EuroSciCon

JOINT EVENT

22nd International Conference on

Advanced Materials and Simulation

&

22nd Edition of International Conference on

Nano Engineering & Technology

December 10-12, 2018
Rome, Italy

Nano Res Appl 2018, Volume 4
DOI: 10.21767/2471-9838-C7-028

Study on porosity defects of EB Med Ti64 components by tomographic analysis

C Pirozzi, R Borrelli and S Franchitti
CIRA Italian Center of Aerospace Research

The Electron Beam Melting (EBM) is one of the most promising ALM technologies, which utilizes a high-energy electron beam, as a moving heat source, in order to melt and fuse (by rapid self-cooling) metal powder and produce parts in a layer-building fashion. Anyway many technical aspects concerning the quality of EBM produced components are still industrial open items and studies need to be carried out. The objective of this study is to evaluate the distribution and the features of porosity defects generated during the EBM process, at this aim a simple test case, consisting in rectangular parallelepiped (50x10x10 mm) samples manufactured in Ti6Al4V, was chosen (Figure 1). A suitable DOE was developed in order to investigate the effect of the following intra-build process parameters on porosity: Samples orientation (fig.2): samples were built according to n.4 different orientations: x, y, z (90°) and 45°. The x and y oriented samples were built horizontally and they were, respectively, parallel and perpendicular to the rake movement direction. The 90° oriented samples were built vertically Location of the sample in layer (fig.3): the group of samples shown in Figure 4a was built in n.5 different zones in the x-y plane which are named hereafter: Z1, Z2, Z3, Z4 and Z5. The Z5 zone was the central one while all the other zones were representative of the four corners of the x-y plane. Such configuration was chosen in order to guarantee a high build envelope symmetry. Height in the build chamber (fig.4): the group of samples shown in 2b was built at n. 3 different levels in the build chamber which are named hereafter: h1, h2 and h3. More in detail, the h1 level starts at z=40 mm, the h2 level starts at z=170 mm and the h3 level starts at z=300 mm.

c.pirozzi@cira.it