

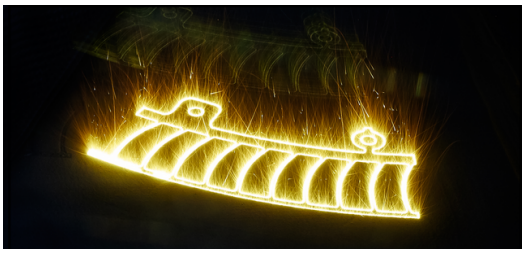
ATHANASSIOS KALIUDIS

How does 3D printing work with metal?

3D printing with metal is finding its way into more and more industries. For example, aircraft engines, tailor-made implants and prostheses or fittings in automobiles are manufactured today with the 3D printer.

The most widely used process is the powder bed process, also known as Laser Metal Fusion (LMF), Selective Laser Melting (SLM) or Powder Bed Fusion. But how does this technology work? We summarized the most important steps and illustrated them in the picture gallery:

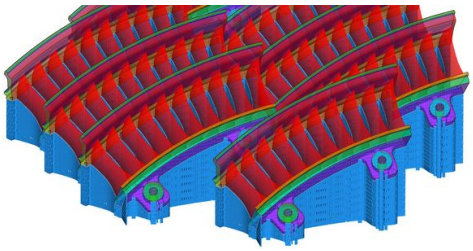
- Laser metal fusion builds up parts layer by layer in a powder bed. The process takes place in what is called a process chamber.
- Laser metal fusion essentially works as follows: The supply, construction and overflow cylinders are situated alongside each other in the same axis. A device known as a coater applies powder from the storage cylinder to the construction cylinder.
- The laser then fuses the first layer of powder into the contours required for the part.
- Next, the construction cylinder moves downward, depositing any excess powder in the overflow cylinder. This process is repeated until the part is complete.
- To boost productivity, some 3D printers can work with several lasers at the same time, a feature known as the multi-laser principle.



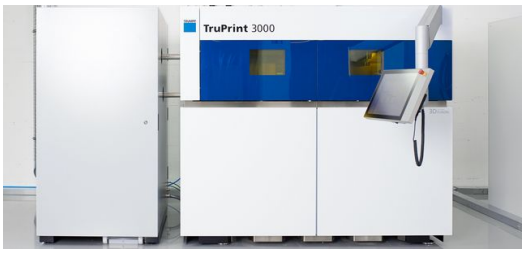
In laser metal fusion, a laser transforms powder into a part by melting it – this long exposure shot makes the process visible.



The construction cylinder is mounted in the unpacking station. (© Clauss Morgenstern)



A software program prepares the data before the 3D printer starts work.



-The 3D printer - here the TruPrint 3000 from TRUMPF, prints the component layer by layer. (© Clauss Morgenstern)



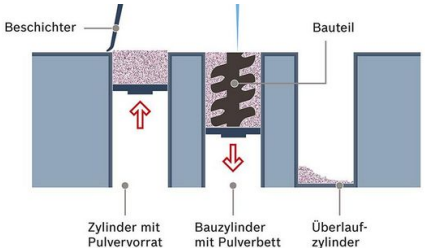
It takes just a few minutes to vacuum the excess powder off the part. (© Clauss Morgenstern)



The excess powder is channeled from the unpacking station (left) to the sieving station. This unit cleans the excess powder so that it can be reused. It does this by removing the smoke residue and dirt particles picked up by the powder during the welding process. (© Clauss Morgenstern)



Done and dusted! A finished part from the 3D printer. (© Clauss Morgenstern)



Functional principle of laser metal fusion.



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