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3D Printed Mold for Powder Injection Molding Process

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Abstract

Powder injection molding (PIM) is a well-established process that allows mass production of metal and ceramic components with complex geometries. This allows to eliminate the machining process and thus reduce the overall production cost. One of the limitations of the PIM process is the high cost for the production of the molds, making this technology non-remunerative for low rate manufacturing. Another constrain of this process is the need of two plate mold in order to remove the piece after the injection. The need of an opening mold generates a certain degree of restriction when complex pieces have to be produced; a common problem to the injection molded part, for example, is the one caused by the undercuts. Due to the mentioned problems, when highly customized parts are needed, or in the case of prototyping, machining has to be chosen instead of PIM. This work propose an innovative process for powder injection molding, making possible the use of this technology also when low production and high geometrical complexity of the part are required.

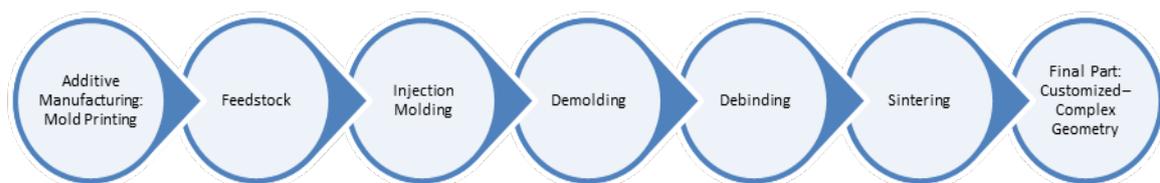


Figure 1: Process chain

The use of PMC (Printed Mold Casting) consent to reduce heavily the mold manufacturing cost, making the PIM process feasible also in case of low production. In addition, by utilizing a single plate mold, a high degree of freedom in designing the part geometry is achievable, making the process valuable for production of customized products. In this study the complete process chain will be presented, focusing on the manufacturing of parts with different inner channels and showing the complexity that can be achieved.

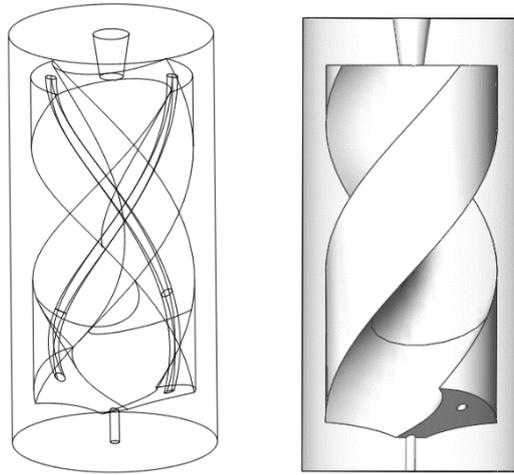


Figure 2: 3D printed mold with inner channels on the left, filled mold on the right.