“Additive manufacturing: industry necessities and research solutions”

Additive manufacturing

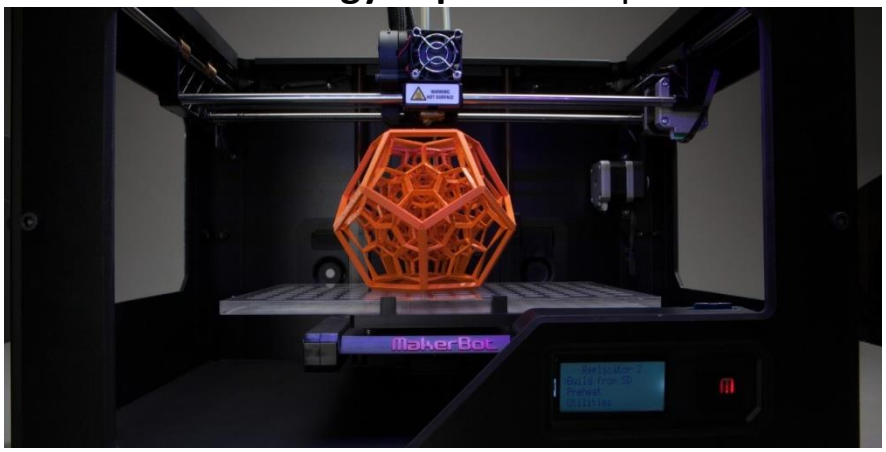
- **A**dditive **M**anufacturing →technologies that build 3D objects by ***adding*** layer-upon-layer of material (material is plastic, metal, concrete or human tissue)
- preproduction visualization models → end-use products

Sursa: Bussiness Today

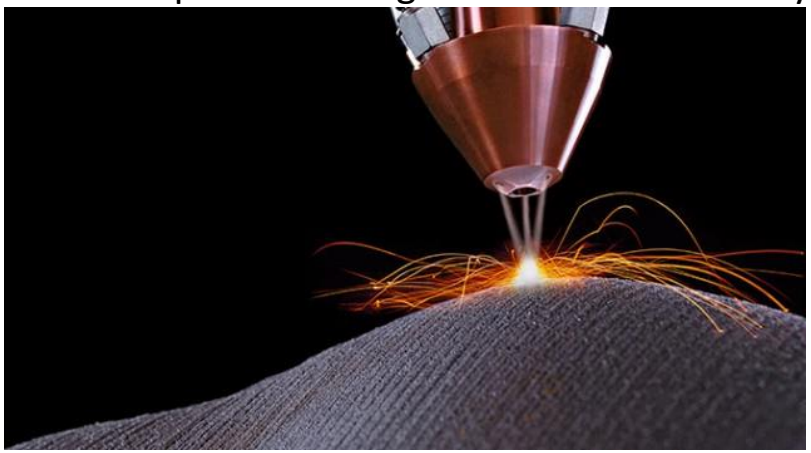
Sursa: www.3ders.org

Techniques

- **Stereolithography** - a pool of resin→ a laser beam, directed into the pool of resin, traces the cross-section pattern of the model for that particular layer and solidifies it.
- **Fused filament fabrication –** thermoplastic polymer that changes to a liquid upon the application of heat and solidifies to a solid when cooled. Materials → injected through indexing nozzles onto a platform.
- **Binding jetting** - powder of plaster based material. An inkjet printer head→ small amount of binder to form a layer→ a new layer of powder is sweeped over the prior layer with the application of more binder → the process repeats until the model is complete.
- **Powder bed fusion** - a high powered laser fuses small particles of plastic, metal, ceramic or glass. During the build cycle, the platform on which the build is repositioned, lowering by a single layer thickness.
- **Directed energy deposition** – powder is blown into a hot spot →melting and solidification→layer



