

## Temperature compensation of length measurements: determination of the apparent coefficient of thermal expansion on polymer parts

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### Abstract

The study deals with the determination of temperature influence on the dimensions of polymer components. The experimental setup (see fig.1) consists of an Invar frame that holds two inductive displacement probes for measuring the length of a polymer part. The temperature is measured with three thermocouples (type K) on the part and one on the frame (not shown). The part is initially heated to a temperature above 30°C. After it is positioned in the frame, the variation in length and temperature is acquired. The apparent coefficient of thermal expansion is calculated from the experimental data of length variation and temperature distribution using different analytical models. A numerical FEM simulation is performed as well. The outcomes from the analytical and the numerical models are then compared. Finally the uncertainty on the apparent CTE and its contribution on the dimensional accuracy are estimated.

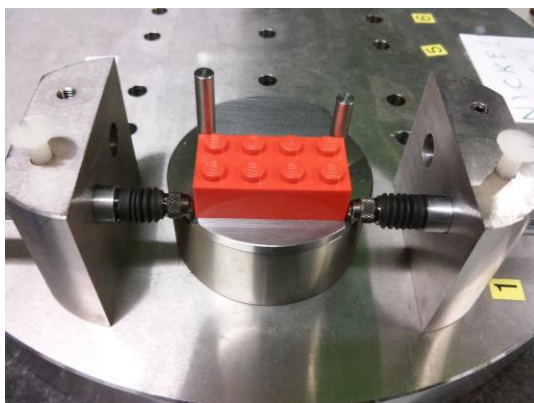


Figure 1: Experimental set up