Advancing globalization in the last years considerably increased the competitive pressure for producing enterprises in Germany. To survive in competition enterprises in high wage countries create high quality and individual products whilst reducing production costs. Therefore, the demand on innovative manufacturing techniques is to solve the actual dilemma in production engineering of scale on the one hand and individual and flexible production on the other hand. At this Selective Laser Melting (SLM) is an additive manufacturing process with high potential.

Approach

Economical production in small batch series with SLM requires an increasing process efficiency and build-up rate. This is achieved by a significant increase of the laser power up to 1 kW. However an increased laser power with constant spot diameter raises the intensity at the processing area and results in higher evaporation and incidence of spatter. Therefore an adaption of the spot diameter is necessary. Towards this, a multi beam concept is being designed and implemented which enables processing with different laser powers and focal diameters depending on the required component features. In analogy with the conventional roughing and finishing process, component cores can be generated with high built-up rates while the required detail solution and surface quality can be guaranteed in the shell area.

Results and Applications

In the first examinations using high-alloy steel primary production time could be reduced by 90%. Currently demonstration objects are produced for highlighting the potential toward manufacturing complex net-shaped series production objects. An example is the manufacturing of a tooling insert and a limit stop which are integrated in a linear motion access at Festo AG & Co. KG. In this case the primary production time was reduced by 70% because of adapting the scanning strategy.

Contact

Dipl.-Wirt. Ing. Sebastian Bremen
Phone +49 241 8906-537
sebastian.bremen@ilt.fraunhofer.de

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

ADDITIVE SERIES MANUFACTURING WITH HIGH POWER SELECTIVE LASER MELTING (HP-SLM)

1 Tools insert with conformal cooling channels (horizontal cut).
2 Tools insert with conformal cooling channels (perpendicular cut).

Subject to alterations in specifications and other technical information. 11/2011.
Fraunhofer Institute for Laser Technology ILT, www.ilt.fraunhofer.de
DQS certified by DIN EN ISO 9001, Reg.-No.: DE-69572-01