

Trends in polymer processing – perception and reality of additive manufacturing

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Medial Interest

In the future everything could be produced in the kitchen at home

BY JACOB BENDSEN

RAPID MANUFACTURING: The development of 3D CAD programmes and 3D printers is progressing rapidly these days. Rapid Manufacturing makes even the impossible possible, and for lots of products new thinking will be required before production is started.

mented by plenty of innovative thinking and exploitation of lasers, welding and computer technology. In simple terms, the technology involves creating a design in 3D CAD and then turning the construction through a printer, which then builds the construction. The printer can use a several component fluid plastic material that hardens when exposed to laser light. Or the material can be a metal powder

computer. This is especially the case in the medical and rehabilitation industry where specific and individual adjustment is necessary. Almost all manufacturers of hearing aids use an RM. All ears have their very own personal shape, and when the mould has been made, the data is digitised and the response is printed out. The file is stored and can be re-used by re-



Wer gar nicht erwarten kann, wie der Nachwuchs aussieht, kann in Japan den Fetus im Mutterbauch scannen und ausdrucken lassen. Und sich das Modell bei Geburt an die Wand hängen. Foto: AFP

Laser and fine powder

Als 3D-Drucker wurden kompakte, behaltliche Konstruktionsteile, Drucker können, können (1) eine Deposition-Mechanismen erhaltbare Schichten- oder Schichtlagen mit Hilfe eines Lasers und anschließend in eine fertige Form überführen. Die Laserstrahlung wird durch eine optische Linse auf den Bauteil aufgetragen, wodurch ein Schmelzbad entsteht, das sich beim Vorwärtsschieben des Lasers nach hinten schließt und so ein festes Material bildet. Die Schichten werden übereinander aufgetragen, bis das Bauteil fertig ist.

3D-Drucker (Strahlungsprozess) sind viel kleiner als herkömmliche Laser, aber auch noch ein wenig teurer. Diese Prozesse verwenden das Material Metall, ein Kunststoff. Das Laserstrahlung mit einer bestimmten Wellenlänge ist ein Element der Technik für die Produktion von Prototypen. Eine neue Technik für Metall aus dem 3D-Drucker. Schon bald gibt es Anlagen für 3D-Druck in der Großserie. Kitzmann

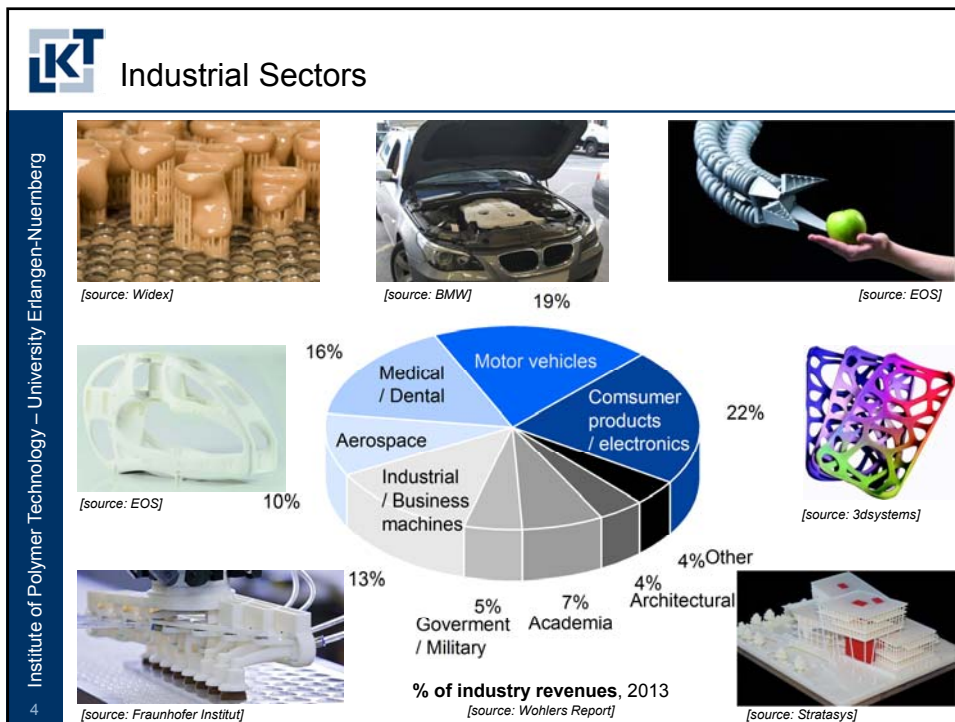
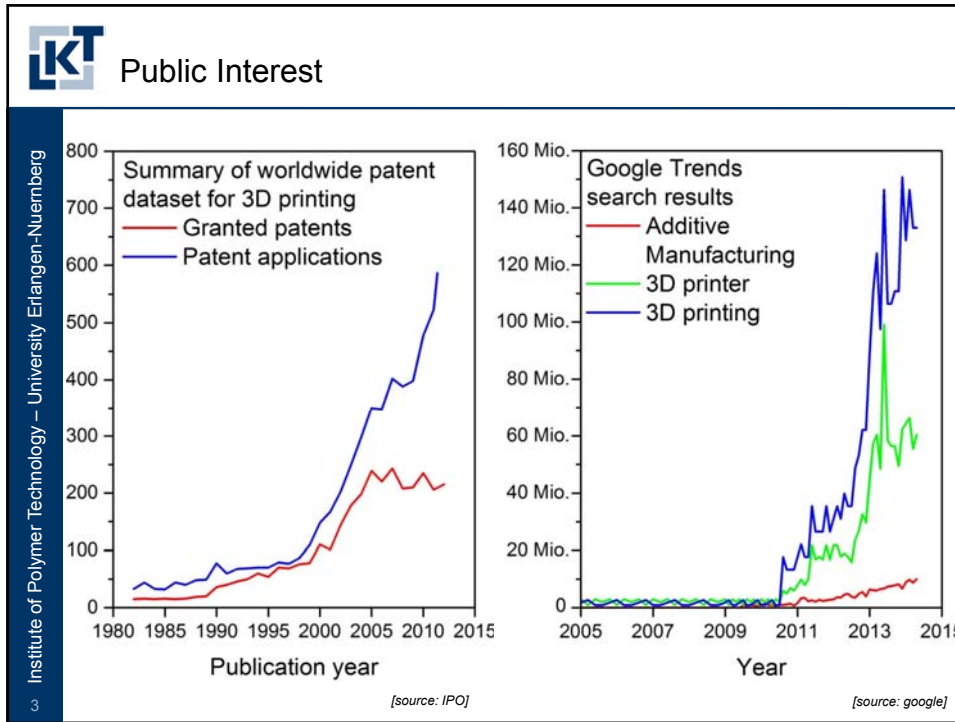
REVOLUTION IN THE DESIGN INDUSTRY

