



ANALYSIS OF SLM MANUFACTURING COSTS

Task

Machine costs make up the largest share of expenses when components are manufactured with Selective Laser Melting (SLM). However, there still is no basic understanding of which machine components cause this largest share of the costs and how different machine designs influence the cost of manufacturing a component. Today's SLM machine designs, for example, differ in the number and power of the laser beam sources used and in their dimensions. The extent to which the SLM machine technology influences the component costs should be systematically investigated and combined in a model to predict the cost drivers of SLM-manufactured components.

Method

To take into account all cost elements and elements during the equipment acquisition (machine price) and while the machine is operated (power, shielding gas, powder, maintenance), Fraunhofer ILT has chosen the method of life cycle costing. For this purpose, a machine structural model was initially developed in which the SLM machine technology is broken down into individual cost-creating assemblies. Using a reference process, the institute shall map typical scenarios of SLM use (e.g. as production of small or large components).

Result

The result is a foundational cost model that can be used to identify the life cycle costs of existing SLM machines and to compare them with each other. The different types of costs can be directly assigned to the assemblies. Thus, the life cycle costs can already be reviewed while SLM machines are in the early stages of development and, where appropriate, optimization measures can be taken. The model allows users to depict the cost development for additively manufactured components, while increasing the total laser power, and to place them next to each other through parallelization of the SLM process by using multiple laser sources.

Applications

This cost method can be used both by users as well as by producers of SLM machines to analyze the machines in terms of the life cycle costs incurred.

The work was supported by the German Research Foundation (DFG) within the framework of the Cluster of Excellence »Integrative Production Technology for High-Wage Countries«.

Contacts

Dipl.-Ing. Johannes Schrage
Telephone +49 241 8906-8062
johannes.schrage@ilt.fraunhofer.de

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

1 CAD model of an SLM machine.