TU Graz – Graz University of Technology

[FSI]

PSM – Institute of Production Science and Management & **IBL** – Institute of Industrial Management and Innovation Research

Additive manufacturing in small series production

Technologies, constraints and opportunities of 3D printing in industrial companies

SITUATION

With additive manufacturing the process of applying material layer by layer in order to build up a three-dimensional model is meant. This process is generally known as 3D-printing. The biggest advantage of this technology is, that there are hardly any restrictions regarding the component geometry. Hence with 3D-printing it is possible to manufacture parts with very complex geometries which would have been impossible to manufacture or at least very cost intensive with conventional manufacturing technologies. (Fig. 1) This makes additive manufacturing also interesting for small series production, because there is no need to prepare expensive forms or tools to manufacture components.

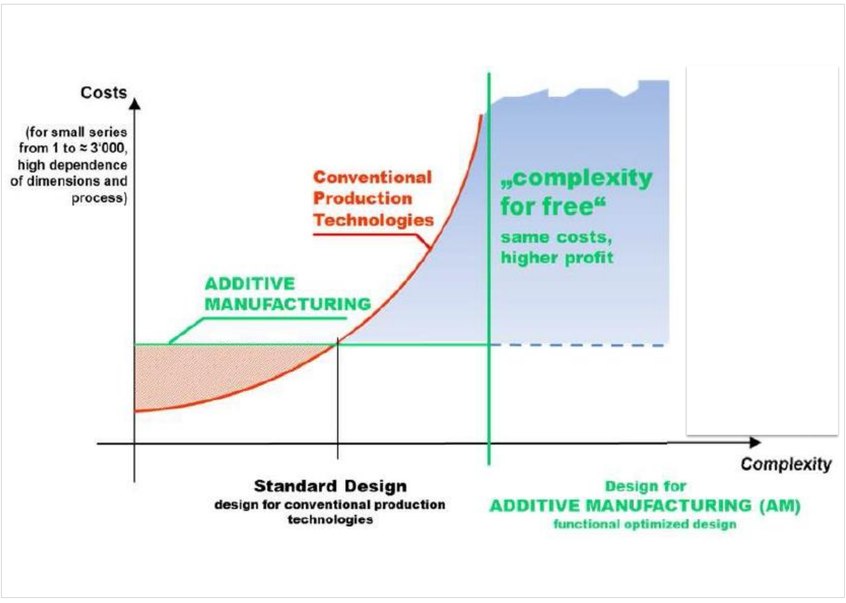

Fig. 1: Cost saving potentials and geometry complexity of additive manufacturing [1]

COMPLICATION

Because of those advantages several research groups have started research activity in this field to enable companies to apply 3D printing all across their value chain. (Fig. 2) Several companies offer 3D printing currently as a service, because know how regarding usage of generative manufacturing is not widely spread and companies in many cases do not have the resources to experiment with those new technologies. (Fig. 3) Several problems arise with generative manufacturing at the moment that need to be further investigated in research: 1) processable materials and carrying capacity of those materials; 2) autonomy and system integration of the technology; 3) reliability and processing speed of the technology

