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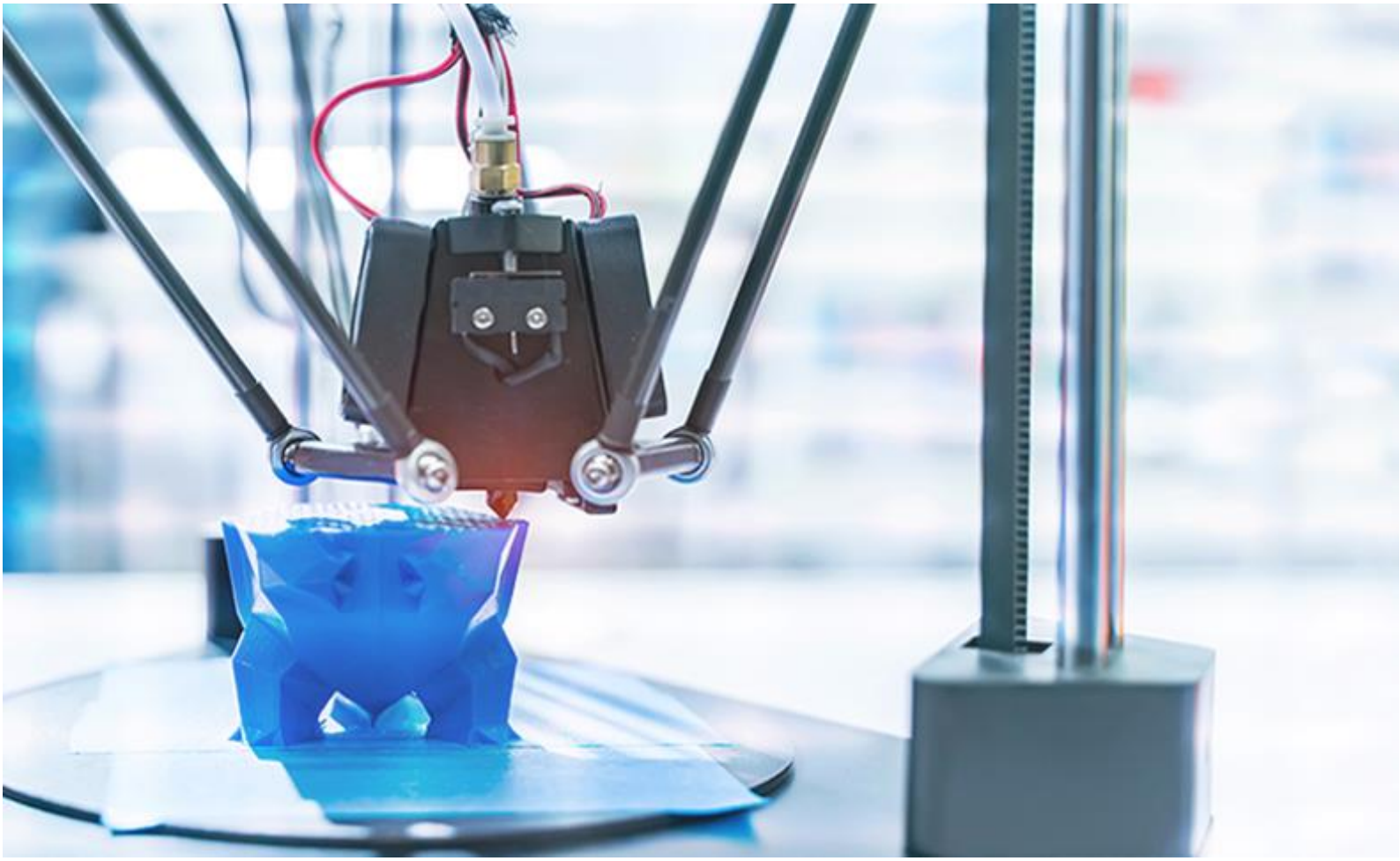
ASSET MANAGEMENT

Lapis Global Top 20 – 3D Printing Index



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3D Printing – Unlimited Possibilities in Manufacturing

