УДК 811.111:67.02

3D PRINTING: DEFINITION, TYPES AND PROCESSES

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3D printing, also known as additive manufacturing, is a manufacturing process in which a 3D printer creates three-dimensional objects by depositing material in layers, according to a digital 3D model of the object. 3D printing makes it easy for anyone to create objects of all shapes, even in the comfort of their own home. Unlike the huge machines found in factories, today's desktop 3D printers are compact, cheap and simple enough to get started without extensive training.

3D printing is in high demand across industries including prototyping, healthcare, automotive, education, architecture, consumer goods, electronics, tooling, defense, and food for applications such as rapid prototyping, personalized products, lightweight component manufacturing, and construction of complex structures.

At the moment there are 7 types of 3D printing: binder jetting, direct energy deposition, material extrusion, material jetting, powder bed fusion, sheet lamination, VAT polymerization [1].

Due to the capabilities of the technology enabling the creation of small quantities and production within the company's facilities, this method is well-suited for prototyping. This implies that products can be developed more swiftly compared to conventional manufacturing methods, and without depending on external supply chains.

Because the process of 3D printing is based upon computer aided designs, any product alterations are easy to make without impacting the manufacturing cost. It allows users to produce items that have geometries which are difficult or impossible for traditional methods to produce.

3D printing facilitates the production of parts with tailored properties by offering the flexibility to utilize specially engineered materials, such as those with high heat resistance or water repellency, catering to diverse application needs beyond conventional plastics and metals [2].

Mechanical engineers must adjust to the evolving environment by mastering 3D printing technologies, software, and materials, as doing so is vital. Those engineers who can effectively utilize additive manufacturing will position themselves as pioneers of innovation, spearheading the design of products and systems previously deemed unattainable.

Despite its numerous advantages, 3D printing also presents certain limitations including high initial investment costs for equipment and materials, as well as challenges associated with achieving production-scale efficiency, thereby posing barriers to widespread adoption in certain industries.

In recent times, there have been extraordinary advancements in 3D printing technology. The range of materials available has expanded beyond plastics to include metals, ceramics, and bio-inks.

Cutting-edge printing methods like multi-material and multi-axis printing have opened up fresh avenues for innovation. Moreover, the incorporation of artificial intelligence and machine learning has improved the accuracy and effectiveness of additive manufacturing processes [3].

In conclusion, 3D printing stands as a transformative technology poised to revolutionize numerous faces of human endeavor, offering unparalleled versatility, customization, and efficiency across industries, thereby heralding a future where innovation knows few bounds, ultimately enriching the lives of individuals worldwide.

References

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