Influence of the scan speed on the microstructure of AlSi10Mg processed by additive manufacturing

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Invited oral presentation – Topic: Additive Manufacturing

The aeronautic industry seeks constant improvement of manufacturing techniques in order to improve the mechanical performances to cost ratio. Thus, additive manufacturing is seen as a promising process. Due to the infancy of the process, the influence of the process parameters such as laser power, layer thickness or scanning strategy on the microstructure requires further investigation. In the present project, bulk samples 10x10x10 mm^3 in size made of AlSi10Mg are processed by Laser Beam Melting (LBM). The microstructure of the samples is characterized for different scanning speeds (165, 186, 212 and 236 mm/s). The size of the microstructure decreases as the scanning speed increases and thus the hardness increases. Electron Backscattered Diffraction (EBSD) images allow to map the crystallographic orientation of the various samples. The columnar grains seem to present a specific crystallographic orientation and are surrounded by equiaxed grains in a pattern that can be related to the hatch space. In addition, the presence of defects and porosities is evaluated by X-ray microtomography and compared according to the process parameters used. In parallel, lattice structures performed by LBM have been analyzed with the same characterization tools and compared with the microstructure obtained for the bulk samples and related to the thermal conditions.