

Current Challenges in designing suitable inline quality control for fuel cell components with reference to the current research project “HZwo-Inspect”

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Abstract:

The main objective of the HZwo-Inspect [1] project is to develop a generally applicable process chain with integrated inline or end-of-line testing for high-rate production of fuel cell components (bipolar plate and MEA). By combining test methods from optics, mechanics, vibro-acoustics, ultrasound, eddy current, X-ray and CT into a hard- and software backbone, the project aims to overcome existing bottlenecks of suitable inline quality control in high-rate manufacturing.

During production of fuel cell components various defects like micro cracks and necking, burr formation may occur on formed bipolar plates, respectively variations of layer thickness, printing errors (uncoated, precision of edge areas, imperfections) or drying errors on the MEA. The use of defective parts would thus be associated with high follow-up costs. For this reason, automated 100% inline control is necessary, but it is associated with many challenges. So-called inline-capable multi-sensor inspection systems are often not available as standard solutions. In addition, the inspection concept must cover the entire surface in order to monitor multiple defect classes and inspection criteria in a contactless manner. However, the impact of the defect classes in the process are not well known and a standardized defect catalog is not available. Since the defects are usually in the micrometer range, optical systems reach their technical limits (resolution, data rate). Various approaches that take the different challenges into account will be discussed in detail.

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