

Thermoplastic elastomer coatings for use as artificial leather

Objective

Currently, PVC-based (with plasticizers) and polyurethane-based artificial leathers dominate the market. The manufacturing processes are energy- and cost-intensive. In addition, plasticizers and solvents that are harmful to health are used. Coatings with thermoplastic elastomers (TPE) offer an alternative. The TPE group combines the advantage of thermoplastic processability with elasticity and dynamic behavior that is almost as high as that of cross-linked, thermosetting elastomers. The polymers should be applied using energy-efficient and environmentally friendly hot melt roller application and slot die technology. In order to achieve specific properties, such as color, appearance, or flame retardancy, the incorporation of appropriate additives was part of the investigations.

Approach and results

In this research project, various thermoplastic polyurethanes were successfully applied to different textiles using direct and transfer coating processes involving roller application and slot die. Transfer coating using roller application was found to be the most suitable method for use as artificial leather. Various additives were successfully incorporated into the TPUs to achieve a range of colors and optical effects. Fabrics (PES, CO/PES), knitted fabrics (PES), spacer fabrics (PES), nonwovens (PES multiknit and needle punched) and TPU meltblown were used as textile carrier materials. This made it possible to achieve different thicknesses in the range between 0.6 mm and 4.7 mm in combination with application weights of 100 g/m² to 200 g/m². The more voluminous textiles were used to produce pressure-elastic artificial leather (soft-touch effect). Soft, flexible, stretchable TPU-based artificial leathers were developed, which are characterized by high abrasion resistance (> 100.000 abrasion cycles) and permanent bend resistance (> 50.000 bends). The colored TPU synthetic leathers showed high colour fastness to rubbing with a rating of 4-5. From today's perspective, potential areas of application for the manufactured materials include synthetic leather for bag goods, home textiles, and the automotive sector.



Project demonstrator "STFI-Shopper"

INNO-KOM

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The final report on this project is available on request.

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