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Process Development and Product Quality of Micro-Metal Powder Injection Molding

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Abstract

Injection molding has been found to be an efficient and cost-effective manufacturing technique for the production of a wide variety of parts and components at both macro- and microscale. This is attributed to the application of robust design and process development. However, every manufacturing technique is challenged by quality issues and part defects, but tackled by continuous improvement framework(s). This systematic monitoring and control approach of dimensional accuracy, mechanical properties, and surface quality of the finished part strongly depend on process conditions at different production stage. Therefore, the aim of this study is to review process development of micro-metal injection molding; focusing on critical factors influencing part quality and optimization of process parameters. The critical factors that influenced the finished part quality are part design, mold design, material selection, machine, and process conditions. Optimizing mold temperature, melt temperature, injection speed, injection pressure, cooling time, packing, and holding parameters improve the quality of the molded part. This trend of process development of injection molding gave rise to a broad scope of applications with brighter future potentials for the next decades, particularly for medical and electronics applications.

Keywords

- Injection
- Micro-metal
- Molding
- Optimization
- Parameters
- Process
- Product
- Quality

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