

Influence of Build Orientation on Machinability of Selective Laser Melted Titanium Alloy-Ti-6Al-4V

Authors : Manikandakumar Shunmugavel, Ashwin Polishetty, Moshe Goldberg, Junior Nomani, Guy Littlefair

Abstract : Selective laser melting (SLM), a promising additive manufacturing (AM) technology, has a huge potential in the fabrication of Ti-6Al-4V near-net shape components. However, poor surface finish of the components fabricated from this technology requires secondary machining to achieve the desired accuracy and tolerance. Therefore, a systematic understanding of the machinability of SLM fabricated Ti-6Al-4V components is paramount to improve the productivity and product quality. Considering the significance of machining in SLM fabricated Ti-6Al-4V components, this research aim is to study the influence of build orientation on machinability characteristics by performing low speed orthogonal cutting tests. In addition, the machinability of SLM fabricated Ti-6Al-4V is compared with conventionally produced wrought Ti-6Al-4V to understand the influence of SLM technology on machining. This paper is an attempt to provide evidence to the hypothesis associated that build orientation influences cutting forces, chip formation and surface integrity during orthogonal cutting of SLM Ti-6Al-4V samples. Results obtained from the low speed orthogonal cutting tests highlight the practical importance of microstructure and build orientation on machinability of SLM Ti-6Al-4V.

Keywords : additive manufacturing, build orientation, machinability, titanium alloys (Ti-6Al-4V)

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