OP-11-224

Tuesday, May 10, 2011, 03:35-03:55 pm
Room: Karam 2

CORRELATION BETWEEN INJECTION MOULDING PARAMETERS, FOAM MORPHOLOGY AND MECHANICAL PROPERTIES OF POLYCARBONATE FOAMS

H.-P. Heim[a] , A.K. Bledzki[b], H. Kirschling[a], M. Rohleder[a]

[a] *University of Kassel, Institute of Materials Engineering, D-34109 Kassel, Germany and* [b] *Westpommeranian University of Technology , Szczecin, Poland*

Microcellular foamed components have been produced for many years. In first instance the main reason was the consumption of raw material and later the reduction of density to get lightweight parts. Meanwhile it is also well known that microcellular foaming by injection moulding offers many more advantages than conventional injection moulding, e.g. lower shrinkage and warpage, shorter cycle times, lower clamp forces, reduced viscosity, but also improved properties of the foamed material in contrast to the resin material.
These arguments are well known, but to improve the material properties it is necessary to understand the relationship with the morphology of the foamed materials and its properties. Furthermore it will be important to know how the processing parameters influence the morphology and, therefore, the properties of the produced part. By means of this knowledge, it is possible to create microcellular foamed parts with exactly defined properties. Special mould technologies like precision mould opening, which is also known as breathing technology or negative stamping, and gas counter pressure were used. This enables the production of well defined homogenous and reproducible foam structures and cell sizes below 10 µm without any nucleation agents or special additives.
By the variation of different processing parameters like blowing agent concentration, injection velocity, melt temperature, mould temperature, density reduction, gas counter pressure, precision mould opening delay time and enlargement injection moulded plates were produced and characterised with regard to morphology and mechanical properties. The analysed mechanical properties were related to the morphology and the processing parameters to enable to the definition of the ideal injection moulding parameters for any application requirement.