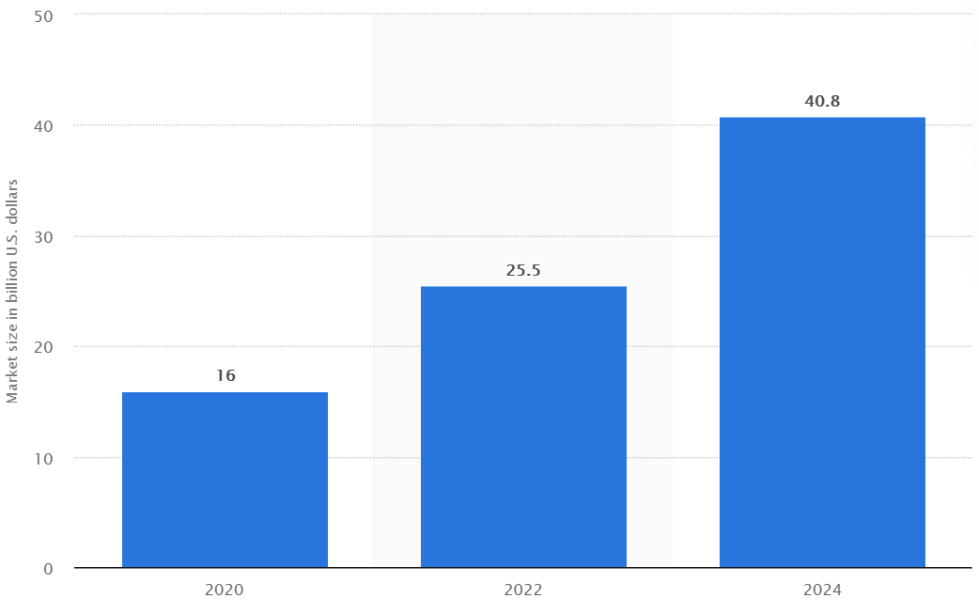
Introduction

Just as nobody could have predicted the impacts of the printing press in 1450, the steam engine in 1750, or the transistor in 1950 it is almost impossible to foresee the long-term impact of 3D printing. But the technology is coming, and it is likely to disrupt every field it touches.

Market Overview

3D printing, or additive manufacturing, has come a long way from its roots in the production of simple plastic prototypes. Today, 3D printers can not only handle materials ranging from titanium to human cartilage but also produce fully functional components, including complex mechanisms, batteries, transistors, and LEDs.

The capabilities of 3D printing hardware are evolving rapidly, too. They can build larger components and achieve greater precision and finer resolution at higher speeds and lower costs. Together, these advances have brought the technology to a tipping point. It appears ready to emerge from its niche status and become a viable alternative to conventional manufacturing processes in an increasing number of applications. The following graphic shows the global market size of 3D printing products and services from 2020 to 2024 (source: statistica).



The 3D printing technology could transform manufacturing flexibility for example, by allowing companies to slash development time, eliminate tooling costs, and simplify production runs while making it possible to create complex shapes and structures that were not feasible before. Moreover, additive manufacturing would help companies improve the productivity of materials by eliminating the waste that accrues in traditional (subtractive) manufacturing and would thus spur the formation of a beneficial circular economy. According to a recent McKinsey research study 3D printing could have an impact of up to $550 billion a year by 2025.

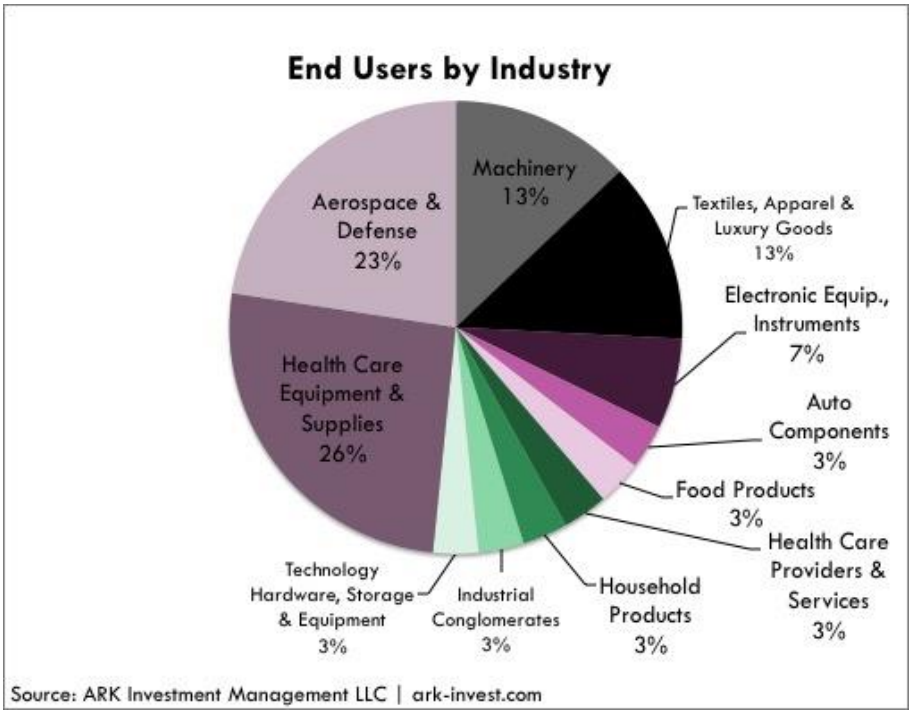
The advantages of 3D printing over other manufacturing technologies could lead to profound changes in the way many things are designed, developed, produced, and supported. According to a recent McKinsey research study there are the following five 3D printing disruptions that senior executives and investors should begin preparing for:

1. Accelerated product-development cycles

Reducing time in product development was a key benefit of the first 3D printing machines, which were designed to speed the creation of product prototypes (and in some cases helped reduce turnaround times to a matter of hours, from days or weeks). Now many industries are poised for a second wave of acceleration as the line between additive and conventional manufacturing blurs.

