

# **ANALYSIS AND MODELLING OF WARP IN THERMOPLASTICS INJECTION UNDER PART DIMENSIONS VARIABLES THROUGH ARTIFICIAL NEURAL NETWORK AND THE RESPONSE SURFACE METHOD.**

## **Abstract**

Most consumer products contain parts made through thermoplastic injection process, which confirms the importance of this forming process compared to other processes of plastic processing. Cost minimization to gain competitiveness as well as eliminating or reducing defects in the molded parts have been the main reasons to control this process through the optimization of the variables that come into play. That is why a great number of numerous studies have been carried out in order to observe the relationship between the process variables and aspects of profitability, aesthetics and defectology of the molded parts. Modelling those relationships through mathematical algorithms in order to optimize results and predict the final state of the molded parts have been the targets of most studies.

One of the intrinsic effects of injection is the deformation of the piece. This deformation is due to several factors involved in the overall process design, such as contraction differences, differences in the refrigeration, the pieces's corners, molecular orientation, etc. These are elements which condition deformation and have been widely studied. This article studies deformation under dimensional aspects of the piece in order to try to find out and optimize the conditions of entry—in this case, the dimensions of the piece— through the observation and modelling of the output variables—in this case, deformation.

Our research questions are how do deformations vary depending on the piece dimensions? Which are the piece dimensions that would minimize the negative effects of deformation? Can one predict the deformation of a piece based on its dimensions?

We will try to provide an answer to all of them.