Effects of micro-injection moulding process parameters on accuracy and precision of thermoplastic elastomer micro rings - DTU Orbit (28/07/2019)

Effects of micro-injection moulding process parameters on accuracy and precision of thermoplastic elastomer micro rings

Micro-injection moulding (μIM) represents the only technology currently capable of enabling the mass production of polymer micro-components. Although this process is mainly utilized to process rigid thermoplastics, the development of new fields of application asks for the extension of the technology potential to novel types of polymeric materials such as soft thermoplastic elastomers (TPEs). In this work, the authors studied the μIM technology of TPE micro suspension rings for sensor applications. An initial benchmark study, based on microscopy inspections and weld line depth measurements, allowed identifying suitable process parameters settings. Then, the effects of the process parameters on the dimensional variation of the outer and inner diameter of the produced micro rings were quantified. A focus variation microscope was employed for the measurements of both parts and mould cavities. The results of this study showed that the outer ring diameter was mostly affected by mould temperature and holding pressure, while the inner one depended mainly on mould and melt temperature. It was also found that the investigated process parameters had an opposite effect on the outer and inner diameter variations, posing great challenges in the achievement of the part geometry specified in the design.

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