ABSTRACT:

Challenges and experiences in the use of future technology 3d-printing in an organization from the perspective of a responsible material research institution

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3D-printing is a technology with enormous potential. Additive manufacturing (AM) processes allow a faster realisation of products and give engineers numerous options for product improvement. However, it comes with an enormous complexity that makes it challenging for organisations and companies to find the right processes and the right starting point to benefit from these innovative manufacturing processes. Various printing technologies for countless applications exist at different levels of maturity. In addition to the printing process, the properties of the printed materials are often process-dependant and differ from used and well-known materials. This presentation aims to show various challenges and experiences with the future technology of 3d-printing from the perspective of a materials research institute serving a large government organisation. Beside some research activities, the authors give examples for challenges that come with such a disruptive technology. For example, staff need to understand the capabilities and possibilities and current limitations of additive manufacturing processes in order to use them. Appropriate quality assurance strategies with non-destructive testing or in-line process control technology are needed to meet today's demanding product requirements. Furthermore, additive manufacturing comes with less geometrical manufacturing restrictions that require new engineering tools to access the potential. Extensive new software tool suites for reverse-engineering are required to utilise 3dimensional geometry data from scans. Nowadays, numerical optimization can be used to optimize parts for single specific requirements. First approaches with machine learning (ML) and artificial intelligence (AI) show possible ways to support and to accelerate the engineering process in the nearer future.