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3D Printing/Additive Manufacturing & the Market

October 6, 2017

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ADDITIVE MANUFACTURING

CURRENT 3D PRINTING TECHNOLOGIES

Technology	Basic Materials
SLA (stereolithography)	Photopolymer
FFF/FDM (fused filament fabrication)	Thermoplastics
SLS (selective laser sintering)	Thermoplastics, powdered metals, ceramic powders
DMLS (direct metal laser sintering)	Many alloy metals
SLM (selective laser melting)	Many alloy metals
EBM (electron beam modeling)	Titanium alloys
PP/3DP (plaster-based printing, powders coupled with jetting binders)	Plaster, colored plaster, starch (after-build infusion)
3D Inkjet	Various poly & wax materials
Multi-Jet Fusion	Nylon PA12

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WHAT DO THEY MAKE?

Technology	Materials	
SLA	Photopolymer	Prototypes, casting patterns, "soft" tooling
FFF/FDM	Thermoplastics	Prototypes, casting patterns, "soft" tooling, low volume parts
Multi-Jet Fusion	Paper, foil, plastic films	Prototypes, end use parts
SLS	Thermoplastics, powdered metals, ceramic powders	Prototypes, "soft" tooling, low volume parts
DMLS	Most alloy metals	Prototypes, "soft" tooling, low volume parts
EBM	Titanium alloys	Prototypes, low volume parts
PP	Plaster, colored plaster	Prototypes

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3D PRINTING

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3D PRINTING

A basic definition from the internet:

"the ability to use an additive process to print, layer by layer, a physical object as a three-dimensional part."

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ADDITIVE **MANUFACTURING**

A simple and not so simple definition:

Simple -*"Using the additive process to produce parts in low volume in both a dimensionally accurate and repeatable way."*

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ADDITIVE **MANUFACTURING**

A not so simple, and very powerful definition:

"It is a whole new way of thinking about your business"

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INVENTORY ON DEMAND

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SPARE PARTS ON DEMAND

The Coleman Story

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NEW & CREATIVE WAYS TO DESIGN

- 45% weight reduction
- 30% increase in structural [illegible]lity

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CURRENT DELIVERY METHOD FOR TRADITIONAL MANUFACTURING

→ Many Miles and lots of $$$

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FOR ADDITIVE MANUFACTURING LOCAL/REGIONALIZED

→ Fewer miles and less $$$

Move from central production to regional or local markets where you are closer to the customer

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CASE STUDY #1: METALIZING PLASTIC

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CASE STUDY #2: JELLO SHOTS AND AM

Testing the product!

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Pictures courtesy of Volim Photo

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Need: Very high z tolerance +/- .003
100's per year
External cost $175/part

Result of on-premise manufacturing to required tolerance = $36K annual savings

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jevo AUTOMATED GELATIN SHOT MAKER

Need: 7 plastic parts
multiple iterations
Reduce tooling costs ≈ $80K

Result: No tooling costs. Were able to get multiple iterations and field test builds for less than $3K.

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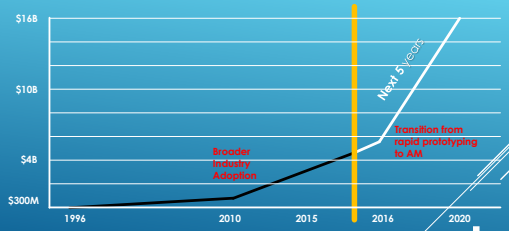
ANALYSTS FORECASTS THROUGH 2020



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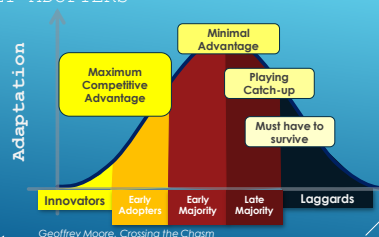
DISRUPTIVE TECHNOLOGY BENEFITS EARLY ADOPTERS



Geoffrey Moore, Crossing the Chasm

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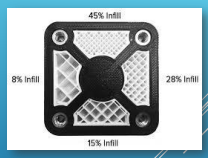
IS AM RIGHT FOR YOU?

- Do you need low volume plastic parts? How are they produced today?
- Can you save money?
- What is the availability of the right kind of materials for your parts/products?
- Would your parts/products benefit from weight reduction, improved mechanical performance, infills, part count reduction or more complex geometries?



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IS AM RIGHT FOR YOU?

- Could you benefit from providing inventory on demand to reduce inventory carrying costs?
- Do you need to produce spare parts for legacy systems?
- Might you find value in redesigning some metal parts in plastic?

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SOME CONCLUSIONS

Additive Manufacturing:

- Is more than 3D printing/Rapid Prototyping
- Offers a higher return on low volume manufacturing
- Has the potential to change a business over time
- Will most likely be the catalyst for the next industrial revolution

A new way of thinking

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