

### 3D PRINTING TECHNOLOGY REVOLUTIONIZING THE PRODUCTION OF PROSTHETIC PARTS

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**Relevance:** Prosthetic limbs play a crucial role in improving the quality of life for individuals who have lost a limb due to injury, illness, or congenital conditions. With advancements in technology, 3D printing has emerged as a game-changing innovation in the field of prosthetics.

**Goal of the work:** to explore the transformative potential of 3D printing technology in the production of prosthetic parts, highlighting its benefits, applications, and future implications.

**Result analysis** – Prosthetic parts are typically made using labor-intensive, time-consuming traditional methods that necessitate numerous fittings and adjustments. On the other hand, prosthetic components made with 3D printing can be specially created according to each patient's specific anatomical needs. This degree of personalization guarantees a better fit, more comfort, and improved functionality, which raises patient satisfaction and increases mobility. Quicker development cycles, a shorter time to market, and an approach that is more effective and patient-centric are all made possible by this iterative design process. Because of its adaptability, lightweight structures that closely resemble natural limb characteristics can be produced, improving comfort and decreasing fatigue. The weight-to-strength ratio is further optimized by the ability to incorporate intricate geometries and lattice structures into the design, producing more effective and useful prosthetic components. Prosthetics technology is expected to advance further as 3D printing technology develops. Among the possible advancements in the future are:

- Integration of sensors and electronics within prosthetic parts to enable better control and feedback.
- Utilization of advanced materials, such as biocompatible hydrogels or bioinks, for the production of more lifelike and functional prosthetic parts.
- Integration of artificial intelligence and machine learning algorithms to optimize design and personalize prosthetics based on individual patient data.

**Conclusion.** 3D printing technology has revolutionized the production of prosthetic parts, offering unparalleled customization, cost-effectiveness, and design freedom. Through its ability to rapidly prototype, iterate, and produce complex structures, 3D printing has transformed the field of prosthetics, enhancing the quality of life for individuals with limb loss. As this technology continues to advance, the future of prosthetic design and manufacturing holds immense potential for further breakthroughs in functionality and aesthetics.