Accurate characterisation of post moulding shrinkage of polymer parts

The work deals with experimental determination of the shrinkage of polymer parts after injection moulding. A fixture for length measurements on 8 parts at the same time was designed and manufactured in Invar, mounted with 8 electronic gauges, and provided with 3 temperature sensors. The fixture was used to record the length at a well-defined position on each part continuously, starting from approximately 10 minutes after moulding and covering a time period of 7 days. Two series of shrinkage curves were analysed and length values after stabilisation extracted and compared for all 16 parts. Values were compensated with respect to the effect from temperature variations during the measurements. Prediction of the length after stabilisation was carried out by fitting data at different stages of shrinkage. Uncertainty estimations were carried out and a procedure for the accurate characterisation of post moulding shrinkage of polymer parts was developed. Expanded uncertainties (k=2) of 3 μm were obtained.

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