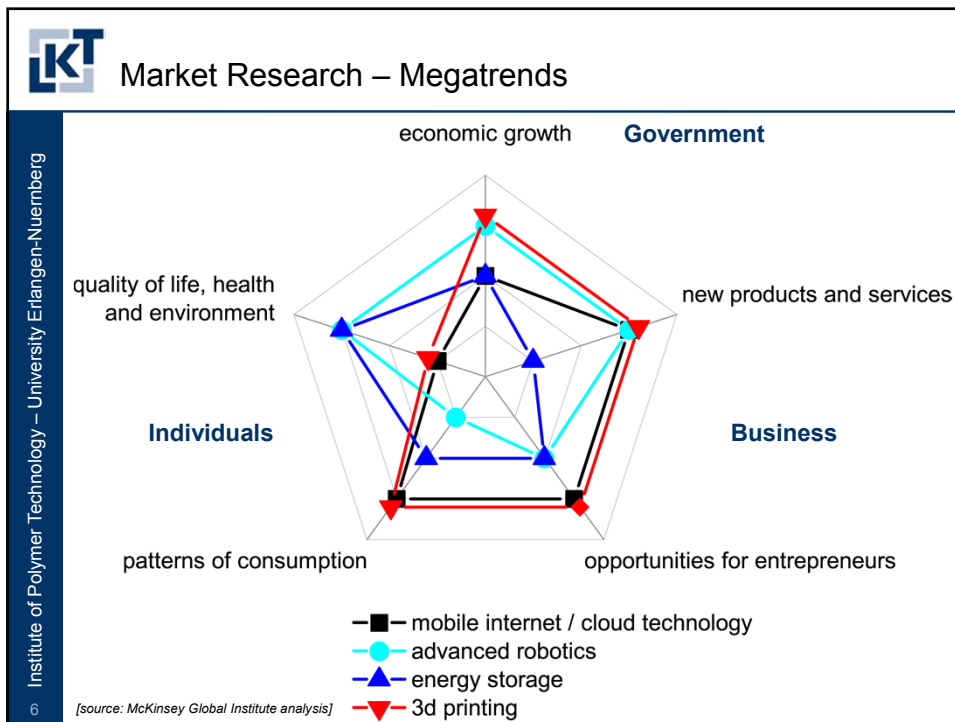
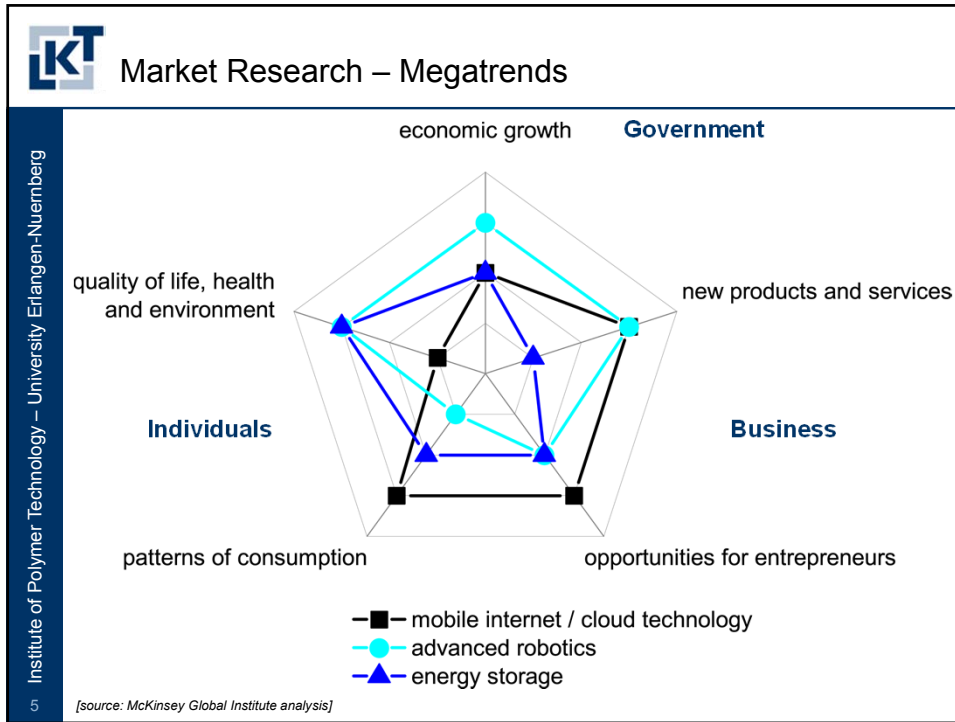
The design industry is seeing a real revolution these days thanks to Rapid Manufacturing (RM). Everything that can be designed in a 3D computer programme can be produced, and that creates opportunities for designing far more complex and advanced products, and for creating prototypes both faster and cheaper.

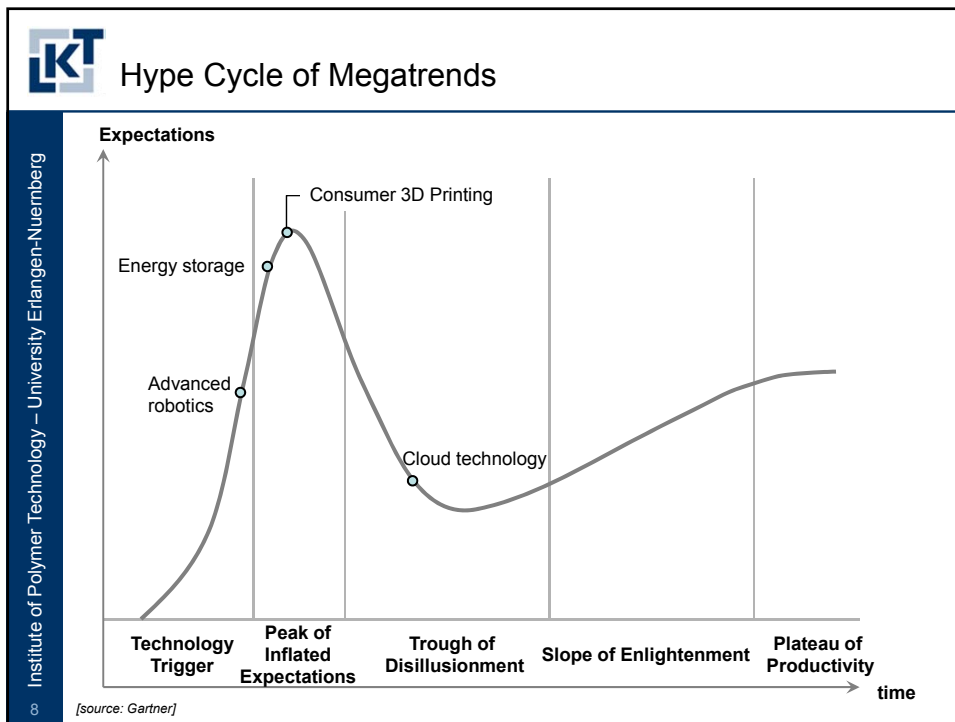
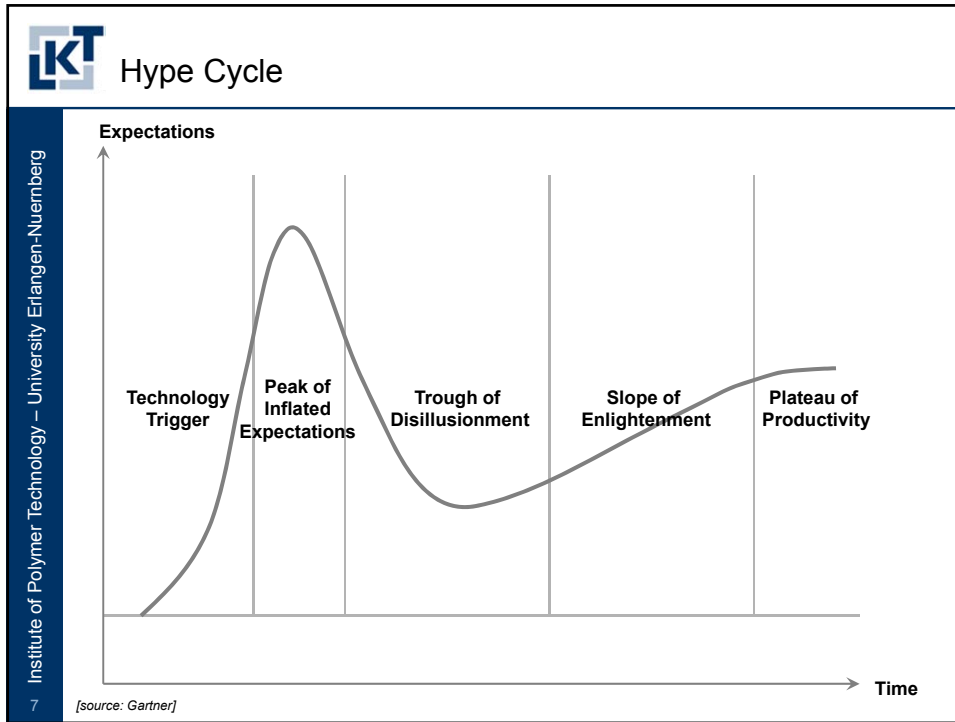
At the Danish Technological Institute in Århus, product manager Oliver Jay estimates that the price of design products created via RM are already competitive. The institute has produced and supplied a stack of two exclusive sunglasses by an Italian designer. The number was deliberately set low to maintain the exclusiveness. If they had been produced in a conventional way, the price per pair would have been twice the RM price, and delivery time close to twice as long. Only with a stock of 1,000 pairs of sunglasses, would it have been cheaper, but not faster, to supply.

