CHARACTERIZATION OF THE HEAT TRANSFER COEFFICIENT IN THERMOPLASTIC PROFILE EXTRUSION

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The cooling stage of thermoplastic profile extrusion is a key step since it determines the production rate and the final dimensions, the level of residual thermal stresses and the degree of crystallinity of the profile. In the production of profiles, the cooling step usually takes place in a calibrator. Therefore, the design of this tool should be optimized to guarantee that the prescribed geometry and dimensions of the profile are achieved, to minimize its tendency to distort when in use and to maximize the production rate. There are many parameters influencing the cooling stage, being one of the most influential the value adopted for the convection heat transfer coefficient, *h*, at the polymer-calibrator interface. This coefficient depends on many factors and is difficult to characterize, which justifies the range of values adopted by different researchers that goes from 10 to 10000 $W/(m^2K)$ [1].

The main objective of this work is to design a prototype system that will enable the determination of realistic values for *h* at the interface polymer-calibrator in real and varied extrusion conditions. The data obtained will allow improving the accuracy of the numerical codes that are being developed by the research team, through the implementation of realistic models for *h*.

References

[1] Nóbrega, J.M., Carneiro, O.S., Covas, J. A., Pinho, F T., Oliveira, P.J. - Design of calibrators for extruded profiles. Part 1. Modeling the thermal interchanges, Polymer Engineering and Science, Vol 44(2004), 12, p. 2216-2228.