

UV-curable coatings for use as artificial leather in the field of technical textiles

Motivation

Artificial leather is mainly based on polyvinyl chloride (PVC) and polyurethane (PUR) coatings. The PVC artificial leather is made from plastisols and the PUR artificial leather from solvent-based or water-based formulations. Due to the high process temperatures, the production of artificial leather is very energy-intensive. The use of harmful solvents and plasticisers is also disadvantageous. UV curing is a curing technology that is already widespread in the paint, printing and paper industries. The use of UV-curable systems is a fast, environmentally friendly and energy-efficient alternative to thermal drying and curing processes.

The aim of the research project was the development of a process for energy-efficient and environmentally friendly production of artificial leather by using UV-curable coatings. The focus was set on the application of artificial leather in the field of technical textiles for use in automobiles and as contract textiles. The aim was to develop a soft, elastic, scratch-resistant, durable and dirt-resistant material.

Experimental

The solution of the project included the development of UV-curable formulations from various urethane acrylates, UV-silicones, crosslinkers, reactive diluents, photoinitiators and synergists. Special additives were incorporated to achieve certain functions (antimicrobial effect, flame retardancy, colour). The formulations were applied to various textiles by means of transfer coating and cured with a 365 nm UV LED lamp under inert atmosphere.



Coating samples and project demonstrator "artificial leather seat cover"

Results

In this research project, three different UV-curable formulations were developed, which could be applied to knitted fabric, spacer knitted fabric and nonwoven fabric by means of transfer coating in a two- and three-coat process. After UV curing, soft (Shore A36 - A83), elastic (up to 337% elongation), abrasion-resistant (> 50,000 rub cycles), durable (> 200,000 buckling cycles), single and multi-colored artificial leather with high color fastness (grade 4-5) received. Different looks and haptics could be achieved through the use of differently structured transfer papers. With application weights in the range of ~ 240 - 400 g/m², material thicknesses of 0.8 mm to 3.1 mm were realised. After the incorporation of special additives, the artificial leather was antimicrobial (microbicidal) and flame-resistant (according to the B2 standard). Compared to thermal drying, the calculated energy saving was 84%.

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