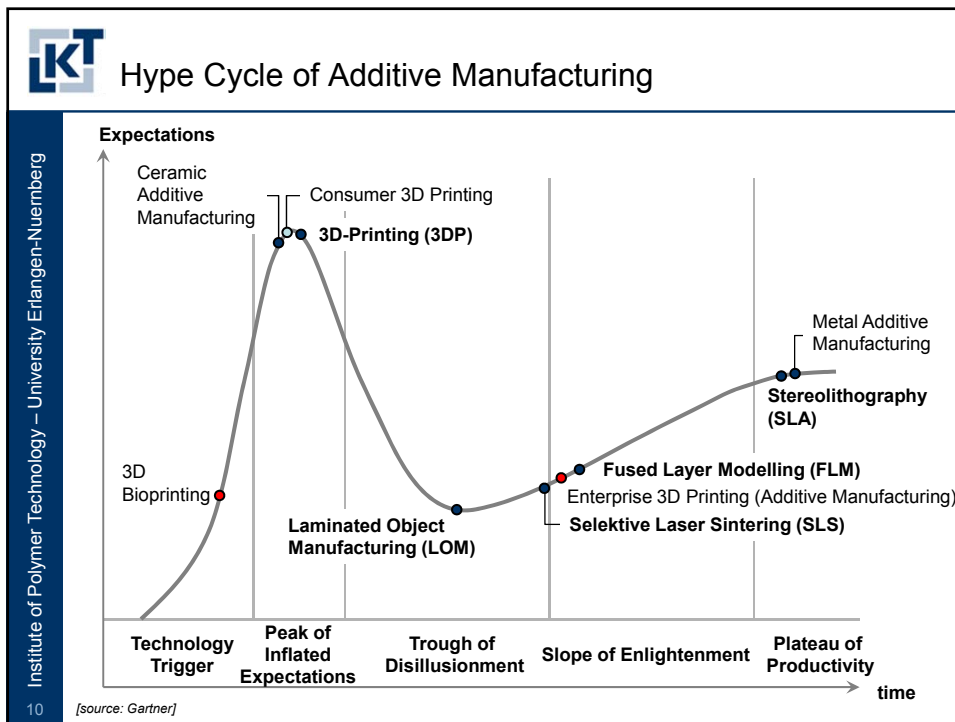
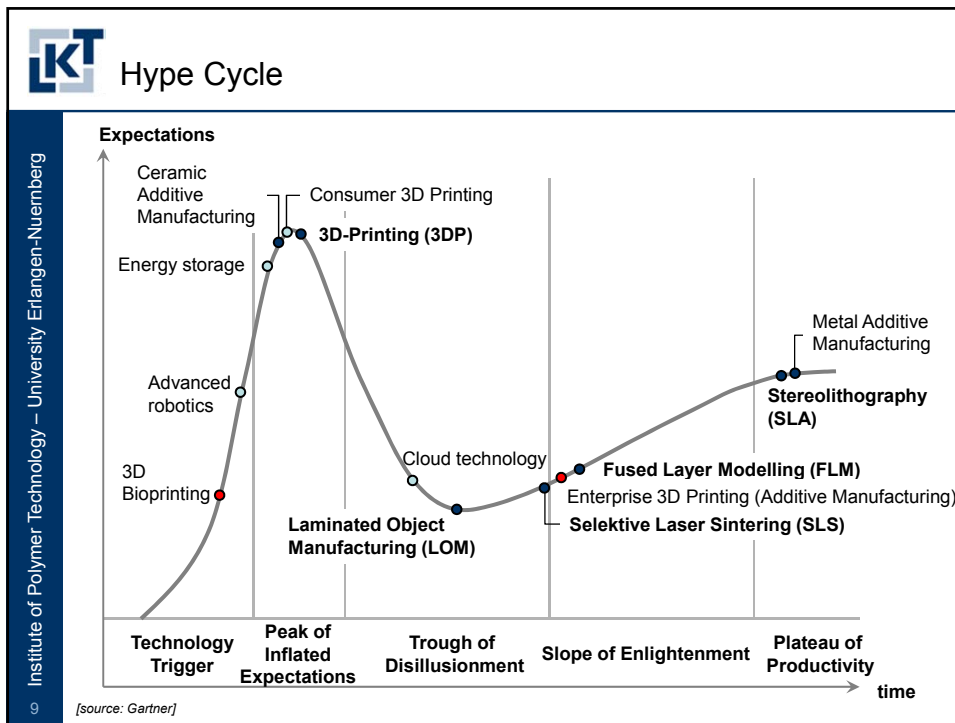
"The production firm also forces the designer to think of the functionality of products in a new way," says Jay. "With RM new opportunities arise for thinking substance into the products, where conventional production concentrates more on expression. Once RM really gains a breakthrough, the designer will have a more and more central role in the production process. Simply because everything will be possible."

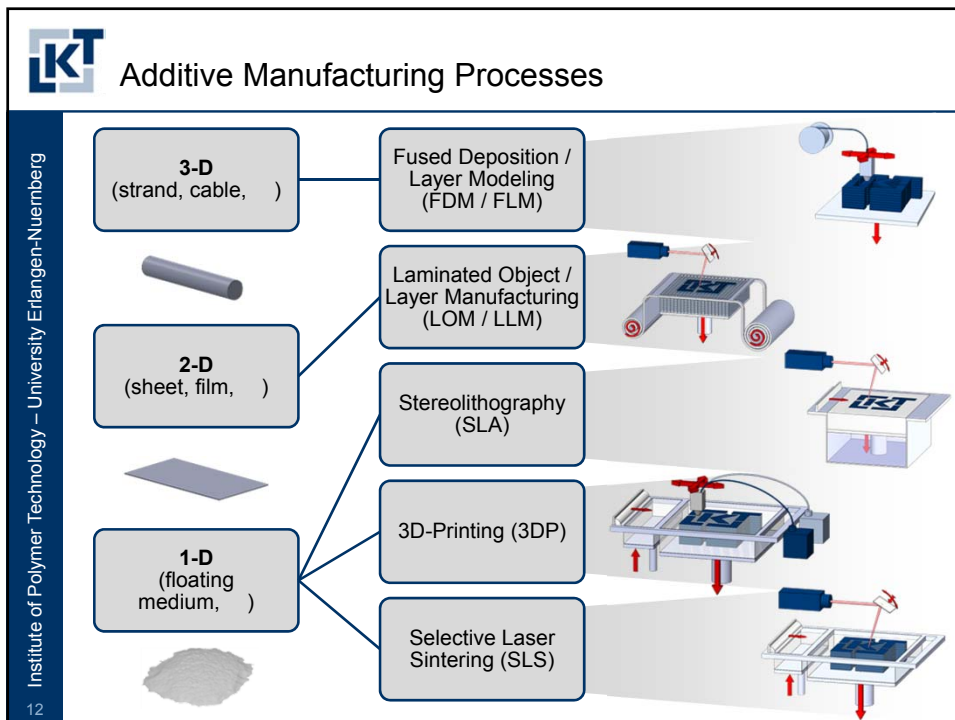
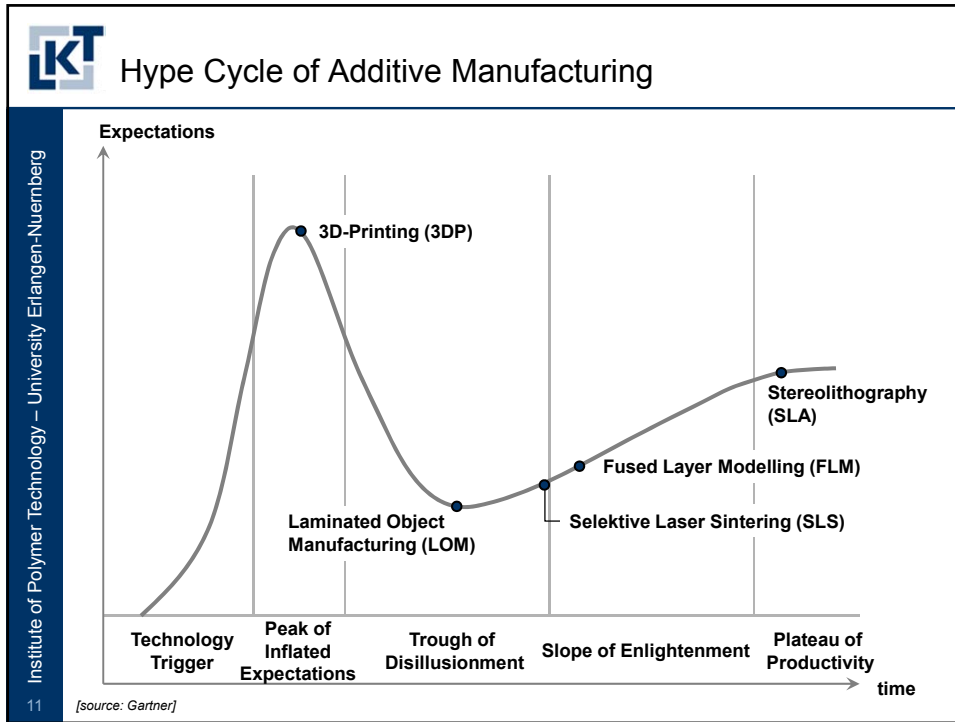


