

Powder bed referencing for in-line surface measurements during selective laser sintering

B. Galovskyi¹, M. Lieret¹, S. Metzner¹, T. Hausotte¹

¹Institute of Manufacturing Metrology, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Germany

bogdan.galovskyi@fau.de

Abstract

More than ten years lie between the presentation of the first commercial selective laser sintering (SLS) machine and preliminary applications of in-line test systems for these machines. Application of SLS in mechanical and medical engineering requires higher quality parameters of the SLS process. In process quality assurance implies the measurement and control of the numerous SLS process parameters. The sintered on the powder bed contour is one of the measurement objects. Camera based measurement systems used to be a common solution for the in-line surface measurements of the powder bed. Despite fulfilling the accuracy and measurement time requirements, camera based systems face numerous challenges. In most cases only single colour powders are used in SLS process and the difference between the sintered contour and not sintered powder is negligible. It obstructs the detection with a camera based measurement system of reference points and unique features on the powder bed. Important challenge to be researched are the lateral and vertical deviations of the sintered layers due to influence of the recoating system and instability of the positioning unit (Figure 1). The concept of optical referencing for the powder bed was developed. The idea is based on the integration of light conductive elements inside the powder volume which are detectable as light markers on the powder bed surface. The position determination via these light markers was investigated using laboratory prototype. The software for the image processing, surface features detection and determination of their position was developed using Matlab. Two calibrated CCD cameras were used for the detection of the free located light conductors inside the powder bed.

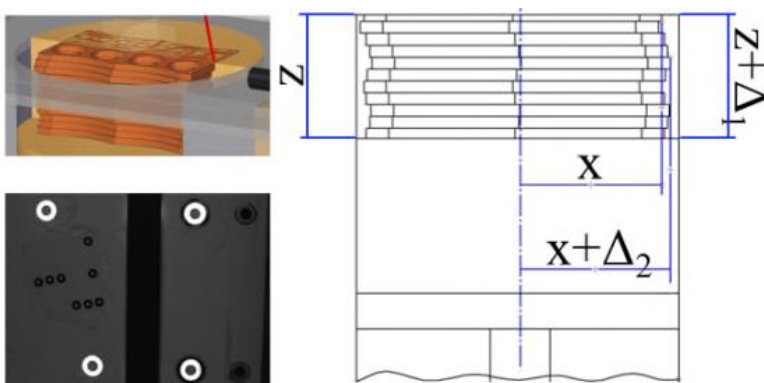


Figure 1: Referencing of the powder bed