Department of Industrial and Materials Science
Chalmers University of Technology

10/2020

Modelling of 3D Print Polyurethane (TPU) Polymer Moulds Used for cold Isostatic Pressing: A Powder Metallurgical Technology

MSc thesis proposal (30/60 credits)

BACKGROUND

Powder metallurgy (PM) process is a mass production method. Not only it meets the demands of saving raw material and energy but also improves the mechanical properties. Conventional methods in PM produces products with inhomogeneous distribution of density and residual stress due to the friction between the die wall, punches and the compact. Hence, it leads to the nonuniform shrinkage during sintering. Cold isostatic pressing method could be used to produce powder compacts with homogeneous density distribution. It is time consuming to investigate different shapes and densities of the complex parts. Thus, simulation is an attractive alternative tool to better understanding of their results with the advantage of less expenses. It is of interest to validate the overall production method by comparing the (Finite element) FE results to the experimental observations (final dimensions and relative density).

AIMS AND OBJECTIVES

The objective of this project is to investigate the modelling results of 3D printed material in producing dense green parts with the experimental work. It is a huge advantage to use these flexible materials in powder metallurgical techonology because of its cost effectiveness of the processing method by re-using these flexible moulds for isostatic pressing. Thus, it is a great start for examining the complex shapes of these moulds which will render its advantage enourmously to powder metallurgy industry in various aspects. Validation woult be done considering certain limits (dimensional parameters such as thickness, edges/corners) for the shapes of the mould to be printed. Modelling these shapes with different dimensions would support the experimental measurements and will help lead to optimize the shape and size of the complex final products.

Student background

- Knowledge in design tool (AutoCAD Inventor, Solid Works)
- Knowledge in FEM Simulation (ABACUS)

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