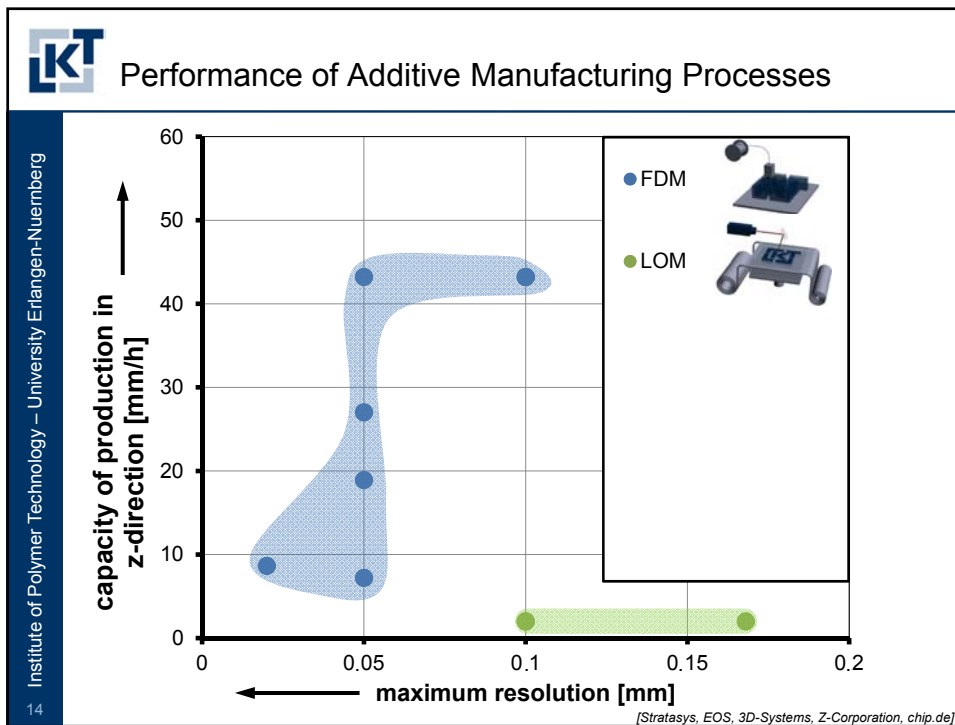
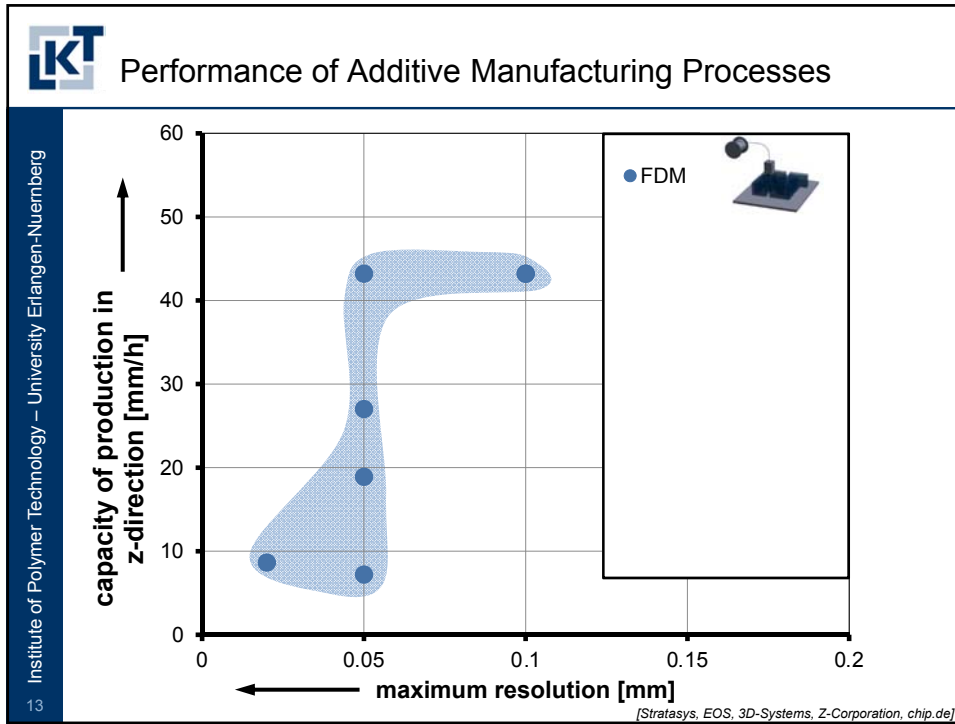


