

A Hybrid Slicing Method to Eliminate the Need of Support Structures in Direct Energy Deposition Process

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ABSTRACT

Owing to the ability of realizing the geometrical and material complexities, Additive Manufacturing (AM) has gained its importance among the researchers of modern metal manufacturing industries. Slicing plays a crucial role in AM for generating support structures. In the traditional planar slicing method, the CAD model is converted into 2D contours perpendicular to the build directions. Nevertheless, it calculates an enormous amount of support structures for overhanging features leading to an increase in manufacturing lead time and material wastages. Moreover, the removal of support structures is also considered to be tedious and sometimes even damages the parent component. In this work, the authors have proposed a novel concept of hybrid slicing method through optimal use of traditional planar slicing and conformal slicing strategies to eliminate the need for support structures. The base of the overhanging features is sliced by using planar slicing while the overhanging features are sliced conformably through the surface to which the feature is attached. A Computer Aided Process Planning (CAPP) has been provided through illustrative examples.

Keywords: CAD, CAM, Slicing, Additive Manufacturing, Wire Arc Additive Manufacturing, Direct Energy Deposition

