

## Fast and simple creation of powder beds for selective laser melting

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**Key Words:** *Particles, Sphere pack, Selective Laser Melting, Numerical Methods.*

The selective laser melting (SLM) is an additive manufacturing process. A laser melts the powder bed layer by layer and forms a component when solidifying. Due to the fabrication tolerances of the particles, their size in the powder is subject to static fluctuations. This leads to irregular powder beds which, in the worst case, results in defective components (pores, cracks, low component density).

To get realistic SLM simulations, the powder bed must be created with representative properties, as e.g. a size distribution of the particle diameter, when considered in the process computation. A challenge is that often the size difference from particle to system is several orders of magnitude so that suitable simulation methods are needed, or appropriate assumptions have to be made.

This contribution deals with the creation of a two-dimensional particle bed by an efficient pixel-based approach. First a size distribution and packing density of the powder are defined for the generation. Discrete steps are then used to place particles in the packing area. Besides a simple algorithm design, the pixel-based approach is also suitable for implementation on the graphics processing unit (GPU), which promises additional performance gains. The resulting sphere pack can be used for heat transfer simulations or as initial condition of a SLM process simulation by the volume of fluid method. Furthermore, additional metrics can be derived from this particle bed and correlated with results of a process simulation.