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Geometry prediction of Nickel-Based Alloy Components in Metal Injection Molding and Binder Jetting

Sinter-based additive manufacturing (SBAM) encompasses various processes such as Binder Jetting, Fused Filament Fabrication, Metal Injection Molding, Cold Metal Fusion, and many more. These processes involve the same steps: (i) formation of the so-called "green part"from powder and binder, (ii) debinding to remove the binder, and (iii) sintering to densify the part. The SBAM processes offer a competitive way to produce complex-shaped metallic parts while reducing machining and is cost-efficient compared to traditional additive manufacturing. The variety of these processes allows us to meet diverse needs, such as rapid prototyping, large-series production, or intermittent production.

One of the main challenges of these processes is the control of part geometry during the sintering step. For nickel-based alloys, the sintering temperature is close to or slightly above the solidus. Consequently, densification is fast, and so is the creep rate of the part. Modeling this phenomenon is a complex task, especially given the industrial context and the variability in powder composition.

This work aims to present the approach used at Safran in an industrial context to address these issues. The focus will be on nickel-based alloys produced by Metal Injection Molding and Binder Jetting. Some recent projects aiming to propose solutions will also be presented.

Professional Status of the Speaker

Senior Scientist

Interest in submitting a paper in a special issue of

No interest

Invitation letter for visa

No

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