

Project Note

Sensor for Following Material in Sewing Machines

A new sensor allows the sewing machine to synchronise the different layers of material independently. Zühlke helps to develop this sensor with large optical experience and modern calculation tools.

Task

Quilting is a sewing technique in which several layers of material are stitched together. Experienced quilters sew these layers into patterns, also known as patchworks, and create genuine works of art in the process. To create an attractive stitched pattern, the single stitches in a seam must be uniformly spaced.

This spacing is especially difficult for beginners to achieve. It demands that they coordinate the handled material with the pedal-controlled speed of the sewing machine. This project involved integrating a suitable sensor to allow a sewing machine to handle this synchronisation independently.

Implementation

The sensor system selected for this project was the Optical Mouse Sensor from Agilent. This fully integrated sensor chip picks up image sequences from any rough surface and calculates displacement in real time on the basis of these sequences. To allow retrofitting and to fit the limited space available, the entire sensor system was built into the presser foot of the sewing machine. The standard optical system of the mouse with its stipulated beam cannot be used under these conditions. Zühlke developed a completely new optical system for the sensor. It features crossed lighting and imaging paths. Simulations and version studies were utilised to optimise performance. Even dark and smooth fabrics can be recorded reliably with this approach. Zühlke machined the first operational models in its own micro-technology workshop. In several iterations, the team created a cost-optimised and mass-producible system in an injection-cast design.



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Customer benefits

- Ready access to extensive optical expertise and necessary calculation tools from Zühlke.
- Assistance with integration at Bernina ensured the efficient implementation of the opto-electrical module.
- Initial operational models were produced in Zühlke's own workshops in optical quality and were quickly made available.
- First sensor on the market for the on-line tracking of material in home sewing machines.

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