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Extended Abstract

Emerging Materials and Nanotechnolgy: Process development: ridge and film formation during high speed stamping of extruded PC-ABS polymer blend- Sebastian Noller, Roland Heiler and Anja Pfennig- HTW-Berlin, Germany

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Abstract

Statement of the Problem: The standard material for cable ducts is polyvinyl chloride (PVC). To prevent PVC releasing hydrochloric acid (HCl) during heating thermal stabilizers are mixed into the polymer granules. The stabilizers work sufficiently for moderate temperature rises but fails when PVC burns. Therefore, industry started using the thermoplastic polymer blend polycarbonate acrylonitrile-butadiene-styrene (PC-ABS) for cable ducts. PC-ABS is self-extinguishing and reaches the highest level V-0 in the UL94 test for flammability of plastic materials. Unfortunately, PC-ABS tends to ridge and formats films during stamping. The purpose of this study is to reduce ridge and film formation during stamping PC-ABS and to identify the dominating failure cause. Methodology & Theoretical Orientation: First investigations focus on the usage, processing and material properties of PC-ABS. Test coupons were taken from in-situ cable ducts including further additives generally used in industry. Vickers hardness (DIN EN ISO 6507), tensile testing (DIN EN ISO 527) and Charpy impact testing (DIN EN ISO 179) as well as microscopic fracture analysis and microstructural analysis was performed.

Findings: Significant differences of PC-ABS tensile properties with and without mineral reinforcement were observed. The hardness of mineral reinforced PC-ABS is significantly dependent on the geometry of the cable ducts. The fracture behavior and morphology of the fracture surface is directly related to the coupon temperature during Charpy impact testing. Conclusion & Significance: The process temperature influences the failure behavior during high impact processing such as stamping. Due to the lower fracture toughness of mineral reinforced PC-ABS less film and ridge formation compared to pure PC-ABS are likely. However, the mineral distribution is not homogeneous and therefore subject to further investigation. This study aims at a better understanding of process properties of PC-ABS products, parameter selection, quality improvement and general understanding of underlying microstructural and surface properties.

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