

Injection Moulding of Thermoplastic/Rubber-Composites using Plasma Coatings as Coupling Agent

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Facing increasing demands of the market and accretive efforts of productivity improvement the multi-component injection moulding offers a substantial potential in developing and manufacturing technically ambitious and highly integrated plastic and elastomer products. The fundamental challenge in manufacturing multi-component mouldings is to realise a sufficient bond strength between both components. To achieve high bond strengths it is desirable to have substance-to-substance-bonds between the different materials. Typically thermoplastic/rubber-composites do not have the ability to build those substance-to-substance bonds. This leads to adhesion forces which are mostly too weak for manufacturing two-component parts with sufficient bond strengths. Therefore the objective of current research is the design and validation of an entirely new process chain for moulding various thermoplastic/rubber composites. The desired bond strengths are ensured by using a plasma polymerised interlayer. The characteristics of plasma coatings can be systematically varied by the process determining parameters of the plasma process. The main parameters under investigation are type and flow rate of the process gases, the duration of the layer deposition and the applied electromagnetic power and process pressure. The constitutional idea is to gain the ability to set individual surface characteristics by varying those parameters for each material combination. First results prove the possibility of directing the chemical composition as well as the physical properties of the plasma polymerised interlayer. Current investigations are now focused on the influence of certain characteristics on the bond strength between the thermoplastic and the rubber components.