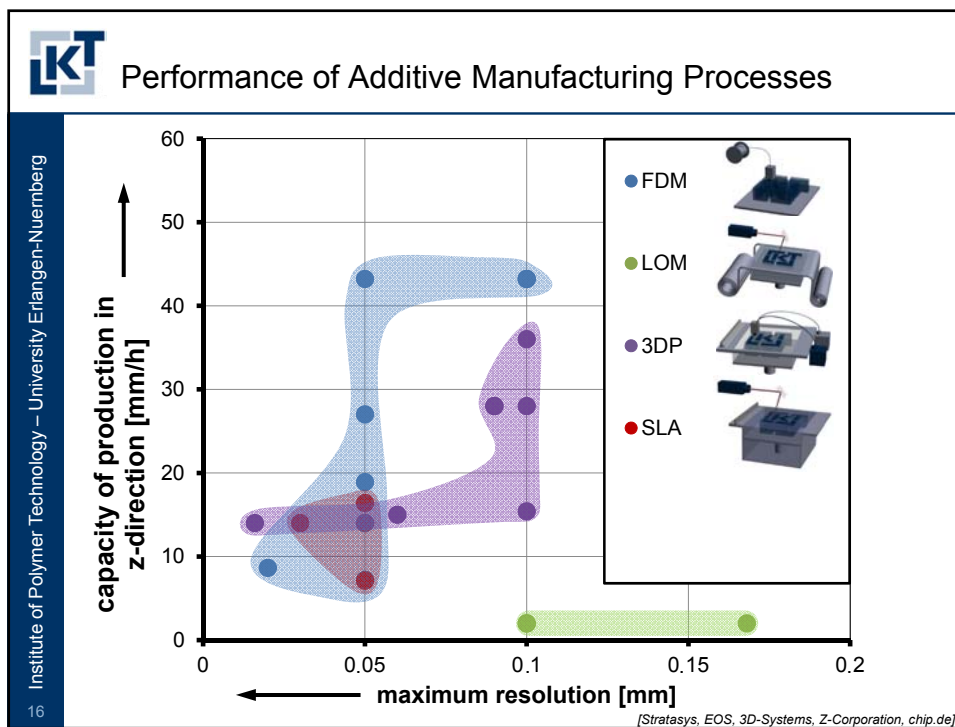
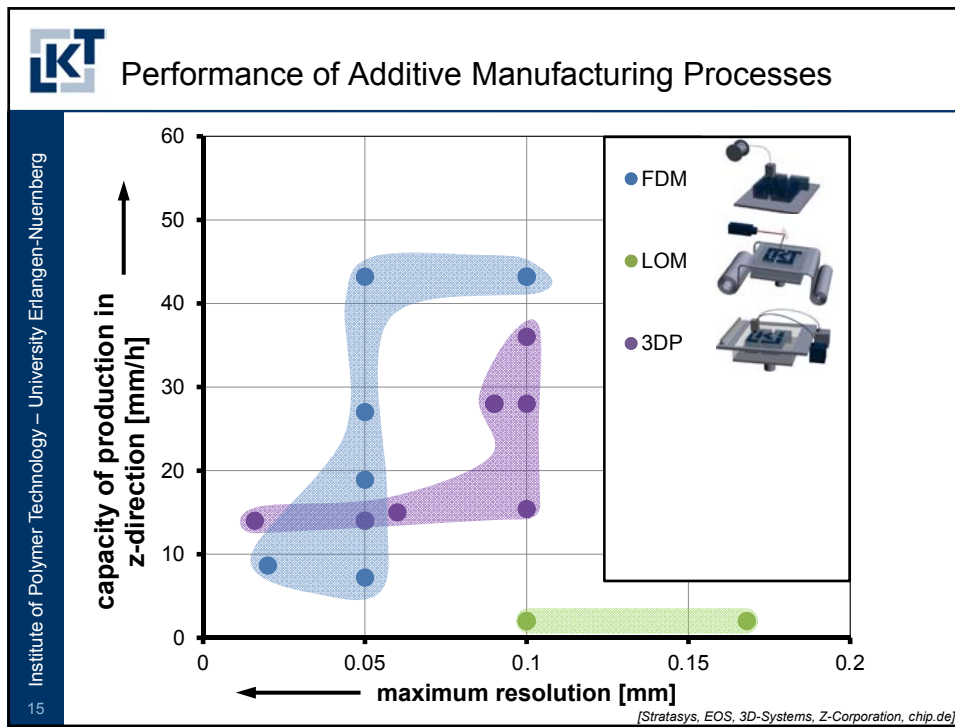


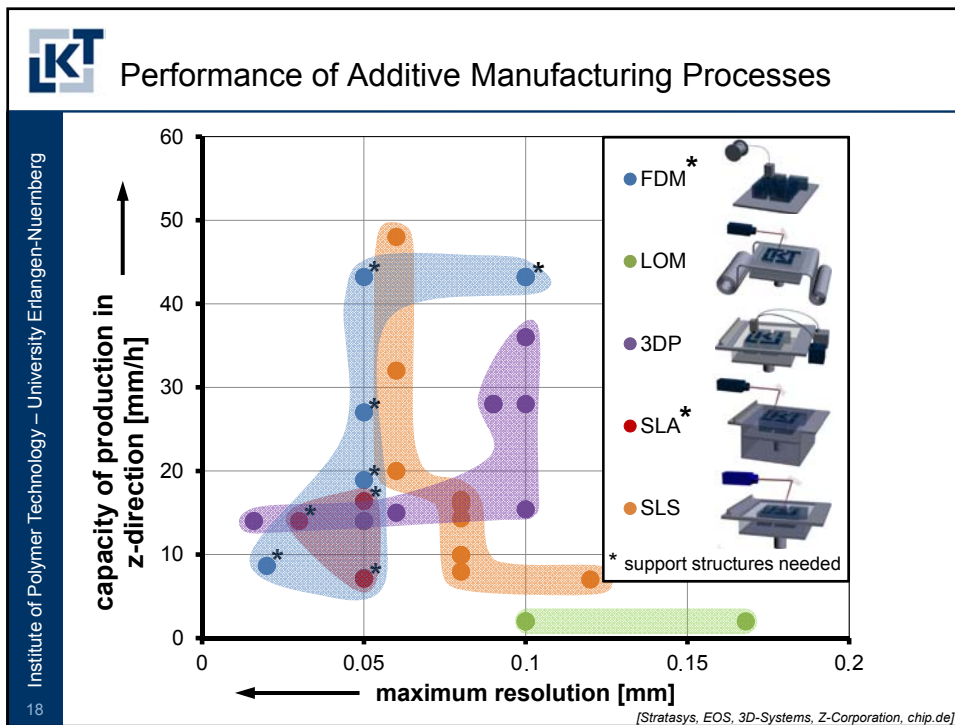
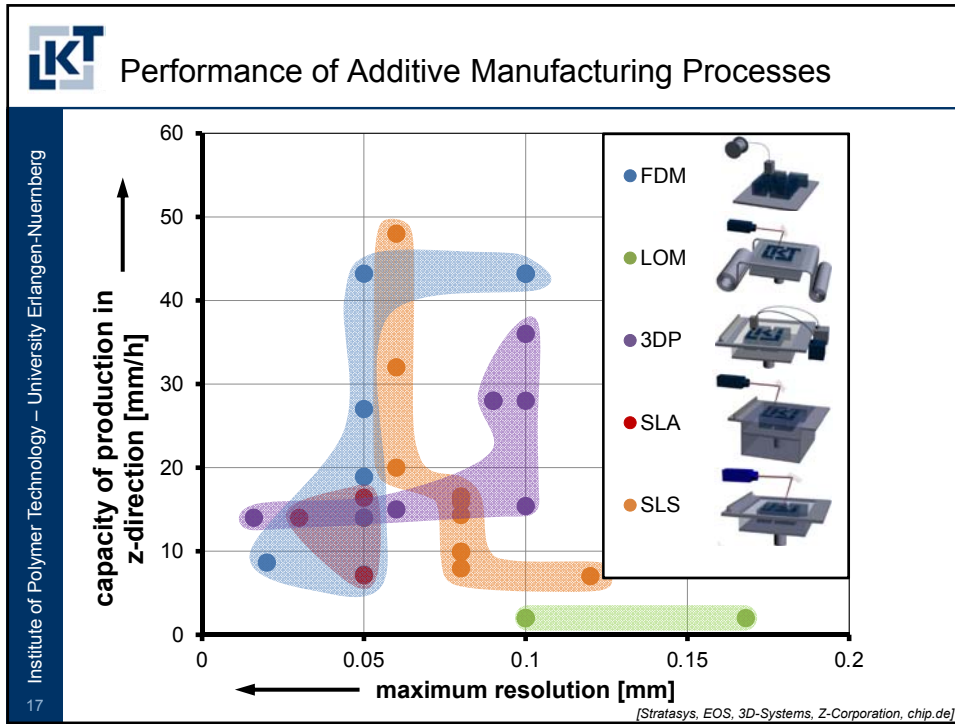


