Comparison of micro and conventional injection moulding based on process precision and accuracy - DTU Orbit (12/08/2019)

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Replication-based processes enable the large-scale production of precision and micro components made of many materials. As for polymers, injection moulding represents the most common technological solution. Micro polymer parts can be, in most cases, either manufactured by conventional injection moulding (IM) or by micro-injection moulding (µIM). However, fundamental differences exist among the two processes. The present study aims at comparing IM and µIM in terms of accuracy and precision of moulded parts. The same micro thermoplastic elastomer (TPE) component was manufactured using the two technologies on two different machines by means of multi-cavity moulds. The produced batches were assessed using a precision scale and a focus variation microscope. The cavities of the moulds were also measured in order to evaluate the pure replication capability by eliminating any influence caused by dimensional variations of master geometries. Measurement uncertainty was evaluated using ISO 15530-3. The data-based comparison revealed that µIM was better suitable for meeting the high precision and accuracy demands typical of micro productions, allowing also to achieve a better cavity balance.

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