Sächsisches Textilforschungsinstitut e.V.

Affiliated institute of the University of Technology Chemnitz

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STFI Media Service

Thermoplastic elastomer coatings for use as artificial leather

Currently, PVC-based 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 behaviour 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 colour, appearance, or flame retardancy, the incorporation of appropriate additives was part of the investigations.

The research project focused on applying the polymers using energy-efficient and environmentally friendly hot melt roller coating and wide slot die technology. In addition, appropriate additives were incorporated into the TPEs for supplementary investigations in order to obtain specific properties such as colour, appearance or flame retardancy.

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 colours 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 coloured 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.

Dr. Ralf Lungwitz, Manager Functionalisation, who led the INNO-KOM project is convinced: “Thermoplastic elastomer coatings as artificial leather are a good alternative material because they have excellent properties for use in demanding applications. We were impressed by their high mechanical strength.”

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Photos

Projectdemonstrator „STFI shopper

Photos in print quality are available on request.

About STFI

The STFI in Chemnitz has been an outstanding innovation partner and service provider for its customers since it was founded in 1992. Textile materials have shaped our activity profile ever since. The non-profit institute addresses technical and social issues through an open, interdisciplinary and reliable approach. At STFI, the main topics of research and development are technical textiles, nonwovens, lightweight textile engineering, functionalisation, recycling, digitalisation and AI. At the Centre for Textile Sustainability, the focus is on application-oriented research into resource efficiency and energy-optimised processes. Additionally, STFI gathered many years of experience and expertise in textile testing as well as certifying Personal Protective Equipment (PPE). Under the name "STFI Academy", the STFI regularly offers modules and courses for specialist qualification and further training, designed to support employers in the textile industry. The STFI has been an affiliated institute of the Chemnitz University of Technology since 2006. Furthermore, it is actively involved as a member of the Zuse Association and the Saxon Industrial Research Association (SIG).

Further information: www.stfi.de

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