

## A PERSPECTIVE ON THE ROLE OF MODELING AND SIMULATION IN METAL 3D PRINTING

**Adrian J. Lew<sup>a</sup>**

<sup>a</sup>*Department of Mechanical Engineering, Stanford University, Stanford CA, USA, lewa@stanford.edu*

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**Abstract.** Metal 3D printing is progressively being considered as a design and manufacturing alternative to traditional means. Leading this change is the ability to imagine never before manufacturable geometries, such as unique rocket engine parts already flying to space, simpler and more efficient fuel injectors for airplanes, materially graded parts for fusion reactors, and revolutionary medical implants. The cost of printing is also progressively coming down, although it is still generally high enough that only application areas with high added value are adopting it. It is also an attractive alternative for difficult-to-machine alloys, such as Titanium-based ones.

In this talk I will illustrate and motivate my perspective of the role of modeling and simulation in parts of this field. In particular, I will discuss examples on two different technologies, selective laser melting (SLM) and liquid metal jetting (LMJ), with materials such as copper, steels, tungsten, tungsten-tantalum alloys and aluminum. Almost all these materials are difficult to print for some reason, and modeling and simulations in these cases help devise strategies to do it.