

New approaches in additive manufacturing – Next level system technology and layer height control using OCT sensor

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In order to gain “First Time Right” parts in laser additive manufacturing processes with cw sources sensor technology is required not only with high temporal and spatial resolution for evaluating the result of the treatment, the measurement has to provide information which can be directly implemented in a closed loop control. Especially in the context of Industry 4.0, digitalization and predictive maintenance reliable sensors get much more into focus. A major drawback of this photon-material interaction with respect to the acquisition of trustworthy measurement data from the interaction zone is the presence of intense process emissions and steep temperature gradients. In DMD processes with powder the material itself also is a source of noise when it comes to sensors coaxially mounted onto the processing head.

A group of scientists from Siemens, Precitec and RWTH Aachen developed a solution for accurate and controlled DMD processes based on the OCT sensor and the SINUMERIK® controller. By controlling the feed rate of the process “First Time Right” is not a pious hope anymore.

Not only surface treatment has established itself as a field of application for the Direct Metal Deposition process, direct “printing” or the production of near net shape structures is an essential field of application for metal powder build-up welding. Although the nozzle technology has been continually improved, the powder efficiency is below 100%, which correlates directly with the track width. The use of wire as a filler in the context of laser radiation has played a minor role in comparison to the powder in recent years.

With respect to the system technology Precitec has developed a processing head for LMD where the wire is fed coaxially to the laser beam which itself is ring shaped and focused right at the interaction point between wire and workpiece surface.