A proof of concept system for the implementation of optimization path planning strategies in additive manufacturing.

by

Sergio Alejandro Salinas-Sáenz, Pedro Orta-Castañón, Horacio Ahuett-Garza
Tecnologico de Monterrey
Escuela de Ingeniería y Ciencias
Monterrey, Mexico
A01280509@itesm.mx, porta@tec.mx, horacio.ahuett@tec.mx

Abstract

Additive manufacturing (AM) technologies have been taking up in industrial implementation. Unfortunately, in AM processes like FDM (Fused Deposition Modeling), which can produce complex shapes created layer by layer, the end-product presents anisotropic mechanical properties that depend mostly on the deposition trajectory. Due to limitations on the deposition trajectory control, the insufficient research in this field, and the lack of consideration of the end-product mechanical properties on commercial systems, the linked process' defects are challenging to improve. Actual machines offer limited options that impede the designer's tool-path strategies to be implemented.

This work presents a proof of concept system integrated by an adapted machine system and a software framework that allows the designer to implement and test the path planning strategies for the deposition trajectory control. An overview of the hardware conditioning is explained. A machine and control were developed to test the concept system for implementing a proposed strategy for increasing the deposition trajectory continuity, as an example of additive manufacturing. The path planning strategy was integrated and evaluated, resulting in an improved trajectory continuity, overall better performance, and an increased path continuity. Optimization of path trajectories improves mechanical properties and reduces defects, creating better products.