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Textiles with integrated optical polymer fibres – Analysis of the influence of the joining technique sewing during manufacturing as well as development and realization of luminous products

Introduction

Textiles with integrated optical polymer fibres are able to conduct and emit light when combined with a light and a power source. They are able to glow. If such textile light systems are incorporated into products, it is possible to create products that visually enhance the wearer and increase his or her visibility in the dark.[1]

Scope and Goal

Polymer optical fibres are fibres for which even minimal influences (such as bending with bending radii in a size range of a few millimetres or even smaller) have an impact on the properties and function. The aim of the master's thesis prepared under the aforementioned title is therefore to determine whether and to what extent joining during fabrication has an influence on textile-integrated polymer optical fibres. Furthermore, to evaluate the influence and, based on this, to provide processing instructions for product manufacturing and to realise luminous products.

Results and Discussion

Based on the examination of textile samples with differently formed seams under the light microscope and with a luminance camera, it is possible to summarise that the joining technique of sewing has a negative influence on the optical polymer fibres integrated into a textile when using stitch type 301. The joining technique causes damage to the polymer optical fibres and results in irregular and unintended light losses. The influence varies depending on the characteristics of the process components used (sewing needle tip shape, sewing needle fineness but also sewing thread fineness and sewing thread construction).

Using the process components determined to be the most suitable (i.e. the components with the least negative influence) and taking into account processing instructions, such as not sewing in and in front of the area where the polymer optical fibres are specifically modified to emit light evenly laterally over a certain length, two luminous products (a backpack and a bicycle jersey) are made (see Figure 1).

Figure 1: Luminous backpack and luminous bicycle jersey (Reference: compiled by the author)

Conclusion and outlook

Due to the fact that the joining technique causes irregular damage and unacceptable light losses and that the joining technique cannot be used without restrictions in the realisation of products made of or with textiles with integrated optical polymer fibres, further research work on the use of the joining technique will be necessary in the future. Research into the use of the joining technique for the controlled introduction of damage (i.e. for surface modification) as well as research into the use of the technique while avoiding damage are considered to be useful.

Literature

1) **Institut für Arbeitsschutz der Deutschen Gesetzlichen Unfallversicherung (IFA) (Hrsg.) (2010)**
Lass dich Sehen! Warnkleidung rettet Leben, Sankt Augustin: o.A..

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