Performance verification of 3D printers

Additive Manufacturing continues to gain momentum as the next industrial revolution. While these layering technologies have demonstrated significant time and cost savings for prototype efforts, and enabled new designs with performance benefits, additive manufacturing has not been affiliated with 'precision' applications. In order to understand additive manufacturing's capabilities or short comings with regard to precision applications, it is important to understand the mechanics of the process. GE Aviation's Additive Development Center [ADC] is in a unique position to comment on additive metal processes and their dimensional capabilities. The former Morris Technologies has been producing Direct Metal Laser Melted parts since 2005 for a wide variety of industries. The retooled ADC now specializes in aerospace applications including GE's first production application: the LEAP fuel nozzle. This paper and presentation will take a deep dive into the hardware and mechanics of the modern-day DMLM machine from three of the largest equipment manufacturers. We will also look at typical post processes including the heat treats that are commonly applied to DMLM metal parts. Along the way, we'll mention several surface finish technologies that have been investigated including one that is known as MMP [micro-machining process] which has been used to controllably remove microns of material. Finally, the research will reveal one or two examples of techniques that have used to achieve tight tolerances at the ADC. These methodologies were employed to manufacture direct parts, where tolerances are not as tight as the conventional tools that would be used to produce such parts. Readers and attendees should walk away with a better understanding of Additive Manufacturing, specifically direct metal parts, and the tolerances obtainable today. It is believed that this background information can help engineers and tool makers make better decisions about when to pursue Additive Manufacturing in their industry.

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