FLOW BEHAVIOR AND INJECTION MOLDING OF WOOD PLASTIC COMPOSITES

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Wood-plastic composites (WPC) show a complex and completely different material and flow behavior in comparison to pure polymers. Especially the flow behavior is very important for the processing of these composites. In the present work results of rheological characterization and investigations of the filling behavior during the injection molding process of two different PP-based WPC are presented. Furthermore, the residual moisture content of the materials on the flow and filling behavior are discussed. The 3D injection molding (IM) simulations were done with the commercial software package Autodesk® Moldflow® Insight 2016 (AMI). The mold filling experiments were conducted with a box-shaped test part (stacking-box).

The experimental filling studies shows that for WPC no classic fountain flow occurred such as at standard thermoplastics (Figure 1, a). Due to low melt elasticity of highly filled WPC the classic fountain flow like for unfilled thermoplastics did not develop. Melt front break and so called finger effects occurred.

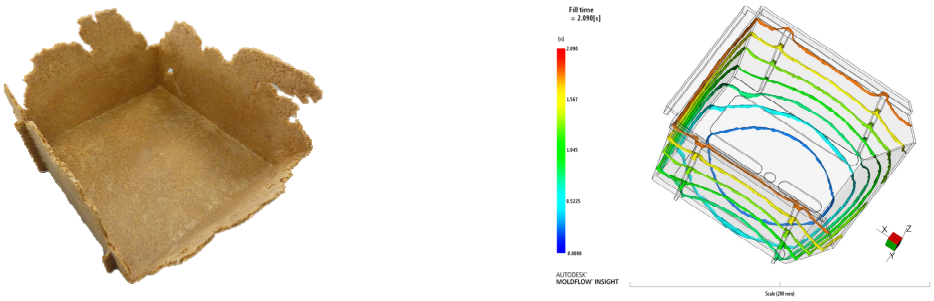

Figure 1: (a) short shot of a WPC, (b) flow front predicted with 3D IM-simulation

The flow behavior of WPC is strongly influenced beside the wood content as well on the moisture content. With the increasing the moisture content increases the material's wall slipping tendency.

The filling behavior of WPC cannot yet be accurately predicted by using the standard 3D IM-simulation software (Figure 1, b). To exactly describe the shape of the flow front, filling stage simulation should use equations for the material properties which take into account the wall slip and the elastic extensional behavior of the melt.