3d Printed Mold for Powder Injection Molding Process

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Powder injection molding (PIM) is a well-established process that allows mass production of metal and ceramic components with complex geometries. PIM allows eliminating the machining process reducing the overall production cost. This work proposes an innovative process for powder injection molding, enabling the use of this technology also when low production and high geometrical complexity of the part are required. A 3D-printed water-soluble sacrificial mold is used which allows to produce final parts with undercuts and inner channels. In this work an overview of the process chain will be presented, focusing then on the degree of complexity that can be achieved. An analysis of the surface deviation between printed parts and nominal values was carried out showing a deviation of 27 µm. Particular attention was paid to the fabrication of cooling channels, investigating the possibility to print straight pillars. It was possible to produce such a feature when diameters below 0.6 mm or higher than 1.4 mm were used. Moreover, an evaluation of the swelling behavior of the photopolymer during the dissolution process was done.

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