

ADHESIVE STRENGTH OF INJECTION MOULDED PLASTIC/RUBBER COMPOSITE PARTS: INFLUENCE OF PROCESS PARAMETERS AND MATERIAL PROPERTIES

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The production of two component composites of a hard plastic and a soft rubber is usually realized in an expensive multistage process. First of all, the plastic component is prefabricated by injection moulding. Afterwards, either bonding agents or activation treatments are applied to the surface in order to achieve a high adhesive strength between the plastic and the rubber components. Finally, the rubber component is added by a second injection moulding step. To reduce the high production costs caused by these different steps, a new single-stage process of two component injection moulding has been developed. During this process plastic/rubber composites are produced in a two component injection moulding machine without using bonding agents or activation treatments. For the high adhesive strength between the two components, diffusion of polymer chains or chemical reactions in the interface have to take place. Therefore, a system of corresponding plastic and rubber types with specific material properties is required. In addition to this material combination, process parameters like cylinder and cavity temperatures, injection and holding pressures, cooling and vulcanisation times affect the adhesive strength of the plastic/rubber composite.



Fig. 1: Two component injection moulding machine

In this study the influence of the process parameters and the material properties on the adhesive strength is investigated. A new two component injection moulding machine (Fig. 1) is used for the experimental setup, which allows the variation of the process parameters. Different types of plastics and rubbers are used to determine the influence of specific material properties on the adhesion. The adhesive strength is measured by using a peeling test on a standard tensile test machine. Additionally, the interface between the thermoplastic and the rubber component is analyzed by means of scanning electron microscopy and transmission electron microscopy with regard to the wetting of the thermoplastic surface by the rubber and to any diffusion processes. The results of this investigation will be used for the development of appropriate plastic and rubber materials and the optimization of this specific injection moulding process.

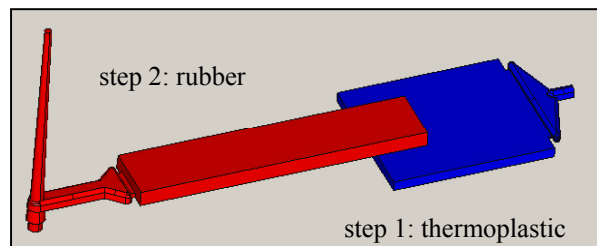


Fig. 2: Two component specimen for peeling test

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- Zweikomponentenspritzgießen von Thermoplast/Elastomer-Verbundbauteilen
- Prozessanalyse
- Haftungsuntersuchungen