



MODULAR BENCHMARK SOFTWARE FOR SELECTIVE LASER MELTING (SLM)

Task

Not only is it very important to accurately predict the process time needed to build a component and to allocate this time among its individual components to optimize existing processes, but also it is particularly critical to modify or even develop new systems for SLM. Moreover, such a predictive model can also be used to compare different plants in terms of economical component manufacturing. This project aims to develop modular, database-driven benchmark software to compare the cost-effectiveness of SLM systems, concepts and processes.

Method

The software consists of the modules »Plant«, »Material«, »Component«, »Operation« and »Process«. By means of Fraunhofer ILT's processor for the commercial data processing software »Magics« from the company Materialise, the component data are provided in a separate file format of the benchmark software. They can be combined to form a so-called construction job analogous to daily production. On the basis of the data stored in the modules »Plant«, »Material«, »Component« and »Operation«, all system-side processing steps – melting process, media (powder, gas), hardware (scanners, build platform) – are displayed in the module »Process«. The metrics belonging to them are also identified.

This includes, for example, production times, component unit costs and the downtime of the plant, from which result acquisition and running costs, among others, the productivity or the degree of added value.

Result

At its current state of development, the software can calculate the duration of the process for commercial systems with a max. error of 3.5 percent. Furthermore, the software can identify component unit costs incl. the underlying cost structure (prorated equipment, personnel, area, energy, protective gas and material costs).

Applications

The software is currently used, in particular, to evaluate new plant concepts developed at Fraunhofer ILT. It can also be deployed, moreover, in bilateral consultation and development projects, e.g. to compare the production times of different component designs, as well as to analyze the general operating efficiency of additive manufacturing. Part of the work was funded by the Federal Ministry of Education and Research within the »Digital Photonic Production« Research Campus under grant number 13N13710.

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1 Use of modular benchmark software in practice.