

THESIS PROPOSAL

Reference: S. Cacace, Professor Q. Semeraro

Subject: Influence of Particle size and shape distribution on the powder bed density in L-PBF processes

Date: May 2021

The objective of the work is to study how different particle size distributions influence the powder bed density in L-PBF processes and the 3D printed parts performances. The work will consist in selecting different particle size distribution, log-normal, bi-modal, tri-modal for example; characterize these distributions using the systems available in the Lab (Morphologi G4 for particle size and shape, FT4 for the rheological properties). Then, a suitable experimental setup should be designed to measure the powder bed density and eventually its influence on the processability of the powder.

Starting date: To be decided with the professors.

Required Knowledge: Basics of Matlab coding, Design and Analysis of the experiments course

Bibliography

Jacob, Gregor, et al. "Measurement of powder bed density in powder bed fusion additive manufacturing processes." *Measurement Science and Technology* 27.11 (2016): 115601.

Ali, Usman, et al. "On the measurement of relative powder-bed compaction density in powder-bed additive manufacturing processes." *Materials & Design* 155 (2018): 495-501.

Lee, Y. S., Peeyush Nandwana, and Wei Zhang. "Dynamic simulation of powder packing structure for powder bed additive manufacturing." *International Journal of Advanced Manufacturing Technology* 96 (2018).