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# A comparison of weldability and mechanical properties of additive manufactured and bulk Ti6Al4V alloy

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**Abstract**
Titanium and its alloys, especially the Ti6Al4V, have tremendous use in the aerospace and biomedical industries. Since conceptualizing additive manufacturing techniques, it has been one of the most popular manufacturing techniques used on Titanium and its alloys. However, building large parts of the Ti6Al4V through additive manufacturing can be cumbersome due to the multiphysics involved in the heating and cooling of the material and the limited building space. This article examines the weldability of additive manufactured Ti6Al4V, manufactured through laser metal deposition (LMD) technique, and bulk sheet metal of Ti6Al4V manufactured through the rolling process. The welds were characterized using hardness, tensile, X-ray diffraction (XRD), and the evolving microstructure. Results show martensitic microstructure within the fusion zone, resulting in high hardness within the zone, which is confirmed in the XRD results. Failure occurred at the LMD heat-affected zone side of the sample due to the martensitic microstructure within the zone. The research further affirms the feasibility of joining Ti6Al4V manufactured through different routes through laser welding.