For example, additive manufacturing is already being used to get prototypes into the hands of customers faster, for quicker and more detailed feedback. The ability to make prototypes without tooling lets companies quickly test multiple configurations to determine customer preferences, thus reducing product-launch risk and time to market. Companies could even go into production using 3D printed parts and start selling products while the traditional production tools were still being manufactured or before the decision to produce them had been made. When companies did order those tools, they could use additive-manufacturing techniques to make them, saving even more time and money.

We expect that the use of such techniques will contribute to significant reductions in product-development cycle times over the next decade. Over time, 3D printing will begin to affect how companies think about R&D more broadly, given how the technology enhances the ability to crowdsource ideas through remote cooperation. For some companies, that crowdsourced brainpower might one day begin supplanting R&D activities, making its management a new priority.



2. New manufacturing strategies

As of 2011, only about 25 percent of the additive-manufacturing market involved the direct manufacture of end products. With a 60 percent annual growth rate, however, that is the industry's fastest-growing segment. As costs continue to fall and the capabilities of 3D printers increase, the range of parts that can be economically manufactured using additive techniques will broaden dramatically. Boeing, for example, already uses printers to make some 200-part numbers for ten different types of aircraft, and medical-products companies are using them to create offerings such as hip replacements.

3. Shifting sources of profit

Additive-manufacturing technologies could alter the way companies add value to their products and services. The outsourcing of conventional manufacturing helped spur companies such as Nike to rely more on their design skills. Likewise, 3D printing techniques could reduce the cost and complexity of other kinds of production and force companies to differentiate their products in other ways. These could include everything from making products more easily reparable (and thus longer lived) to creating personalized designs.

Indeed, reducing the reliance on hard tooling (which facilitates the manufacture of thousands of identical items) creates an opportunity to offer customized or bespoke designs at lower cost and to a far broader range of customers.

4. New capabilities

Design is inherently linked to methods of fabrication. Architects cannot design houses without considering construction techniques, and engineers cannot design machines without considering the benefits and limitations of casting, forging, milling, turning, and welding. While there is a wealth of knowledge around design for manufacturing, much less is available on design for printing.
Getting the most out of additive-manufacturing techniques also involves technical challenges, which include setting environmental parameters to prevent shape distortion, optimizing the speed of printing, and adjusting the properties of novel materials. Indeed, tuning materials is quite a challenge. While plastics are relatively straightforward to work with, metals are more difficult.

The most successful players will understand these challenges. Some are already creating centers of excellence and hiring engineers with strong experience in additive manufacturing.

5. Disruptive competitors

Many benefits of 3D printing could cut the cost of market entry for new players. The use of the technology to lower tooling costs, for example, makes it cheaper to begin manufacturing, even at low volumes, or to serve niche segments. The direct manufacturing of end products greatly simplifies and reduces the work of a designer who would only have to take products from the computer screen to commercial viability. New businesses are already popping up to offer highly customized or collaboratively designed products. Others act as platforms for the manufacture and distribution of products designed and sold online by their customers. These businesses are gaining insights into consumer tastes and building relationships that established companies could struggle to match.

Initially, these new competitors will be niche players, operating where consumers are willing to pay a premium for a bespoke design, complex geometry, or rapid delivery. Over the longer term, however, they could transform industries in unexpected ways, moving the source of competitive advantage away from the ability to manufacture in high volumes at low cost and toward other areas of the value chain, such as design or even the ownership of customer networks. Moreover, the availability of open-source designs for 3D printed firearms shows how such technologies have the potential to create ethical and regulatory dilemmas and to disrupt industries.

Lapis Investment Solution

Lapis Asset Management developed and launched several proprietary equity indices, mostly with dividend yield focus. All equity indices are rule-based and use scientifically proven selection criteria. To reduce risk, we apply quarterly rebalancing and optimal diversification. For this reason, our equity indices show an attractive risk/return ratio which is especially worthwhile in the long term. To provide our private and institutional clients with a unique access to the promising 3D printing industry, we have developed and calculated the **Lapis Global Top 20 – 3D Printing Index**.

Lapis Global Top 20 – 3D Printing Index

This unique equity index is composed of the worldwide best-known and leading top 20 companies based on the research approach of an internationally recognized company. The companies included in the index are operating in the fields of 3D printing hardware, 3D printing simulation software, 3D printing centers and 3D printing materials. All stocks are equally weighted and the Index is **rebalanced on a quarterly basis** (end of January, April, July, and October).

We offer our existing customers and prospects the following access to our unique **Lapis Global Top 20 – 3D Printing Index**:

- **Mandates** (segregated accounts)
- **Lapis funds** (not yet available) or **white-label financial products**
- **Certificates** or other **index-based financial products**

We would be pleased to explain the advantages of our unique equity indices in a **personal advisory meeting** to determine a **long-term and optimal investment strategy** that matches with your risk profile and is able to **meet your investment goals**. Further information on the **performance** and relevant **financial ratios** of our equity indices will be provided upon request.

Please visit our website: **www.lapis.finance**.

Kind regards,

Andreas Wueger
CEO

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