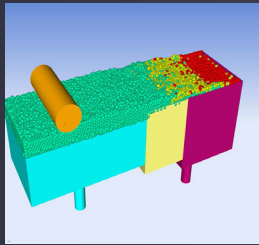


Additive Manufacturing Process Simulation with FLOW-3D

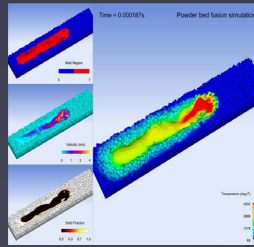
FLOW-3D is a CFD software that simulates and analyzes additive manufacturing processes such as laser powder bed fusion, binder jetting, and direct energy deposition. FLOW-3D's multiphysics capabilities offer highly-accurate simulations of powder spreading and compaction, melt pool dynamics, porosity formation for L-PBF and DED, and resin penetration and spreading for binder jetting processes, for analysis and optimization of process parameters.

POWDER SPREADING



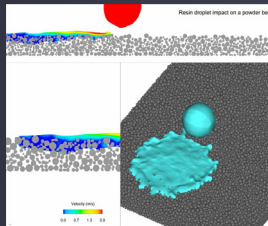
Using the discrete element method, **FLOW-3D** is able to accurately simulate the powder packing and spreading processes. Models to study particle-particle interactions, particle-roller/knife interactions, and full particle-fluid flow coupling for various particle size distributions are available.

LASER POWDER BED FUSION



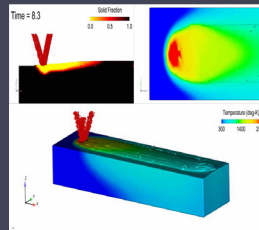
The effect of process parameters (laser power, scan patterns and speed) on underlying physical phenomena (melt pool dynamics, phase change & solidification microstructure evolution, porosity formation in keyhole welding, balling defects & microstructure prediction in L-PBF processes, and crystal growth & orientation in direct energy deposition processes) can be modeled in FLOW-3D.

BINDER JETTING



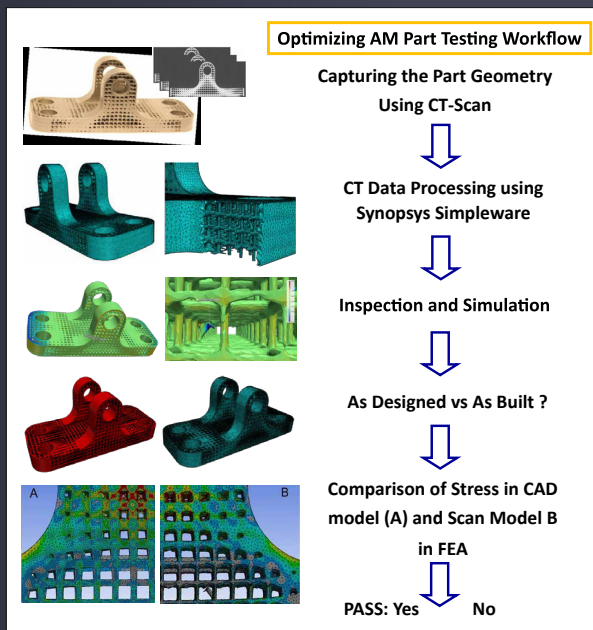
FLOW-3D models resin infiltration and lateral spreading in a powder bed during a binder jetting 3D printing process. Fully and accurately resolving the particles and voids within a particle bed enables analysis.

DIRECT ENERGY DEPOSITION



In direct energy deposition processes, process parameters such as powder injection rate, particle size distribution, laser power and scan speed can influence the printed layer thickness and crystal orientation. **FLOW-3D** can simulate the DED processes in fine detail to achieve better process control of multi-layer deposition.

Optimizing AM Part Testing with Synopsys Simpleware™



Going from a 3D computed tomography (CT) scan of an AM part to a completed simulation is achieved by using Synopsys Simpleware™ software as a crucial bridging technology that generates high-quality meshes from CT Scans. Results from test workflows show the differences between as-designed and as-manufactured parts, catching unexpected defects early in the design stage and saving on long-term costs caused by manufacturing errors.

- Workflow enables validation and inspection of high-value AM parts
- Go from computed tomography imaging to computer simulation
- Compare reality and as-designed part through metrology and multiphysics simulation
- Increase your understanding of AM capabilities for extremely complex designs
- Evaluate impact of manufacturing defects on part performance to better inform design decisions