The challenges and the state of the art in powder bed fusion systems for 3D printing

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Abstract

3D Printing or Additive Manufacturing is going through an exponential growth. One of the most promising technologies for parts beyond prototyping and the lead into manufacturing is powder based systems. While the focus of the talk will be on HP's Multi Jet Fusion, the state of the art and the many challenges for all powder-based systems will be covered. There are several key sub-systems where inventions will be needed to develop predictive and repeatable parts demanded for end-use manufacturing. Among these are powder transport to the layering system, powder spread and layer quality, controlled consolidation (fusion or melt), caking and thermal stability, powder extraction and recyclability. Particle size distribution must be maintained throughout the entire powder cycle, especially when reinforcing additives are added (spheres or fibers). Simulation tools are key in understanding the physics for the various sub-systems. DEM is gaining traction and is one of the enablers for pushing AM in the next phase. Current understanding of particle engineering in AM is growing but still in its infancy; more applied research is expected and needed to make 3D printing seriously competitive with traditional manufacturing methods.

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