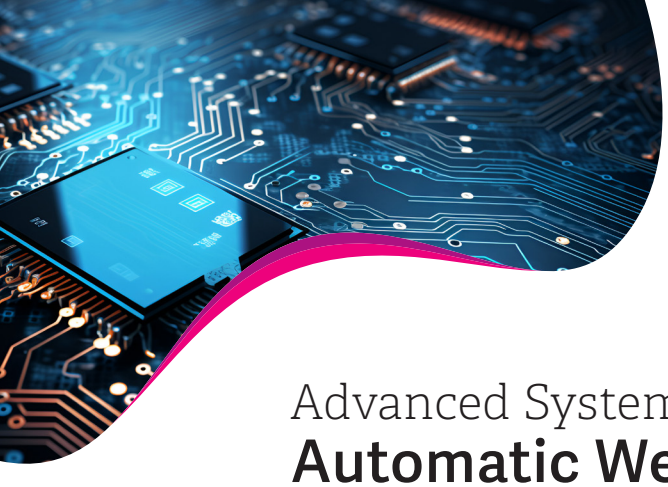


IMES | Institute for Microelectronics, Embedded Systems and Sensors

OST Eastern Switzerland University of Applied Sciences

Advanced System Technologies
Automatic Weld Line Inspection

The company Georg Fischer Piping Systems asked itself how weld lines of thermoplastic pipe connections could be reliably, reproducibly, and automatically tested and qualified in the future.

Initial Situation

To inspect critical polyvinylidene fluoride (PVDF) pipe joints, specially trained experts have been required. As this pipe systems are used in clean rooms and chemical plants with high safety requirements, systematic inspection of weld lines is necessary to ensure that the pipe connections remain stable and leak-free over a long period of time. Today, fully automatic welding machines with an extremely low error rate are also used for such pipe connections. The welding machines plane the left and right pipes flat, heat the end faces to a precisely specified temperature and press the pipes together with precisely defined pressure and/or travel. After cooling, a weld line is created. This weld line that must have a certain shape to be considered «good». But even after this well-defined mechanical process, one wants to be sure of the quality. Every weld has to be measured and recorded over the entire circumference of the pipe. It is obvious to automate this previously manual check and thus reduce sources of error.

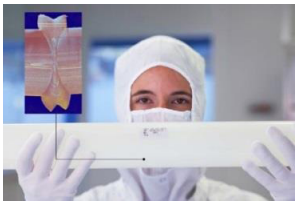
Hardware and Algorithms

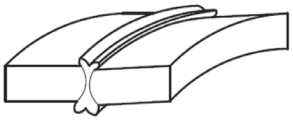
To indicate the quality of the pipe connections, essentially two parameters are critically: The wall offset, i.e. the offset between the left and right pipe, and the K-dimension. Both parameters can be measured using image recording and image processing. During the Innosuisse co-founded research project, it was shown that a backlight image is best suited for this purpose. An X-axis motor is used to move the camera to the optimum position in order to start image acquisition. The image processing software then analyses the images.

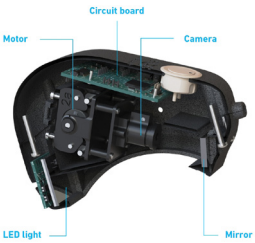
From Prototype to Product

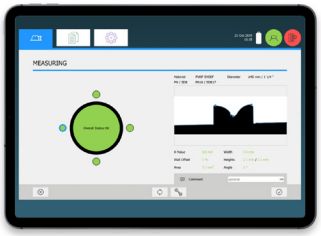
The WBI tool is currently available in two sizes to test the joints of pipes in a range from d20 to d225. The enclosed software can be used to analyze the key areas of each weld line and simultaneously create a certificate of the test for the inspected weld lines.

In this project, +GF+ found an experienced partner in IMES, which was on board from the concept phase through a research project with the construction of a prototype until the product design. Successful student projects have also been carried out in this field.









Produktvideo von +GF+

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