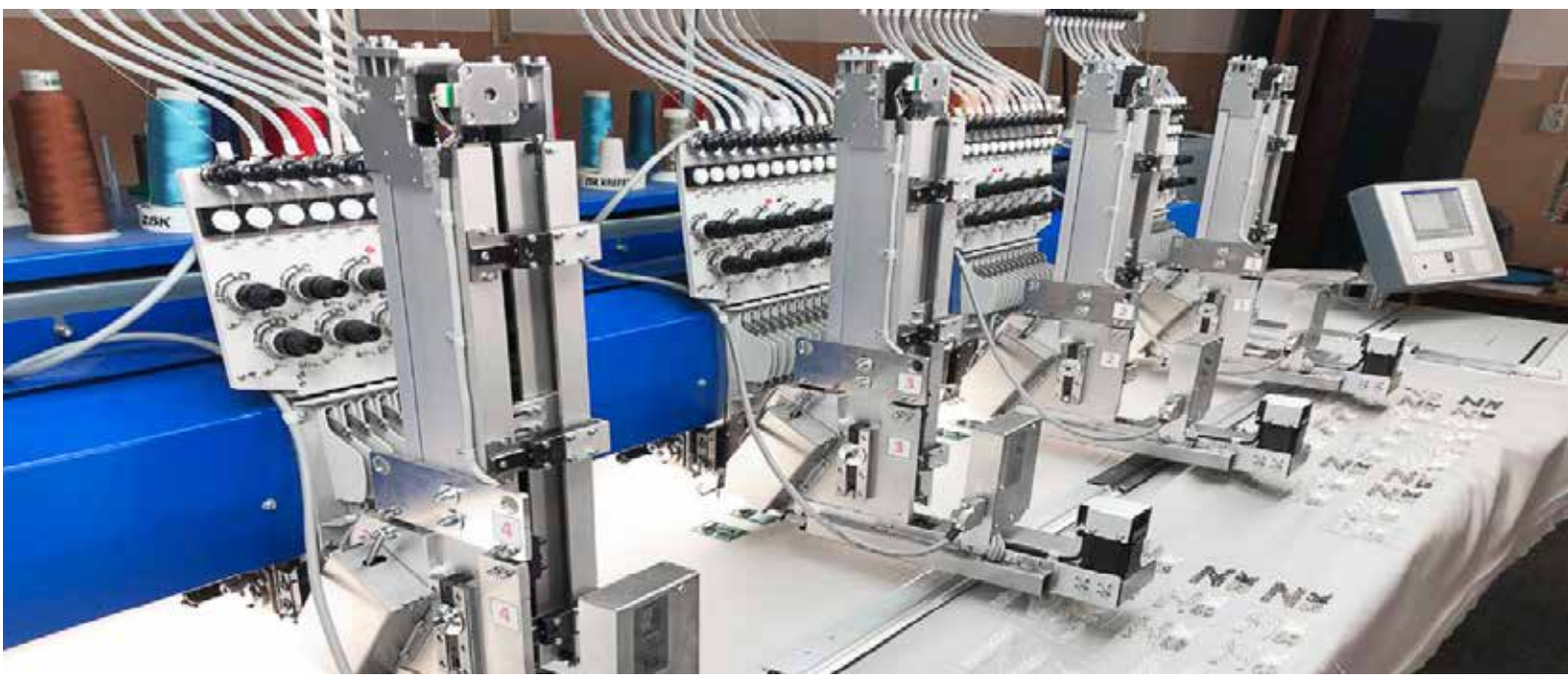
TECHNICAL EMBROIDERY SYSTEMS
A Division of ZSK Stickmaschinen GmbH

Smart Solutions
Embroidery ▪ Electronics ▪ Engineering



ReliableMassProduction of E-Textiles by using EmbroideryTechnology

Abstract

Technical embroidery systems, due to their high precision, are applicable for the integration of functionality into textiles through textile sensors, actuators, electrodes and functional LED or RFID sequins. Even entire circuit boards (PCBs) can be automatically and reliably fixed and connected with conductive threads.

Technical Embroidery systems provide solutions to two of the greatest challenges of the e-textiles industry by creating a reliable interface between the electronic components and the textile and enabling the automated mass production of smart and e-textiles.

Reliability

State of the Art & Deficit:

- Thick PCB substrate
- Non-metalized, sharp edges
- Connection holes too big
  - relative movement between PCB and textile
  - unreliable contact
- Electronic components in the embroidery area can be damaged
- Loose embroidered connections

Solution:

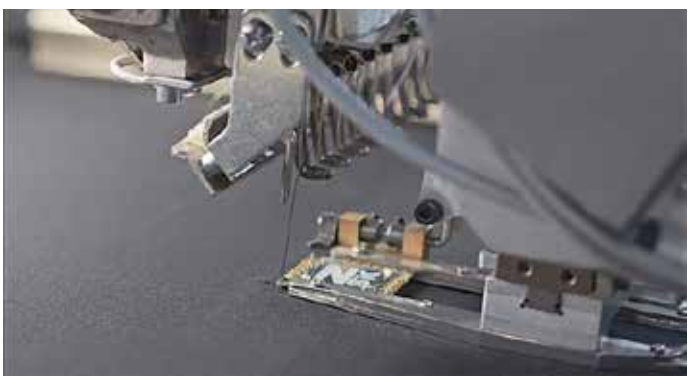
- Thin PCB substrate
- Metalized, round edges
- Small, castellated connection holes plus additional fixation holes
- No electronic components in the embroidery area
- Optimized stitch sequence for tight and reliable connections

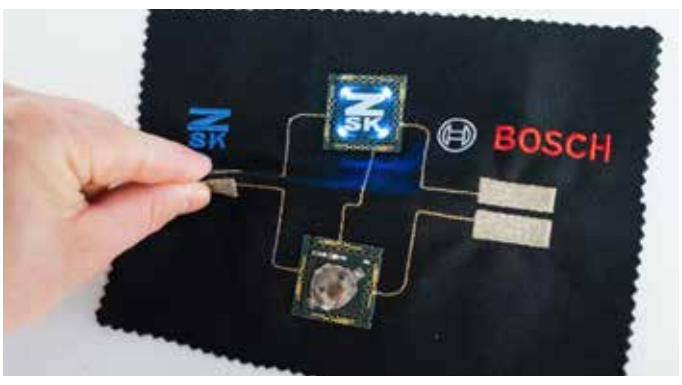
Results

The optimized PCB and embroidery design is a product of scientific research and provides a textile-to-electronics interface, which:

- Ensures a reliable electrical connection
- Can withstand the mechanical stress at the rigid-flex transition on the PCB edge
- Is produced fully automatically by the embroidery machine
- Is washable

Mass Production





Automation

The PCB placement device, developed in cooperation with Robert Bosch GmbH, enables a new degree of automation in the e-textiles production process.

Benefits

- Automatically fix and connect PCBs
- Significantly reduce production time
- No manual production steps
- Ensure reliability and reproducibility
- Opens up a wide range of applications

Properties

- Handles various PCB sizes and geometry
- High precision and carefulness for surface-mount electronic components
- Retrofittable on embroidery machines
- Cost-effective

Scalability

Products developed by using single-head embroidery machines can simply be upscaled to a mass production process by using multihead embroidery machines which are producing several products simultaneously on one machine

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