



SLM EXPOSURE DESIGN FOR EASY SCALING OF PRODUCTIVITY AND BUILDING SPACE

Task

For several years, the additive manufacturing method Selective Laser Melting (SLM) has been successfully used to produce prototypes and parts in small-lot sizes, mainly for small-volume components. However, users are beginning to demand greater productivity with higher build rates and increased flexibility in terms of the available building space. Furthermore, a robust process with reproducible component quality and process monitoring are of vital importance for series production. The optical system currently used in SLM systems (single beam, scanner and focusing optics), however, creates significant restrictions.

Method

In this context, Fraunhofer ILT is developing a new exposure and plant design that does entirely without scanner systems and instead uses a machining head having several individually controllable diode lasers. This makes it possible to increase the build rate of the system by increasing the number of beam sources to a nearly unlimited extent, without having to adapt the system design and the process parameters. In addition, this new machine concept enables an increase of building space simply through greater travel paths of the axis system and without having to modify the optical system.

1 Processing head of the SLM laboratory plant.

2 Overall view of the plant.

Result

Using funds from the Cluster of Excellence »Integrative Production Technology for High-Wage Countries«, Fraunhofer ILT has developed, designed and built a laboratory unit in order to investigate the new exposure concept. Its machining head consists of five diode lasers that can focus the beams in different configurations (e.g. as a line) into the machining plane. Moreover, it also has a local shielding gas guiding system to ensure a constant shielding gas stream at the machining point on any large construction space. Currently, the institute is investigating the component quality that this system is able to achieve.

Applications

This new exposure and plant design can be used to flexibly scale SLM systems for manufacturing metal components; its applications range from manufacturing prototypes in the pre-development phase to industrial series production.

Contacts

M.Sc. Florian Eibl
Telephone +49 241 8906-193
florian.eibl@ilt.fraunhofer.de

Dr. Wilhelm Meiners
Telephone +49 241 8906-301
wilhelm.meiners@ilt.fraunhofer.de