A Soft Tooling Process Chain for Injection Molding of a 3D Component with Micro Pillars

The purpose of this paper is to present the method of a soft tooling process chain employing Additive Manufacturing (AM) for fabrication of injection molding inserts with micro surface features. The Soft Tooling inserts are manufactured by Digital Light Processing (vat photo polymerization) using a photopolymer that can withstand relatively high temperatures. The part manufactured here has four tines with an angle of 60°. Micro pillars (Ø200 μm, aspect ratio of 1) are arranged on the surfaces by two rows. Polyethylene (PE) injection molding with the soft tooling inserts is used to fabricate the final parts. This method demonstrates that it is feasible to obtain injection-molded parts with microstructures on complex geometry by additive manufactured inserts. The machining time and cost is reduced significantly compared to conventional tooling processes based on computer numerical control (CNC) machining. The dimensions of the micro features are influenced by the applied additive manufacturing process. The lifetime of the inserts determines that this process is more suitable for pilot production. The precision of the inserts production is limited by the additive manufacturing process as well.

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