

Abstract

Mootaz M Ghazy

Tool Life Performance of Injection Mould Tooling Fabricated by Selective Laser Melting for High Volume Production

Rapid Tooling processes are developing and proving to be a reliable method to compete with subtractive techniques for tool making. This paper investigates large volume production of components produced from Selective Laser Melting (SLM) fabricated injection moulding tool s. To date, other researchers have focused primarily on investigating the use of additive manufacturing technology for injection moulding for low-volume component production rather than high volume production. In this study, SLM technology has been used to fabricate four Stainless Steel 316L tool s of a similar geometry for an after-market automotive spare part. The SLM tool s have been evaluated to analyse the maximum number of successful injections and quality of performance. Microstructure inspection and chemical composition analysis have been investigated. Performance tests were conducted for the four tool s before and after injection moulding in the context of hardness testing and dimensional accuracy. For the first reported time, 150,000 injected products were successfully produced from the four SLM tool s. Tool s performance was monitored under actual operating conditions considering high-level demands. In the scope of this research, SLM proved to be a dependable manufacturing technique for most part geometries and an effective alternative to subtractive manufacturing for high-volume injection moulding tools for the aftermarket automotive sector.