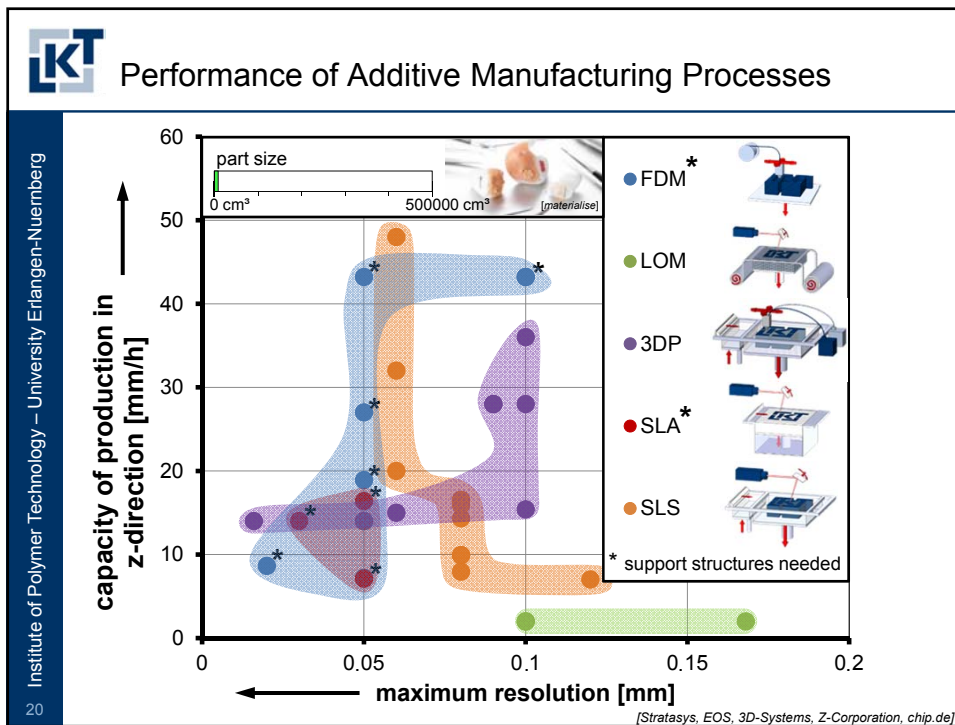
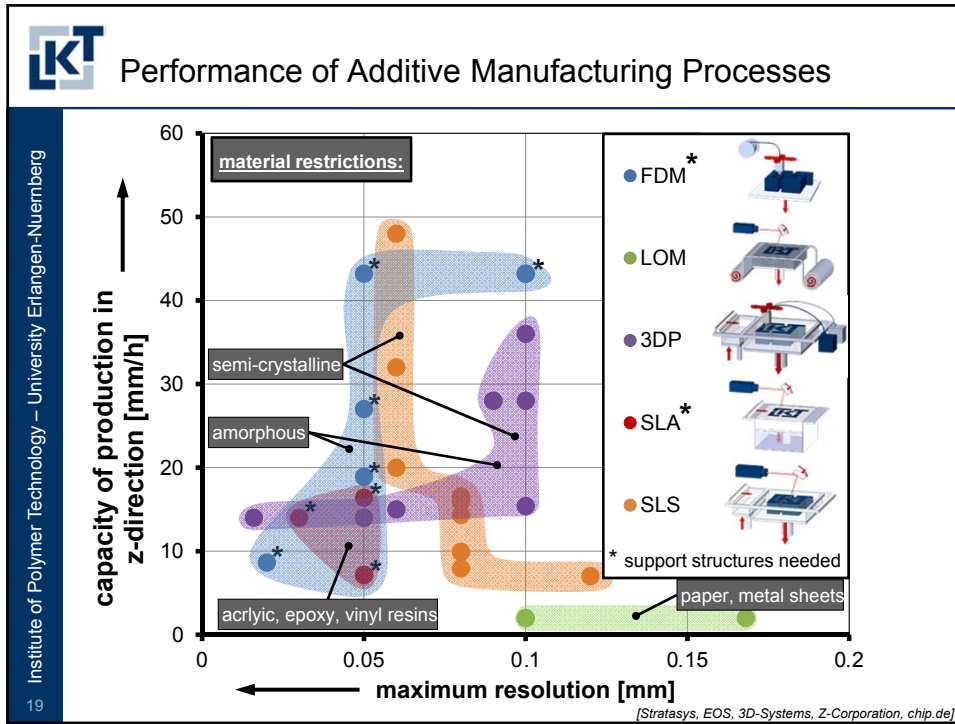


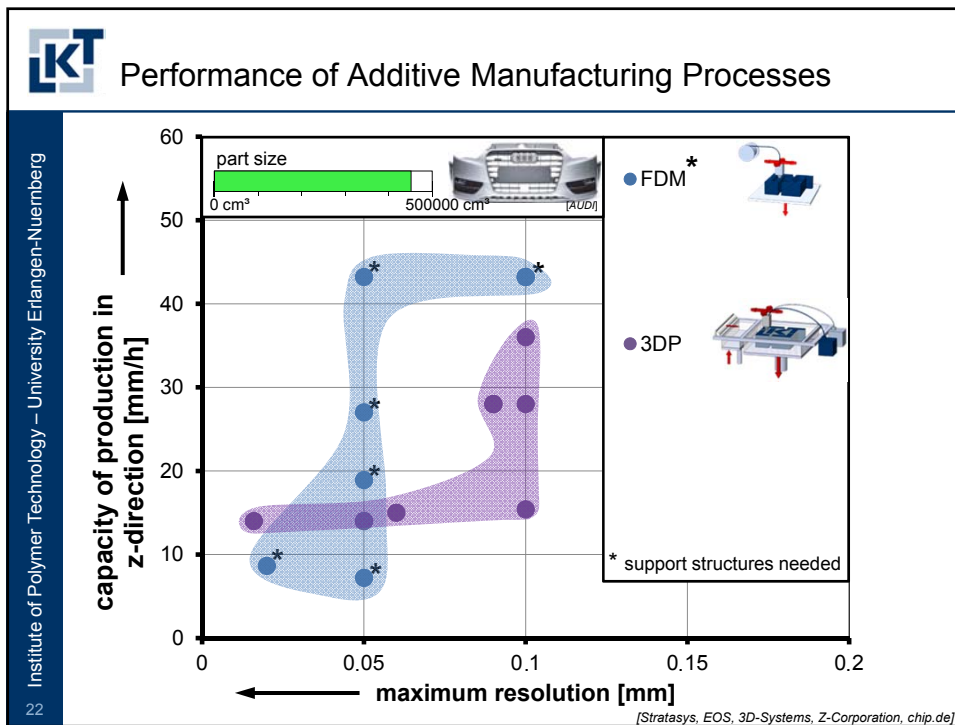
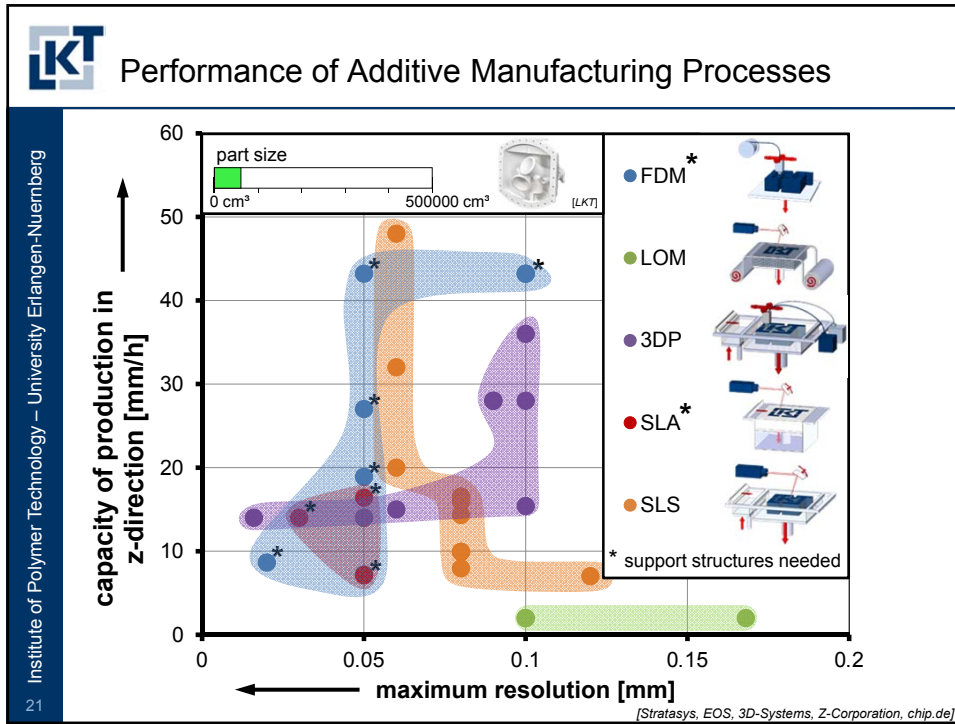


