness is derived largely from geometric flexibility and ability to print multi-component assemblies as one piece. This reduced part count and elimination of joints can result in a more robust product. While this process is finding application in the aerospace industry for the fabrication of low volume components with complex internal features from a monolithic metal, the market could be extended by the ability to fabricate bi-metallic structures. By combining additive methods, such as blown powder, with subtractive methods, it is possible to use various metals in the build. Limitations in the feature size and surface finish using blown powder AM processing can be improved by hybridizing the manufacturing process. As the material is deposited, machining can be done on internal features before they are buried in the build. This study looks at the fabrication of an igniter for a liquid rocket engine which has a Cu alloy core with an Inconel 625 structural jacket. By using an additive/subtractive process, the component was fabricated in 3 days. Properties of the additive manufactured material will be discussed along with characterization of the intermetallic region of the bi-metallic joint.