

Future of Manufacturing Part III

Additive Manufacturing

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About Additive Manufacturing / 3D Printing

By now, additive manufacturing or 3D printing is a well-known buzz

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"Additive manufacturing (AM)—the process of making a product layer by layer instead of using traditional molding or subtractive methods"

word, and hardly a new technology. However, what makes additive manufacturing an exciting part of the future is the speed in which its underlying capabilities are improving. 3D printing has and will continue to be an easy and effective prototyping tool for most manufacturers. The ability to materialize a design into quick and cost effective prototype makes a lot of sense and is already in use by many OEMs. But beyond that, the access to cheaper materials, the speed of printing and the ability to scale to a production size scale is quickly making 3D printing a viable option for consideration in the factory of the future.

Forbes Middle East recently wrote an article entitled How 3D printing is shaping the future of Manufacturing. In it the author states:

"From a commercial standpoint, 3D printing is truly disrupting things, encapsulating the factory of the future concept. This doesn't just apply to individual businesses, but for the manufacturing industry itself, which in turn creates a positive knock-on effect with the potential to affect economies."



Many still don't fully believe that additive manufacturing has large scale commercial application but real world use cases are already in play. Airbus, for instance, have accelerated the adoption of 3D printing (FDM) for their aircraft parts. From as far back as 2012, they have been printing single replacement parts. More recently however, Airbus 3D printed over thousands of parts for early A350 XWB aircraft to meet the delivery schedule on time. Other OEMs are following suit and are taking it a step further as they raise the question of digital inventory and borderless logistics via a digital thread.

**Read
Forbes
Article
Here**

McKinsey published an interesting table in their article Additive manufacturing: A long-term game changer for manufacturers to explain the reality of additive manufacturing across industries.

Additive manufacturing is already a reality in many industries.

Aerospace	Industrial	Healthcare
<ul style="list-style-type: none"> • Fuel nozzle for flight engines • 5x more durable, 25% lighter 	<ul style="list-style-type: none"> • Repair of burner heads for gas turbines • Reduction of repair time from 44 to 4 weeks 	<ul style="list-style-type: none"> • Hearing aids • Mass production of highly customized parts
<ul style="list-style-type: none"> • Thrust chamber for aerospace rocket engine. More reliable, robust, and efficient 	<ul style="list-style-type: none"> • Printing of industrial filters with geometrical optimization • 15% pumping energy reduction 	<ul style="list-style-type: none"> • Model to aid tumor surgery • Reduction of surgery time and complications
<ul style="list-style-type: none"> • Metal brackets designed for additive manufacturing • Resulting in up to 50% less weight and less raw material input 	<ul style="list-style-type: none"> • Increase of machine parts performance through special design • Reduction of production time from days to hours 	<ul style="list-style-type: none"> • Artificial limbs constructed in 2 weeks, replacing lower half of left leg • Perfect physical fit with aesthetic components

McKinsey&Company | Source: MarketsandMarkets; press reports

Additive manufacturing offers significant benefits.

Design and engineering	Manufacturing	Service
Faster time to market <ul style="list-style-type: none"> • Fast prototyping • Fast design adjustments Greater customization <ul style="list-style-type: none"> • New customized applications • More differentiated products Product enhancements <ul style="list-style-type: none"> • Better functionalities/ product performance • New designs • Less weight 	Faster/more flexible manufacturing process <ul style="list-style-type: none"> • No setup time in production • Fewer production steps/ interfaces • Fewer required parts • Less assembly time • More flexibility and better load balance • Inherent quality assurance process • Fewer dedicated machines Higher material productivity <ul style="list-style-type: none"> • Less material waste • New material features 	Simplified supply chain <ul style="list-style-type: none"> • Localized production • Elimination of obsolete parts • Refurbishment for specific components • Less dependence on suppliers More efficient sales process <ul style="list-style-type: none"> • Customized product exemplification
Relevant for		
Engineering-intensive business	High-value/ low-volume business	Spare parts-intensive business

McKinsey&Company | Source: Expert interviews; team analysis

McKinsey states that,

"In the long run, AM can completely change the way products are designed and built, as well as distributed, sold, and serviced."

Their second table in the same article provides a clear view of benefits:

[You can read the full article here.](#)

The state of the technology

JABIL rightly states in their article, the future looks bright for Additive Manufacturing, that as it stands, 3D printing is hardly the standard for high volume mass production.

"Traditional manufacturing processes such as machining and injection molding have emerged as industry standards for high-volume mass production over the past half century. These methods make perfect sense due to their low cost and high quality, while 3D printing has been relegated to rapid prototyping and low-volume production runs."

However, timeline and pricing demands will force industry innovation and manufacturers will over time most likely turn to additive manufacturing as it evolves into a faster, more economical, precise and efficient alternative.

"The future of additive manufacturing looks bright. In the future, 3D printing will position itself more prominently in the manufacturing landscape. As costs continue to reduce and processes become more efficient, the possibilities for use-cases will expand considerably."

[You can read the full article from Jabil here:](#)



Micro's stance on 3D Printing

The commercialization of 3D printing is still very much in the trial period and integrating additive manufacturing into production lines will take time, education and industry partnership. Beyond education, there also exists certain limitations that relate to scale, setup costs and maintaining the hardware with a skilled workforce.

With that said, the future is encouraging and even though we see a knowledge gap and lag between advancements and industry understanding, we still believe the value that manufacturers will realize from including 3D printing into their production and assembly lines will play a large role in reducing costs, increasing efficiencies and improving quality control in the future.

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1. Rapid prototyping
2. Tooling replacement or enhancement
3. Manufacturing final parts
4. Decentralizing logistics and the digital thread
5. You can read the full report here

[You can read the full report here](#)

Finally, for our automotive readers, Deloitte published an interesting report on the opportunities for 3D printing in the automotive industry.

[You can read the full report here](#)



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