Simufact Additive

Process simulation for metal additive manufacturing

Simufact Additive is a scalable software solution for the simulation of metal-based additive manufacturing (AM) processes which focuses on laser powder bed fusion (L-PBF) and metal binder jetting (MBJ) processes.

It is a software solution designed to predict and compensate for distortion, compute residual stress and temperature distribution throughout the printing, heat treatment, cutting, hot isostatic pressing (HIP) as well as machining processes virtually before the part is physically manufactured by the 3D metal printer.

Ultimately, Simufact Additive allows the user to overcome the AM obstacles and to print AM parts first time right.

Advantages

- Identify optimal parameters: Optimise your build parameters & estimate your costs.

- Reduce Trial & Error: Save material, time and money with virtual tests.

- Predictive Analytics: Anticipate issues such as warpage, cracks or distortions

- Workflow driven: No expert knowledge required through a user-friendly, intuitive software design.

Simufact Additive: Your AM simulation companion

- **Powder Bed Fusion Processes:** Simufact Additive focuses on Laser Powder Bed Fusion processes where every step from support structures, to HIP, cutting etc. can be considered.   (Direct Energy Deposition (DED) is currently covered by Simufact Welding)

- **Metal Binder Jetting:** The sintering process's changes often can be the bottleneck for manufacturers. However, using Simufact Additive, manufacturers can simulate the sintering process, helping to realize the full benefits of Metal Binder Jetting.

- **PBF Process and Defect Analysis:** A novel multi-scale process simulation approach for location-specific defect predictions within full-scale geometries. The model enables thermal history and defect prediction at the individual scan vector and powder layer level in minutes.

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## Metal Powder Bed Fusion simulation - Predicting and optimizing the AM process

⚙ Challenge

- Thermal induced distortion and cracking / delamination
- Support failure
- Recoater interference due to warpage
- Shrink/shift lines

✓ Capabilities

- Predict distortion and residual stresses of AM parts
- Complete model including part orientation, support generation, build risk and simulation, unclamping, heat treatment, cutting, support removal, HIP, quality check and slicing.
- Automated iterative distortion compensation
- Add-on machining module
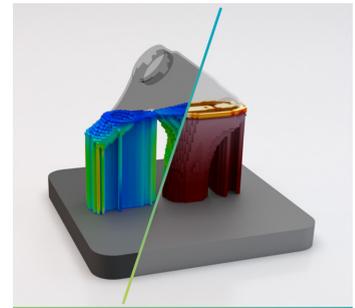
Benefits

- Minimized trial and error
- Reduced scrap
- Faster
- Enhanced part quality

## Metal Binder Jetting (sintering) - Mitigate effects of sintering

⚙ Challenge

- Sintering causes massive volume reduction with nonlinear shrinkage
- Manually managing distortion is increasingly time consuming and expensive
- Creep effects during sintering can be catastrophic
- Large shrinkage requires compensation

✓ Capabilities

- Predict and mitigate sintering induced distortion
- Orient optimally to deliver stable and compensable sintering behavior
- Simulation based multi-physics on phenomenological, macro-scale, continuum mechanics model
- Automated iterative distortion compensation
- Built-in live setter generation
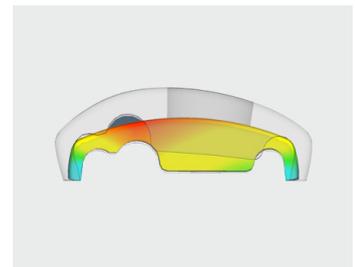
Benefits

- Virtual tryouts
- Less waste
- Less post processing
- Higher efficiency by streamlined process

PBF Process and Defect Analysis - Rapid assessment of optimal process parameters

⚙ Challenge

- Constant (un-moderated) build parameters do not result in uniform thermal conditions
- Finding the "ideal" parameters is difficult with limited "off the shelf" parameter sets
- Evaluating defect risks requires trial and error
- Qualifying and certifying new L-PBF build recipes and parts is expensive

✓ Capabilities

- Predict defects like keyhole porosity, unmelt, balling and identify defect free regions
- Ideal laser parameters set based on defined hatch strategy
- Evaluates thermal history and post exposure temperature
- Very quick solve times
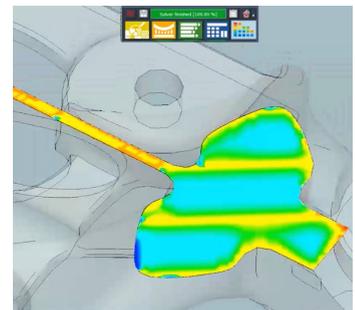
Benefits

- Reduce effort to qualify new L-PBF process
- Find ideal process parameter set
- Reduce tests & inspections
- Increase part quality

Learn more with this link **hexagon.com/products/simufact-additive**