

ATHANASSIOS KALIUDIS

What industries use 3D printing

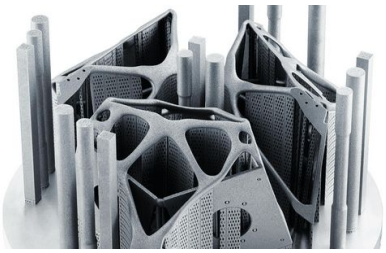
If 3D printing were a human being, it would be on the verge of adulthood. All the broad outlines are already there, but it might well still have some surprises up its sleeve. Here we take a look at the key trends.

1. Aerospace

The aerospace industry was the first to embrace 3D printing, and now regards it as a standard part of their toolkit. The reasons are clear: unlike cars, aircraft are in almost constant use and spend very little time parked. That means the price of each individual component plays much less of a role. The decisive factor is how well it fulfills its intended use – and in this case lightweight design is the name of the game. If you can make an aircraft component one kilo lighter by modifying its design, that can translate into direct savings of hundreds of thousands of euros in kerosene costs over the aircraft's service life. What the industry needs is the highest possible quality standards in batches that are typically very small – and that makes LMF the ideal choice. The most popular 3D printed parts in the industry are turbine components.

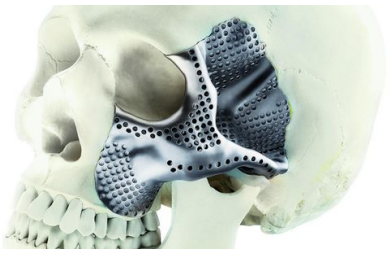
2. Medical devices and dentistry

These sectors are also playing a pioneering role, with 3D printing proving to be particularly popular for items such as dental prostheses, inlays and other implants. In practice, you need both offthe-shelf and custom-built parts, because every hip and dental prosthesis is di erent. Custom implants are easier to insert and can help patients recover faster. One likely development is that imaging methods will be used to measure a patient's knee or jaw and then send a CAD blueprint of the required implant directly to the 3D printer, which will then immediately start building it.



The aerospace industry requires a combination of high rigidity and minimal weight. This satellite part is just one example.

– Philipp Reinhard



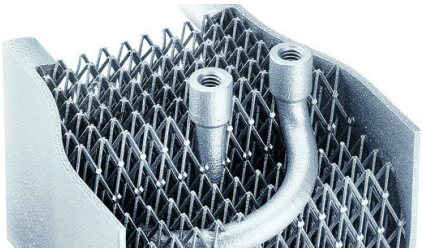
Skull implants such as this one will help many cancer patients in the future.

– Philipp Reinhard



LMF has become a standard technique in the automotive industry, especially for turbochargers and heat exchangers.

– Philipp Reinhard



The ability to print your own heat exchangers saves time and money at the development stage.

– Philipp Reinhard



This mold core offers an example of how internal structures simply cool better.

– Philipp Reinhard

3. Mechanical Engineering

It's a familiar yet unpleasant chore for machine makers: having to pacify a customer even though the machine they ordered is almost ready for delivery – all because a couple of small parts are unavailable and have brought the whole process to a halt. The industry is taking steps to rectify this situation by installing its own 3D printers to shake off the shackles of its suppliers' schedules. 3D printers can supply high quality versions of parts such as clamping fixtures. A first wave of companies is also starting to print its own consumables, such as milling tools and drill bits, asserting their independence in this area, too. More and more machine makers are discovering new functionalities through 3D printing – for instance nozzles that can be hugely improved by simply modifying the shape of the channel.

4. Automotive

LMF has struggled to gain a foothold in the automotive industry due to the focus on minimizing prices and sticking to conservative design principles. All the components used in this industry are designed with well-established methods in mind such as casting and turning – and this situation is unlikely to change. LMF is only used for visible parts in premium vehicle segments and for filters and flow-optimized exhaust manifolds. The industry also has high hopes for the speedy binder jetting

process. By eliminating the need for a mold, this method will help companies slash the cost of producing parts that were formerly cast and that are produced in quantities of less than 100,000 pieces.

5. Tool-making

Manufacturers of injection molds have recently discovered the cooling effects of 3D printing – and they are now printing mold inserts with flow channel designs that have never been seen before. Conventional methods such as drilling or milling cannot always reach all the areas of a tool that need to be tempered, even though this is critical to ensuring that an injectionmolded part cools in an optimum fashion. That has consequences, including manufacturing problems, diminishing quality over a part's service life, and high scrap rates. 3D printing opens the door to completely new cooling designs that can easily reduce scrap rates by 30 percent while increasing overall quality.



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