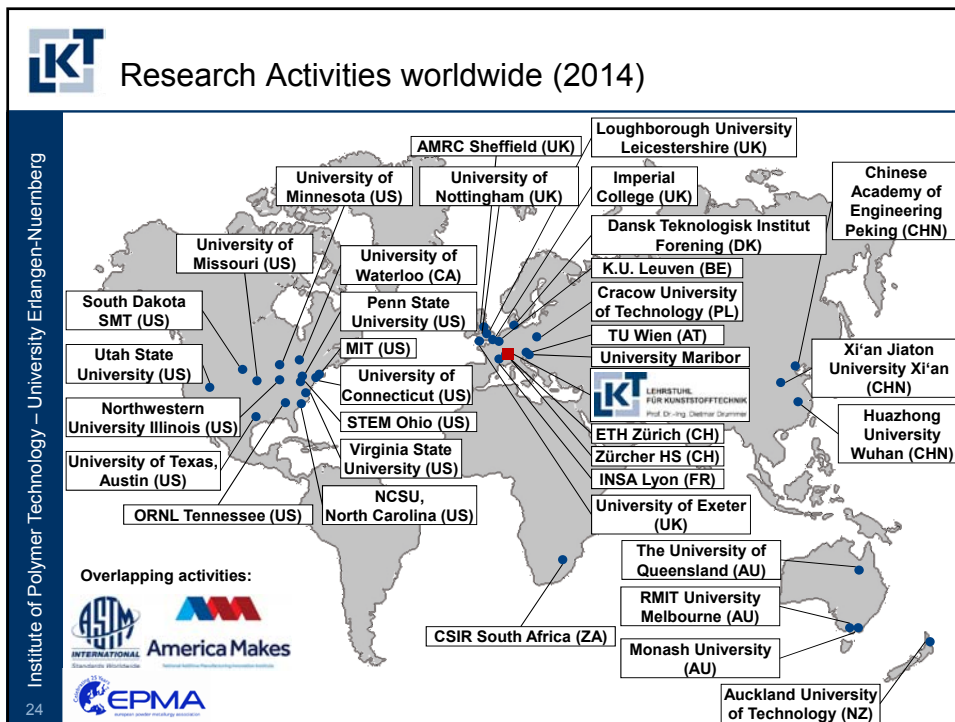
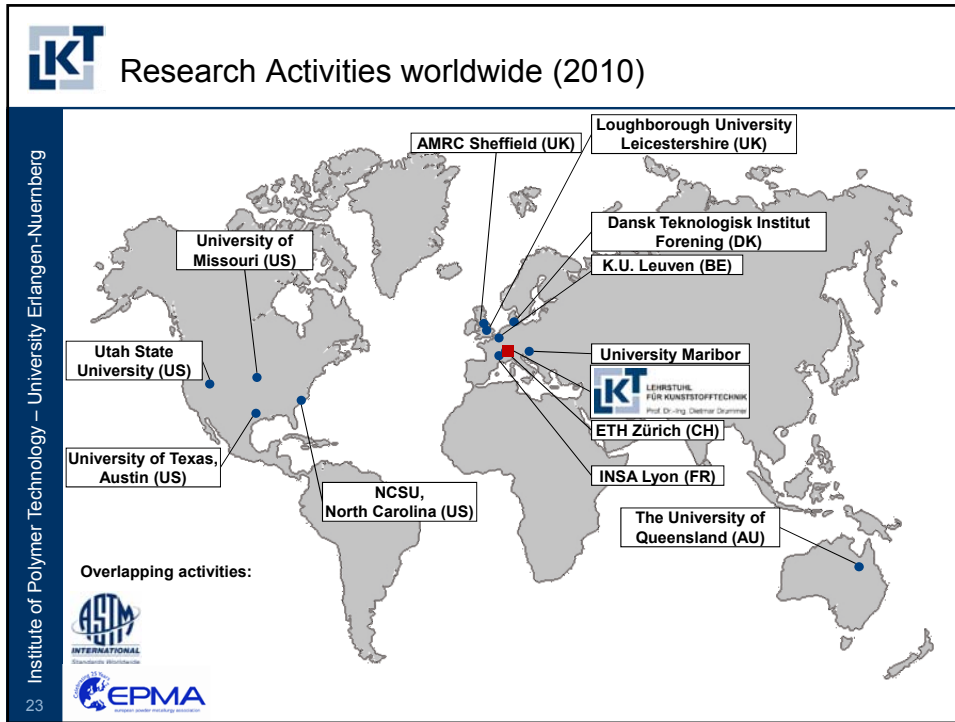


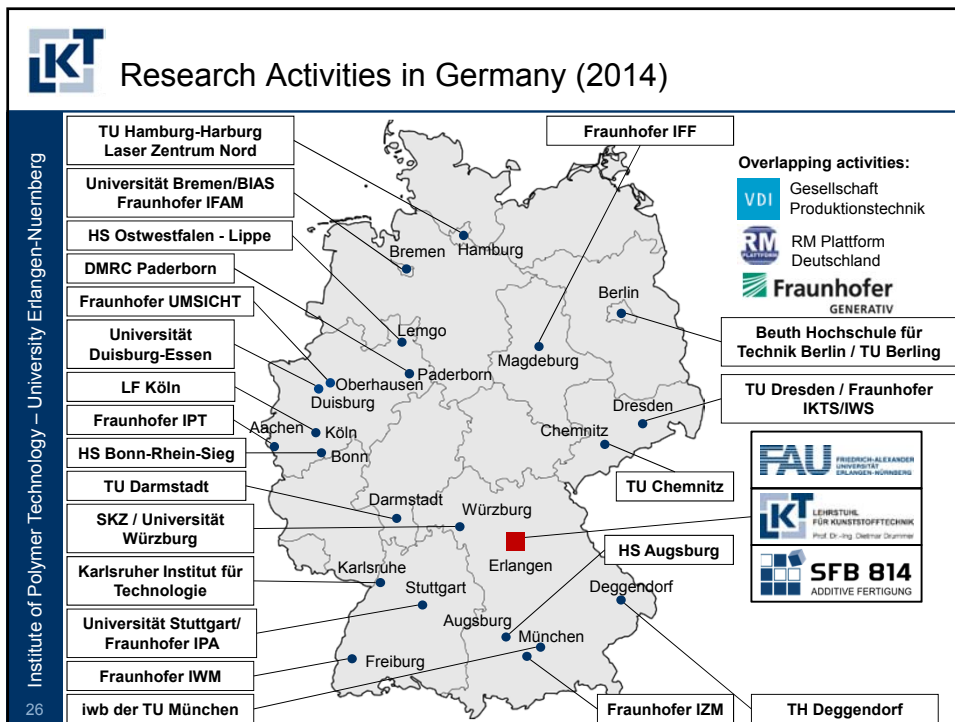
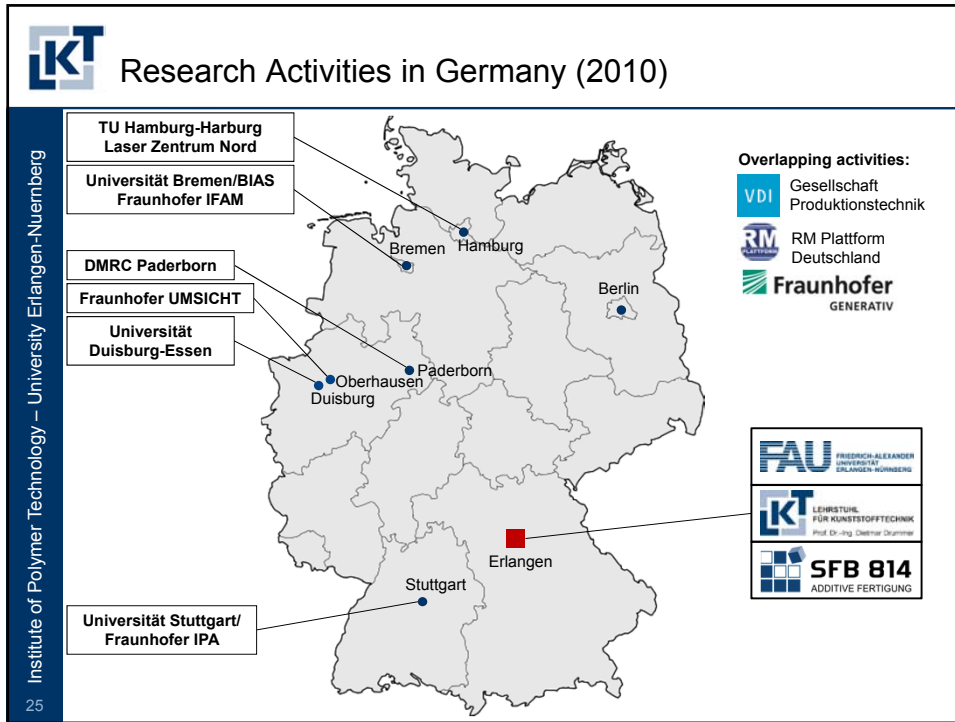






