Standard method for microCT-based additive manufacturing quality control 2: density measurement

Anton du Plessis

Abstract

MicroCT is best known for its ability to detect and quantify porosity or defects, and to visualize its 3D distribution. However, it is also possible to obtain accurate volumetric measurements from parts – this can be used in combination with the part mass to provide a good measure of its average density. The advantage of this density-measurement method is the ability to combine the density measurement with visualization and other microCT analyses of the same sample. These other analyses may include detailed porosity or void analysis (size and distribution) and roughness assessment, obtainable with the same scan data. Simple imaging of the interior of the sample allows the detection of unconsolidated powder, open porosity to the surface or the presence of inclusions. The CT density method presented here makes use of a 10 mm cube sample and a simple data analysis workflow, facilitating standardization of the method. A laboratory microCT scanner is required at 15 μm voxel size, suitable software to allow sub-voxel precise edge determination of the scanned sample and hence an accurate total volume measurement, and a scale with accuracy to 3 digits.

Protocol