

## **Comparing the spreadability of powders on a powder bed and a solid surface to study the physics of powder layer formation over parts being printed and unbound powder areas in AM printers**

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### **Abstract**

In an AM printer, powders are spread over a powder bed and over the part being printed. The part is a hard surface as opposed to the area around the part which is a soft and elastic powder bed. This creates different powder spreading physics in the printer. Over a hard surface, the gap between the recoater blade is fixed and powder particles with a size near or larger than the gap will not pass through the recoater. This changes over a powder bed where particles can be embedded in the bed and the gap between the recoater and bed can be increased by the action of the recoater. The density, thickness, and quality of layer formation are presented for several powders spread on both a powder bed and a hard surface. This illustrates the difference between powder spreadability physics over parts being printed and powder bed areas.

### **Introduction**

The ability of a powder to form a layer in a powder AM printer is critical to producing high quality parts. This ability is referred to as powder spreadability. Powders are typically spread in AM printers by horizontal relative motion between the build area and a spreading device. The spreading device is typically referred to as a recoater and can be a flat blade, rounded blade, counter-rotating roller, etc. The recoater is moved across the build area to spread one layer and moved vertically relative to the bed in fixed distances to spread multiple layers. The vertical movement is referred to as the leveling height and it is typically between twenty to two hundred micrometers.