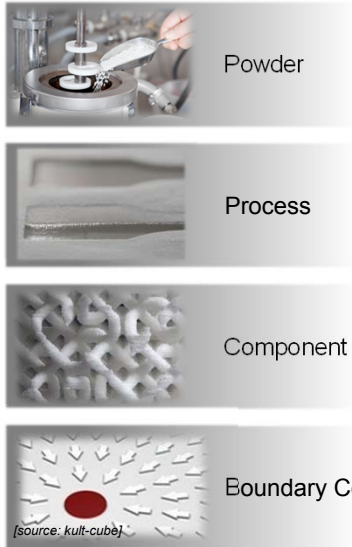






KT Challenges in Additive Manufacturing exemplary shown on powder based Techniques

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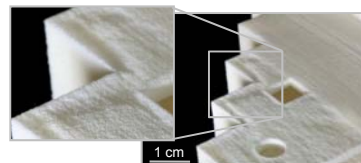
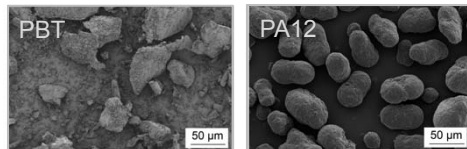
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KT Challenges in Additive Manufacturing exemplary shown on powder based Techniques

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- powder production
- disposability and price
- material aging
- material requirements (temperature conditions)
- variety of materials



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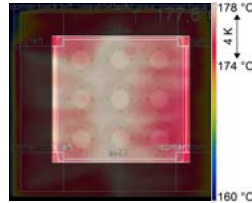
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Process

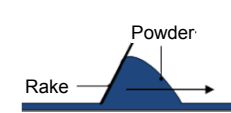
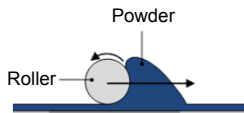
- process and part layout
- machinery
- repeatability of processes
- simulation
- patents



temperature distribution building chamber



delamination due to a missing layer



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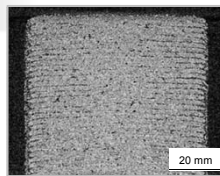
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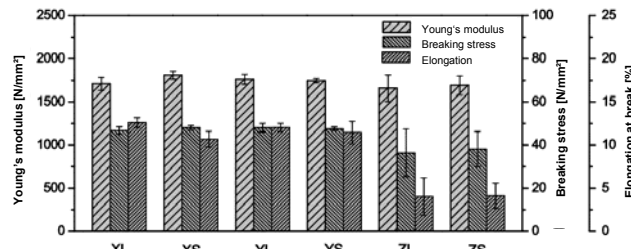
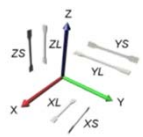
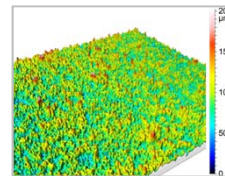


Component

- mechanical part properties
- internal stresses / deformation
- anisotropy
- topology optimization
- surface quality



porosity and surface topology of a laser sintered part

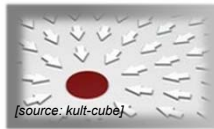


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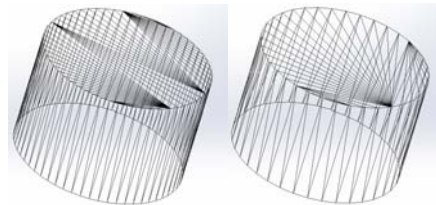
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Boundary Conditions

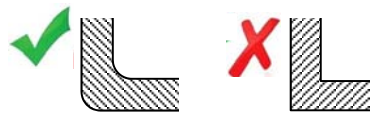
- construction
- shaping and education
- legal situation



data preparation



[source: MakerBot]

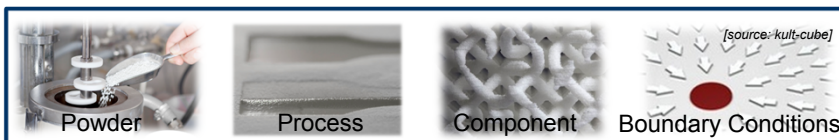
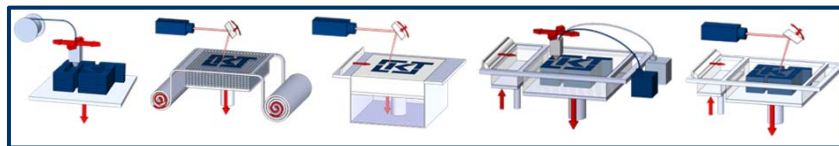


construction

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Summary

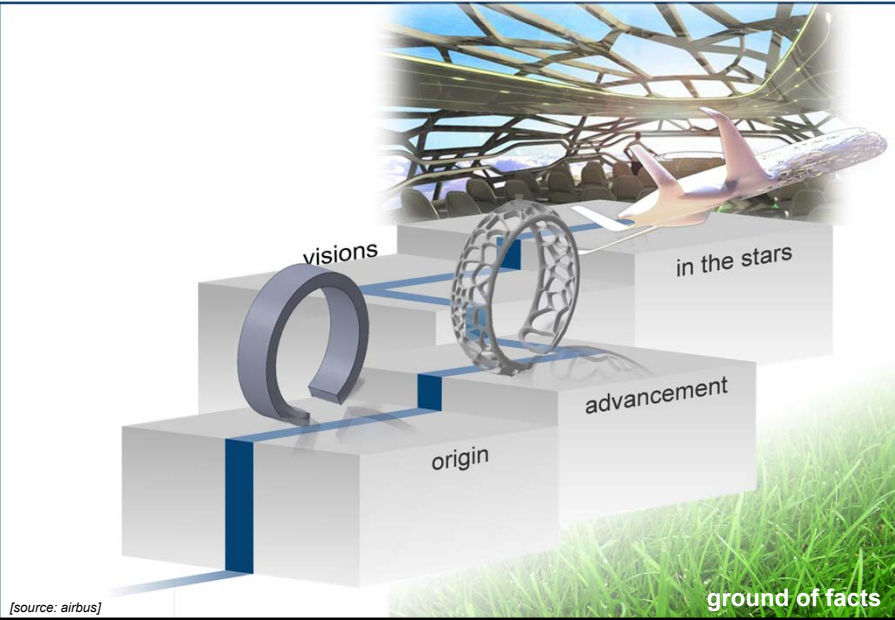


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Thank you for your attention