



IN-MOLD SURFACE MODIFICATION AND IN-MOLD PRINTING DURING INJECTION MOLDING

T. Härtig^{a*}, M. Gehde^a, G. Mennig^a

a Chair of Polymer Engineering / Chemnitz University of Technology / Reichenhainer Straße 70, 09126 Chemnitz, Germany

**Corresponding author: thomas.haertig@mb.tu-chemnitz.de*

Surfaces of plastic parts often need a pre-treatment before they can be further bonded or painted. In the presented project an innovative method of process-integrated surface modification by surface-reactive injection molding has been investigated. Before the injection cycle starts a thin modifier film is applied uniformly (or selectively) on the mold surface. Then the high temperature of the injected polymer melt is used to initiate a chemical reaction binding functional groups to the newly created surface of the plastic part. Controlling the adhesion processes like chemical reactions in the millisecond range is especially challenging. This means that no subsequent surface pre-treatment is needed in order to save costs, time and energy. In contrast to many of the commonly used methods, the modification effect is permanent. The surfaces can be functionalized in a broad range by tailoring the type of the modifier for e.g. hydrophobic or hydrophilic surfaces. In current investigations even the modification of polyolefins could be achieved successfully. One of the most promising applications would be In-Mold Printing where fully finished surface decorated parts can be produced during injection molding. Here even two subsequent processing steps are saved compared to the common printing process of polymer parts: the surface modification for better adhesion and the printing itself are integrated in the process of injection molding. This could be realized by printing patterns of modified paint on the mold surface, e.g. by pad printing. During injection molding the paint is transferred completely to the surface of the polymeric part, which develops at this point. In-Mold Printing shortens the process chain, saves material, energy and time and opens new application fields, e.g. the integration of printed electronics to low-cost plastic products in mass-production.