Unlocking True 3D Printing Potential

**VTIP 20-069: "Workflow for Layer-less Multi-Axis Material Extrusion"**

THE CHALLENGE

3D printing is a technology that has transformed industries with Additive Manufacturing (AM) techniques. But 3D printing today is sequentially printing 2D layers, unable to fabricate parts with complex load paths. These are constrained and in effect are sequential 2D printers. This limits the application of 3D printed parts in multiple areas that could benefit from it.

OUR SOLUTION

We present a generalized algorithm, for generating multi-axis toolpaths to fabricate layer-less (unconstrained) 3D objects. While existing multi-axis material extrusion techniques are restricted to planar or curved surfaces, this algorithm uses multi axis deposition to freely align material to 3D non planar load paths.

This process adds strength and added complexity to the structures fabricated using AM.
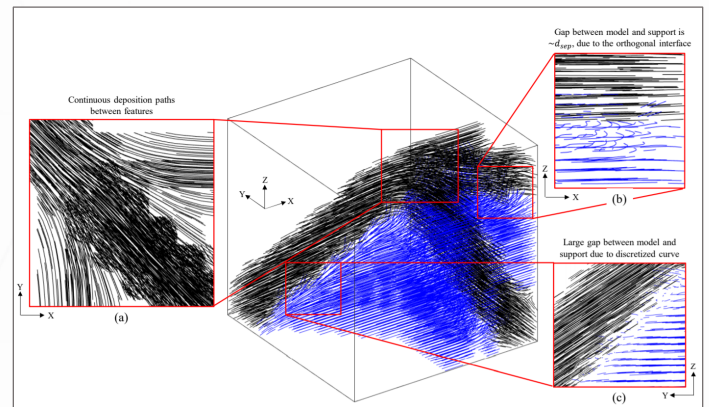
Multi-axis deposition paths - roads through sample geometry.
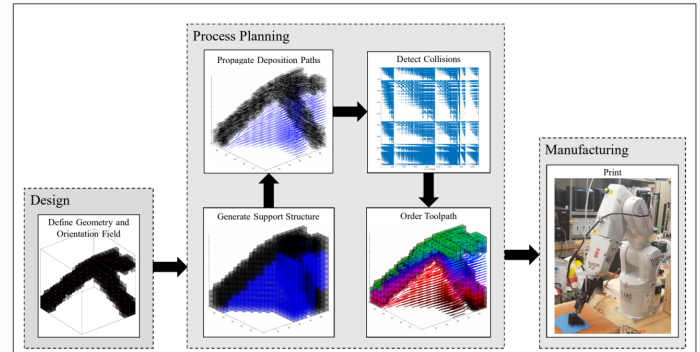
Proposed workflow with new algorithm.

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