Multifunctional Protective Workwear for Outdoor Workers: Developing a Spacer-Fabric Shirt for UV Protection, Cooling and High Visibility

Caroline Gierke*†[1], Heidi Schaarschmidt‡[1], and Dr. Yvonne Zimmermann*[1]

[1]Textilforschungsinstitut Thüringen-Vogtland e.V. – Germany

Abstract

Workers who are exposed to the elements whilst working outdoors are increasingly suffering from the effects of extreme weather events. The DGUV recommends long-sleeved clothing that protects against UV-radiation, has a cooling effect and, for certain work areas, provides an appropriate high-visibility. At present, however, the market only offers products that fulfil one or, at most, two of these functions. A combination of all the properties is currently not available. Some of the available products are even impractical in everyday working life or pose an additional risk of overheating. These and other shortcomings are being addressed in this DGUV-funded research project. The aim of the project is to develop an innovative long-sleeved outerwear that protects outdoor workers from overheating and UV exposure. The project is expected to result in a multifunctional Shirt made from a spacer fabric that can consideres not only the necessities of men, but also of women. The current research project, which will run until mid-2028, is characterised by its high relevance and innovative potential, as it addresses several needs and research gaps simultaneously. These include the development of a multifunctional spacer fabric as an alternative to combining several individual materials, the structural adaptation of the outer surfaces to simultaneously optimise UV protection and evaporative cooling and high-visibility features into a single textile structure. Another innovative focus lies on the development of segmented retro-reflective applications, which are intended to offer improved freedom of movement and greater thermophysiological comfort compared to conventional reflective strips. This task presents a major challenge in terms of selecting suitable materials, processes and structures, as there is a risk of these factors negatively interfering with one another. The development is intended to comply with the requirements of Regulation (EU) 2016/425 on personal protective equipment.

Keywords: PSA, PPE, Cooling, Warning, UV, Protection, Climate Change, Heat, Spacer Fabric, Warp Knitting, Functional Fabric, Protective Clothing, Functionalisation, Garment, DGUV Germany, Resilience, Workwear

*Speaker

†Corresponding author: c.gierke@titv-greiz.de

‡Corresponding author: h.schaarschmidt@titv-greiz.de