Sursa: The manufacturer



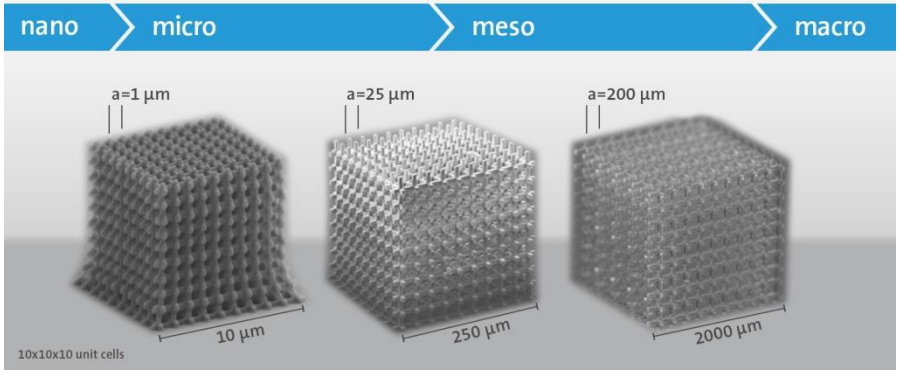
Sursa: ExtremeTech

Variations

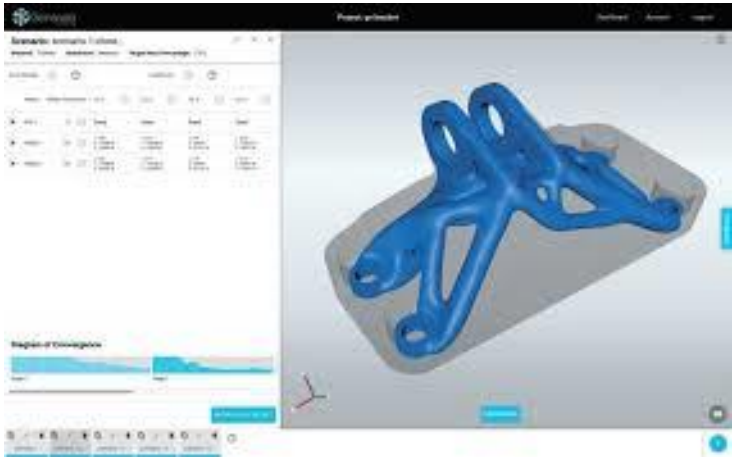
- Multilayer deposition
- In situ alloying and fabrication of metal matrix nanocomposites
- Compositional gradient
- Color gradient
- Cladding for changing surface properties

Future of 3D printing

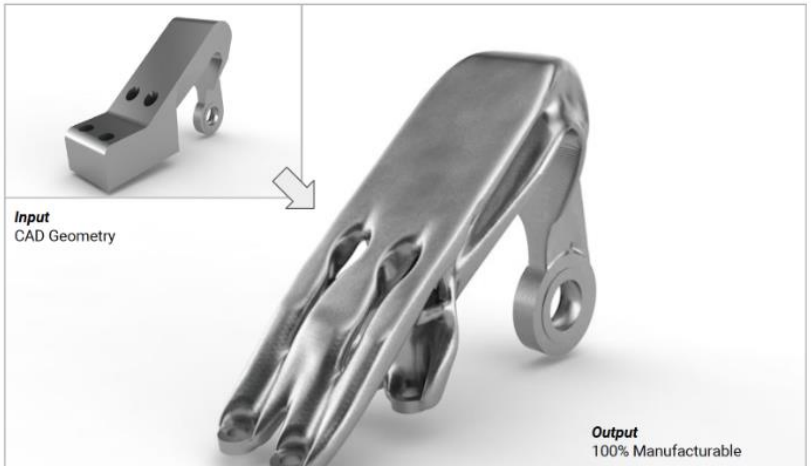
- Software for generation of shapes
- Printing at micro- and nano-scale



Sursa: Nanoscribe GmbH

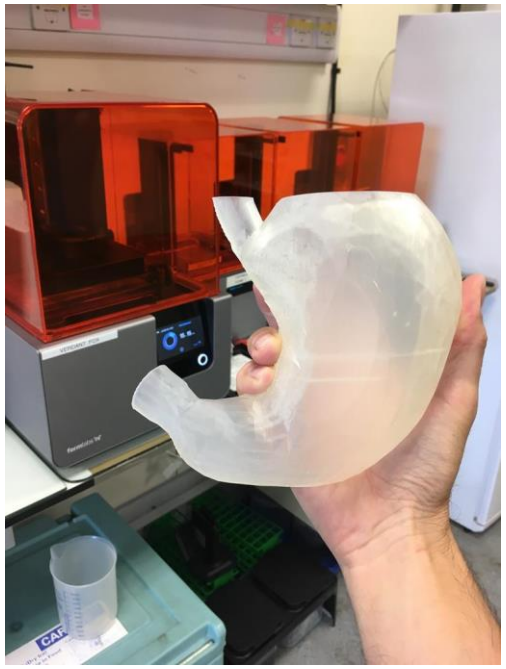


[Sursa: old.digitaleng.news]



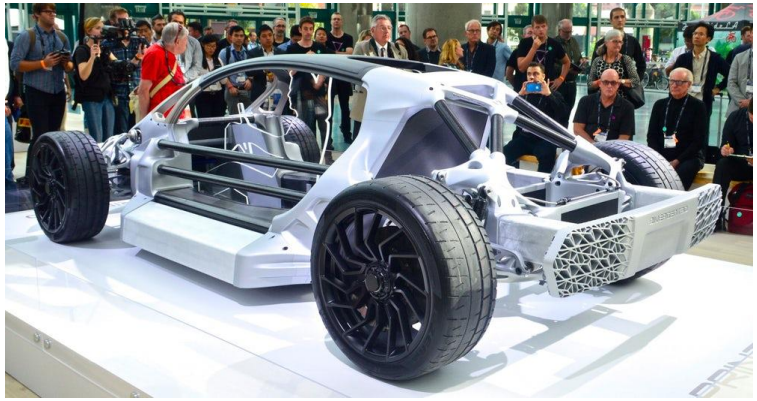
3Dprintingindustry.com

Applications



Sursa: www.chemistryworld.com

Sursa: beyonddesignchicago.com



Sursa: newatlas.com

Sursa: CNN.com

Romania and additive manufacturing

Research Centers

- Advanced Technology Laser Center, **Bucharest**
- National Institute for Research and Development in Microtechnologies, **Bucharest**
- Faculty of Mechanical and Mechatronics Engineering, POLITEHNICA University of **Bucharest**
- National Institute of Research and Development in Mechatronics and Measurement Technique, **Bucharest**
- Department of Manufacturing Engineering, Technical University from **Cluj-Napoca**
- POLITEHNICA University of **Timisoara**
- Gheorghe Asachi Technical University of **Iasi**

Industry

- POC-G – Apel Laser SRL, Optoelectronica 2000