

Costing Analysis for Additive Manufacturing (AM) during Product Lifecycle 2.0 (Project CoA²mPLy 2.0)



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In the project CoA²mPLy the cost structure of Additive Manufacturing (AM) has been analyzed and a costing framework considering the whole life-cycle costs is one result of CoA²mPLy. This allows a comparison between AM and traditional manufacturing concerning costs in each process in a parts lifecycle. During the research activities some problems regarding cost relevant parameters have been identified. Based on these outcomes and gathered knowledge there are three main objectives to address in the follow-up project CoA²mPLy 2.0:

- (1) Enhancement of costing framework developed in CoA²mPLy
- (2) Achievement of comparability between machines and technologies regarding costing aspects and particularly building rates - proposal for standardization

- (3) Development of an expandable IT-System with a costing calculation module, an AM Database and a presentation of advantages of AM

Enhancement of the SLM costing framework

The costing framework developed in CoA²mPLy focuses Selective Laser Melting (SLM) with its specific characteristics in terms of necessary pre- and post-processing, the manufacturing process itself and the achievable benefits during product lifecycle compared to traditional manufacturing. Objective (1) comprises an adaption of the costing model to the Laser Sintering (LS) process and to the Fused Deposition Modeling (FDM) as well to provide cost calculations for the three most used additive manufacturing processes (compare figure). This work will enhance the existing framework for costing analysis to be utilized by OEMs, additive manufacturing part suppliers and additive

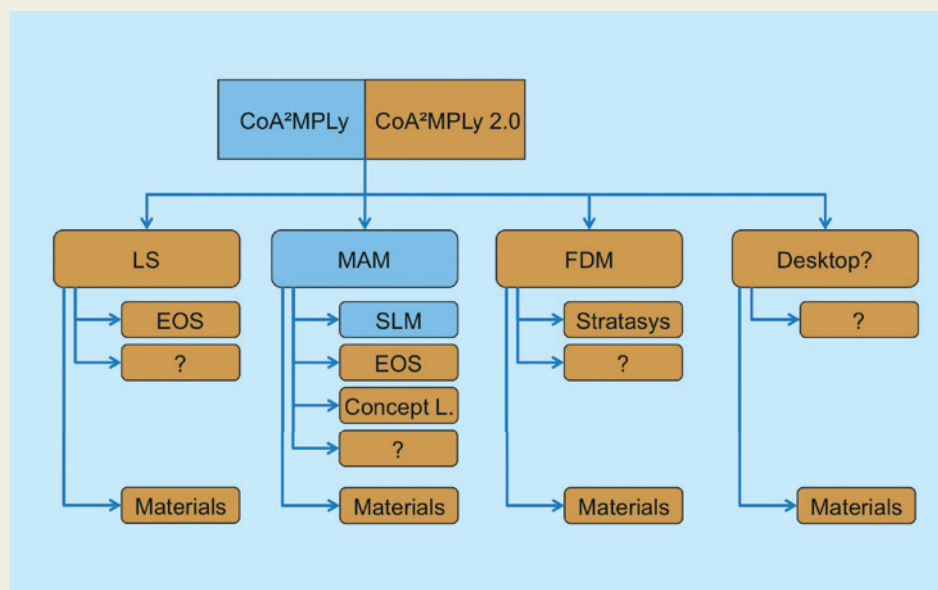


figure 1: enhancement of previous results

manufacturing part users. Furthermore the applicability for different branches and impacts on supply chain will be considered.

Comparability between AM machines and technologies

Objective (2) addresses the comparability between different types of machines and technologies. At the moment the machine manufacturers measure the building rate in different ways and specify these rates even in different units for instance cm/h or mm³/h. To achieve comparability and transparency for potential customers that are facing a make or buy decision a proposal for standardization of measurement and specification of building rates will be elaborated starting with the determination of material properties that have to be one of the reference parameters. Furthermore the efficiency of the use of resources like energy and gas will be considered.

Development of an IT System for costing calculation

During CoA²AMPLy the costing framework mentioned before is implemented as a Microsoft Excel tool. The capabilities of this software are limited particularly in terms of usability and complexity. Thus objective (3) is meant as development and implementation of an expandable IT-System concept. Simplifying and improving the use of the costing framework will be the starting module. Due to web access to the IT-System no software will be needed for calculation. The enhancements stated in objective (1) will be considered so that users and potential customers

will be able to compare costs in additive and traditional manufacturing. By reason of an interface to import STL/AMF files a more detailed calculation of expected costs will be possible. Thus utilization of building chamber of the specific machine as well as the part orientation and the concrete part geometry can be considered in the calculation. Another module of the IT-System will be used to monitor build jobs and to gather process knowledge regarding cost data, material properties and quality aspects. The concept has to be developed with respect to prospective maintenance effort that has to be low.

The overall results of the projects will help to define rules for the cost efficient utilization of additive manufacturing and therefore help to foster the growth of the technology. Furthermore the outcomes will enable the possible end users to compare different technologies in regard of building speed and efficiency.

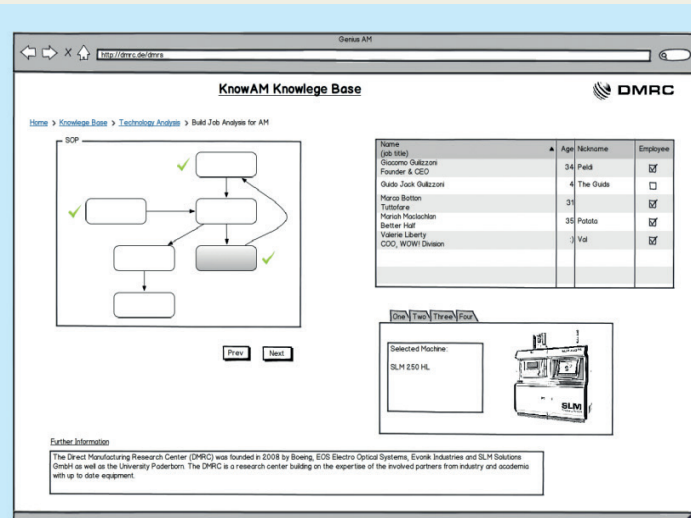


figure 2: Mock up of the IT System