Recent studies of the European Space Agency into metallic powders as raw material for additively manufactured space parts

Martina Meisnar[1], Thomas Rohr[2], Laurent Pambaguian[2]
[1]European Space Agency, [2]European Space Agency

Additive manufacturing (AM) has gained increasing recognition in high performance industries such as space, aerospace and automotive due to its inherent benefits for the manufacturing of high performance parts. In recent years, it became clear that the control of the entire AM process chain, encompassing design, material supply, AM processing and post-processing, is critical to the success of the manufacturing process. As a result, the European Space Agency has been placing tremendous efforts into developing technology in these areas. One of the topics under investigation is the metallic powder representing the feedstock for many of the AM processes considered by the European Space Industry for manufacturing parts. Although intrinsically linked, the relationship between raw material and final part properties is not yet fully understood. However, it was determined that the basis for deriving such relationships is a thorough understanding of the powder characteristics themselves. As a result, studies have been initiated to investigate currently available commercial and non-commercial powder characterization methods. It was found that traditional characterization techniques used to assess the characteristics of AM powders often lack applicability to the AM process, whilst novel and less established techniques are in need of evaluation and development of experience and know-how. Finally, the powder characteristics were analysed and interpreted in the context of their processability and the final parts produced. This paper presents the activities that have been carried out so far by the European Space Agency on metallic powders as raw material for AM space parts, highlighting the lessons learnt, challenges and future areas of interest