Sächsisches Textilforschungsinstitut e.V.

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PLA hotmelt coatings – Ecological polylactide-based hotmelt coatings for technical textiles

Objective

A growing number of industries are turning towards the production of ecological and sustainable products. The focus is on both materials and processes. In terms of materials, bio-based and/or biodegradable materials are becoming increasingly important. Green processes are those that save energy and are environmentally friendly (low emissions, no harmful solvents).

The aim of the research project was the development of an ecological hotmelt coating based on PLA (polylactide, polylactic acid) for technical textiles. By ecological, we meant that the coating polymers and the carrier textile should be biodegradable and bio-based (ideally 100 %). The desired coatings should be flexible, stretchable and soft.

Approach and results

The selection of thermoplastic polymers included various types of PLA and PBS. Different types of plasticisers were investigated for the project. The compounds were produced by varying the type of PLA, PBS and plasticiser and their proportions. The compounds were then analysed with regard to their rheological properties, Shore hardness, thermal resistance and extraction behaviour.

Project demonstrator (left) and coating sample (right)

The best results were achieved with two basic compounds, each consisting of 35 % PLA, 35 % PBS and 30 % plasticiser. All materials were biodegradable and the bio-based content of the compounds was 82.5 % and 52.5 % respectively. Various additives were successfully incorporated into both materials to achieve different colours, optical effects and a microbiostatic effect. The application was carried out using a hotmelt roller application in a transfer process and a slot die as a direct coating. The textile carrier materials used were 100 % bio-based and biodegradable PLA spunbond and PLA fibre nonwovens.

The coatings are flexible, stretchable (up to 45.1 %), abrasion-resistant (> 51,200 abrasion cycles), durable (50,000 to 125,000 creases), colored, pressure-elastic and flame-retardant. By using different transfer papers, different looks and haptics could be achieved. From today's perspective, the potential areas of application for the materials produced are artificial leather for bags, household and home textiles, advertising banners and tarpaulins.

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The final report on this project is available on request.

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