

Project title: **ProPSAStick** - Development of a digitalised process chain for personal protective equipment using embroidery

Partner: Hollmann GmbH, Cologne

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Mission Statement

In April 2018, the regulation for personal protective equipment (PPE) came into force in all EU member states. Manufacturers and dealers may only sell PPE if it meets the basic requirements of health and safety protection. Design and individualization options are specified in the PPE ordinance as type designs. In many branches of industry, PPE with refinements, e.g. with company logos or employee names, is used. With over 180 SMEs, embroidery finishing is still one of the classic textile industries in Germany. Because the highest demands are placed on shape fidelity, color fastness and consistent quality, most companies maintain long-term business relationships with their embroidery companies. For a high-quality embroidery application, a lot of experience and extensive knowledge is required, for example, regarding the setting of the correct thread and basic embroidery tension. This can be guaranteed for classic embroidery applications with common thread and embroidery base materials. When manufacturing PPE emblems, however, new (mainly technical) materials are processed, which vary in their combination depending on the customer's order. Since there is only limited knowledge about the processing of these materials in the embroidery process, the field of tension between the highest quality requirements and the safe processing to PPE emblems is growing. Information on shape and colors as well as the required materials for embroidery thread and embroidery substrate from the manufacturer must be implemented according to PPE specifications.

The biggest deficit of the manufacturing process is the transfer of optical and technical requirements into the manufacturing parameters, as well as the processability of the new materials. Embroidery errors can occur due to incorrect machine programming or errors during machine set-up with yarns and embroidery backing. The wrong choice of material by humans holds further potential for error. As a result of incorrect material selection or processing, hot or chemically aggressive media can stick to the embroidered emblem during use and lead to burns or burns of the wearer. The PPE conformity of the entire garment is thus invalidated. Overall, current solutions lead to a high reject rate due to low process monitoring while at the same time meeting the highest product requirements. Furthermore, many sub-process and communication steps create complexity, which results in increased effort - and thus costs.

Approach

The aim of this cooperation project is the first development of an embroidery process with actively controlled, automated material feeding by real-time process monitoring for the production of individualized PPE. The construction of a new type of feeding system guarantees the faultless clamping of the embroidery ground. By means of inline monitoring of the embroidery process an increased process reliability is achieved. The development of digital interfaces between machine, material, employee and order ensures correct material selection. Based on this, the material and process-adapted parameters (e.g. thread tension, embroidery speed, etc.) can be derived in order to process novel PPE materials in the embroidery process with a high degree of process reliability. By combining the desired innovations, productivity is increased and the reject rate is reduced.

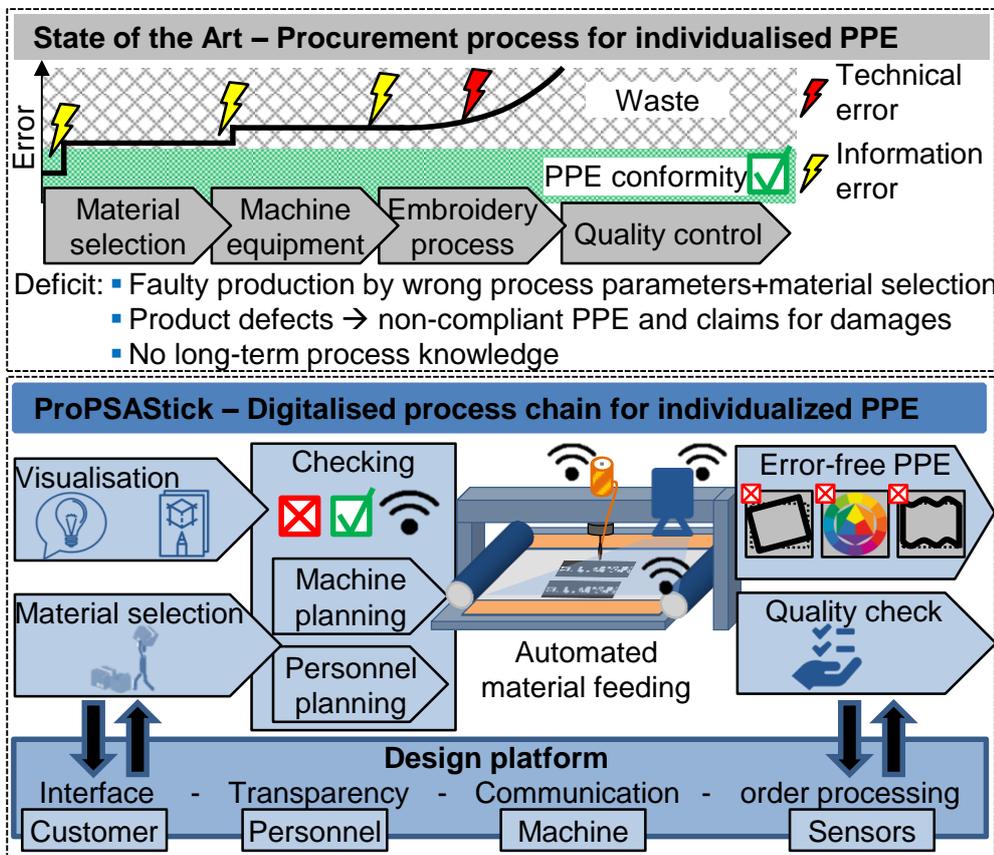


Figure 1: Central picture of the approach for the ProPSAStick project

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