# MICRO-MACRO RELATIONSHIPS FROM DISCRETE ELEMENT SIMULATIONS OF SINTERING

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## ABSTRACT

Sintering is an essential stage of powder metallurgy processes in which solid parts are manufactured from metal or ceramic powder mixtures. Sintering consists in consolidation of loose or weakly bonded powders at elevated temperatures, close to the melting temperature with or without additional pressure. Sintering is a complex process affected by many factors. Modelling can be used to optimize and to understand better the process. There are different approaches in modelling of sintering processes, ranging from continuum phenomenological models to micromechanical and atomistic ones.

In this work, an original micromechanical model of sintering developed in the framework of the discrete element method will be used [1]. This paper will present a possibility to derive micro-macro relationships from the discrete element simulations of powder sintering [2]. This will allow us to use the discrete element model in the framework of multiscale modelling of sintering. The numerical simulations will be performed for sintering of the NiAl powder. Numerical model will be calibrated using own experimental results.

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## References

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[2] J. Rojek, S. Nosewicz, K. Pietrzak, M. Chmielewski, Evaluation of macroscopic stresses in discrete element models of sintering processes, Computer Methods in Materials Science, 15, 219-225, 2015.