

The Effect of a Plasma Pre-treatment on the Quality of Flock Coatings on Polymer Substrates

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Flock coating is a widely used process to create a textile-like texture on substrates of arbitrary shape and material. In the process, flock fibers - short fibers typically 1 to 3 mm long - are oriented and accelerated towards the substrate by means of an electric field. Impacting fibers are stuck to the substrate surface by an appropriate adhesive. The technique is applied to products as diverse as textiles, plastic car interior components, floor coverings or furniture with the objectives being decorative, but also functional effects, e.g., with regard to friction. Substrate materials range from polymers to metal as well as ceramics.

Primary quality criteria are adhesion of the flock fibers, but also the so-called flock density, i.e. number of fibers per unit area, and evenness. Here, influential physical and chemical factors refer to interfacial adhesion, but also charging effects by the impacting fibers. Up to now, these aspects have been addressed by choice of adhesive as well as fiber polymer and process parameters.

Present developments, especially with regard to car parts, aim at easy to recycle single-material systems, i.e. substrate, adhesive and flock fibers based on identical polymer chemistry. A system presently under investigation is comprised of a molded car component, hot-melt adhesive, and flock fiber based on aliphatic polyamides. One aspect in this study was the application of an air plasma pre-treatment of the PA substrate, mainly in order to increase hot-melt adhesion. The presented paper will give a general overview over physical and chemical properties of the treated surfaces and the resulting effects on flock coating.