World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:14, No:12, 2020

Non-Destructive Testing of Selective Laser Melting Products

Authors : Luca Collini, Michele Antolotti, Diego Schiavi

Abstract : At present, complex geometries within production time shrinkage, rapidly increasing demand, and high-quality standard requirement make the non-destructive (ND) control of additively manufactured components indispensable means. On the other hand, a technology gap and the lack of standards regulating the methods and the acceptance criteria indicate the NDT of these components a stimulating field to be still fully explored. Up to date, penetrant testing, acoustic wave, tomography, radiography, and semi-automated ultrasound methods have been tested on metal powder based products so far. External defects, distortion, surface porosity, roughness, texture, internal porosity, and inclusions are the typical defects in the focus of testing. Detection of density and layers compactness are also been tried on stainless steels by the ultrasonic scattering method. In this work, the authors want to present and discuss the radiographic and the ultrasound ND testing on additively manufactured Ti_6Al_4V and inconel parts obtained by the selective laser melting (SLM) technology. In order to test the possibilities given by the radiographic method, both X-Rays and γ-Rays are tried on a set of specifically designed specimens realized by the SLM. The specimens contain a family of defectology, which represent the most commonly found, as cracks and lack of fusion. The tests are also applied to real parts of various complexity and thickness. A set of practical indications and of acceptance criteria is finally drawn.

Keywords : non-destructive testing, selective laser melting, radiography, UT method
Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development
Conference Location : Chicago, United States
Conference Dates : December 12-13, 2020