

Foam injection molding of a glass reinforced polyamide-66 for automotive applications

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The present work reports the preliminary results obtained by a technical and scientific collaboration between SAPA s.r.l. and the University of Salerno, which aims at obtaining lighter plastic parts made of glass reinforced PA66 for automotive applications. The parts were obtained by foam injection molding. This processing technology is a variant of the more traditional injection molding technique which is used to produce plastic parts of a well-defined shape, consuming less material without sacrificing mechanical properties. The saving of material is achieved by creating voids by means of a physical foaming agent. In particular, the plastic resin is mixed with a supercritical gas inside the cylinder during the batching phase. The forward motion of the screw forces the resin/gas solution into the mold cavity with a volume lower than what needed to obtain the final geometry of the part. Due to the pressure drop between the nozzle and the cavity, the volatile material forms gas bubbles in the melt and expands the melt until it completely fills the cavity.

In this work, foam injection molding has been carried out by using nitrogen as a physical blowing agent. The adopted material is a PA66 with 30% glass fiber. Several molding conditions are analyzed: mold thickness, injection temperature, gas content.

The effects of these molding conditions on the part properties, namely weight reduction with respect to the unfoamed part and mechanical resistance, are systematized and presented, so that the pros and cons of applying the process to the specific material for automotive applications can be assessed.

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