

# Concepts, strategies and frontiers for the modelling and simulation of the FAST-Sintering Process

In recent years, advances in the mathematical modelling of sintering processes have led to continuous improvements in simulation efficiency and reliability. Current modelling approaches address different length scales, so from macroscopic simulations of shrinkage effects for offset-geometry design and production error minimization, to microscopic phase-field models that enable detailed simulation of microstructural evolution during sintering. Although significant progress has been achieved at both ends of this spectrum, frontiers in modelling remain. This contribution reviews and evaluates the state of the art in sintering process simulation, using the FAST/SPS sintering of aluminium chips as an example. Strategies and concepts basing on recent developments of numerical analysis and IT are discussed, aiming to collocate the respective models and their use and applicability. The contribution includes a discussion of a scalable approach to the inverse computation of physical and phenomenological material data. Based on the discussed models, strategies are derived to estimate process control variables in order to achieve targeted post-sintering microstructures. Finally, the applicability of the proposed approach to aluminium chip recycling is discussed, including strategies for experimental parameter identification and model validation.

## Professional Status of the Speaker

Doctoral or Master Student

## Interest in submitting a paper in a special issue of

No interest

## Invitation letter for visa

No

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