

Computer Vision-Based Pattern Investigations for Predictive Maintenance of Drop-on-Demand Printing

Drop-on-Demand (DoD) printing is a marking solution that prints individual droplets of ink onto the substrate. In combination with ink formulas which contain solid glass and ceramic particles, DoD printing can be used to print Unique Identifiers onto metal substrates. The marking is not only suitable for harsh process environments such as temperatures above 1000°C, but also more stable and faster to apply, e.g., compared to laser marking. This work investigates a predictive maintenance concept which is based on monitoring of the printing quality through Computer Vision based analysis of the printed pattern. Typical indicators for printing quality degradation are identified and are made quantifiable through segmentation of the individual ink drops and analysis of drop-specific parameters. The most meaningful parameter for the quality degradation is the deviation of ink droplets from their target position caused by odd trajectories, therefore different target position algorithms are explored. Quality measures are evaluated for series of printed results, showing the suitability of the measurands for monitoring printing quality and predicting the remaining useful lifetime.



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