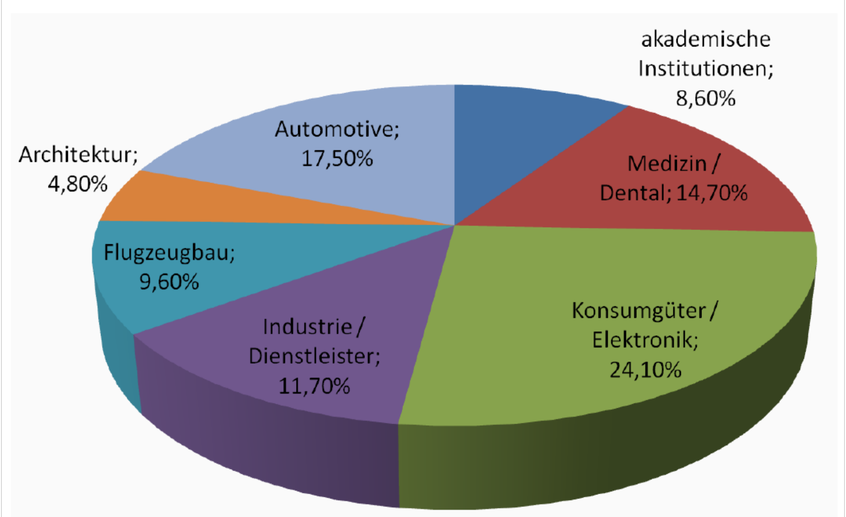

Fig. 2: Application areas of additive manufacturing [2]

SOLUTION

To tackle these complications a long term concept has to be developed, that defines and shows the possibilities and constraints of all the different additive manufacturing technologies for specific use cases.

The first step of the underlying project is to define specific use cases where additive manufacturing could be reasonably implemented. Furthermore several existing technologies in the field of additive manufacturing are screened and evaluated regarding their applicability for the specific use cases. In the end an operator model should be developed to facilitate an optimum solution for each project partner - research possibilities for the university and application in small series production for the industrial partner.

Fig. 3: Service provider in additive manufacturing in the 2012 in Germany [3]

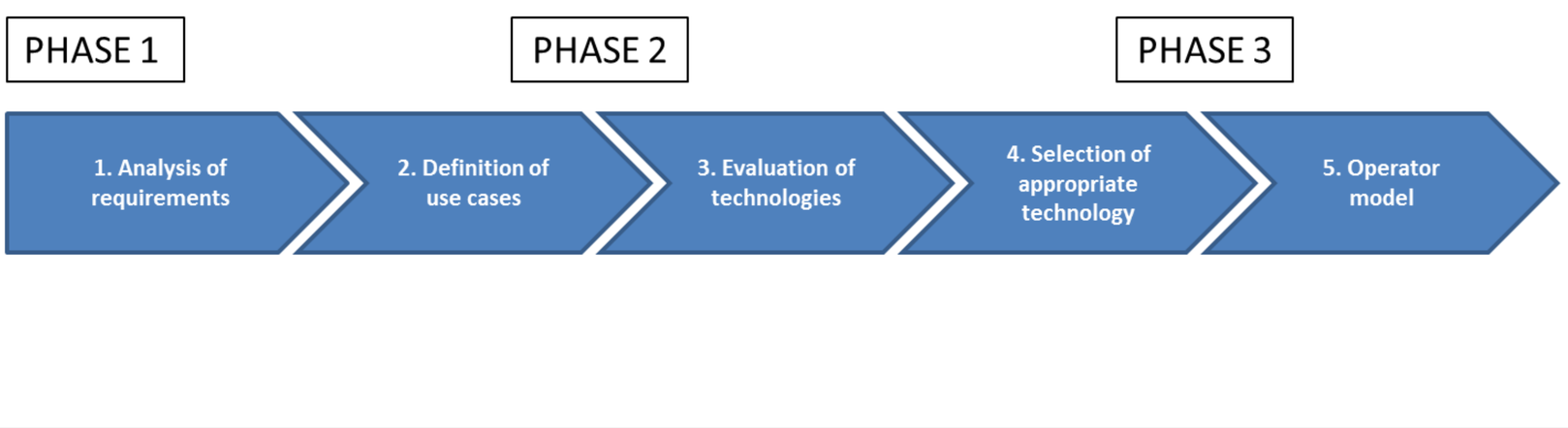

Fig. 4: Approach within the project: Additive manufacturing in research and industry

Sources:
[1] Spierings A.: SLM Materialeigenschaften – Aktueller Stand und Trends, 8. Swiss Rapid Forum am 29.08.2012
[2] Wohlers Report 2010, ISBN 0-9754429-8-8
[3] Schilling M., Schilling Th.: Der Prototypenbau zwischen Entwicklung und Produktion, Firmenpräsentation 3D Druck Schilling

Head of PSM & IBL: Univ.-Prof. Dr. Christian Ramsauer **Mario Kleindienst, Markus Brillinger**