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Editorial

Additive Manufacturing: Producing Custom Orthopedic Implants

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Additive manufacturing (AM), also known as 3D printing, is a process of creating three-dimensional objects by adding material layer by layer based on a digital model. The process involves slicing the digital model into thin layers and using a machine to deposit material layer by layer until the object is complete [1].

Here are some of the ways additive manufacturing is being used in various industries:

1. Prototyping: Additive manufacturing can produce physical prototypes quickly and at a low cost, allowing for iterative design and testing.
2. Manufacturing: Additive manufacturing can be used for low-volume production of complex parts that are difficult or impossible to produce with traditional manufacturing techniques.
3. Medical: Additive manufacturing is used in the medical field to produce customized implants, prosthetics, and surgical tools that are patient-specific and improve outcomes.
4. Aerospace: Additive manufacturing is used to produce lightweight, complex parts that reduce weight and improve fuel efficiency in aircraft.
5. Architecture and construction: Additive manufacturing is used to produce 3D-printed buildings, as well as prefabricated building components like walls and columns.
6. Automotive: Additive manufacturing is used to produce lightweight parts and components for vehicles, including engines, transmission parts, and body panels.

Overall, additive manufacturing has the potential to transform various industries by enabling the production of complex geometries, reducing lead times, and creating customized products tailored to specific requirements.

Additive manufacturing (AM), has become an increasingly popular technology in orthopedics due to its ability to create complex geometries, customize implants, and reduce lead times.

Picture 1: *Lomber cage produced with 3D printer.*

Here are some of the ways additive manufacturing is being used in orthopedics:

1. Implant manufacturing: Additive manufacturing can produce customized implants that are patient-specific, improving the fit and reducing the risk of implant failure. For example, AM can produce implants with lattice structures that mimic the mechanical properties of bone, which can improve the implant's integration with the surrounding bone [2].
2. Surgical tools: Additive manufacturing can produce specialized surgical tools that are designed to match the specific requirements of a surgical procedure, improving precision and reducing the time taken for surgery.
3. Anatomical models: Additive manufacturing can produce anatomical models of a patient's bone and joint structure, which can be used for pre-operative planning, simulation, and education [3].
4. Training models: Additive manufacturing can produce training models that replicate the complexity of human anatomy and pathology, allowing medical students and residents to practice surgical procedures in a safe and realistic environment.

Overall, additive manufacturing has the potential to transform the field of orthopedics by improving implant fit, reducing lead times, and enabling the production of complex geometries that were previously impossible to create with traditional manufacturing techniques.

Bibliography

1. Wallner T., *et al*. "Additive Manufacturing-Enabled Low-Cost Particle Detector". *Journal of Visualized Experiments* 24.193 (2023).
2. Nakhaei M., *et al*. "Experimental analysis and numerical fatigue life prediction of 3D-Printed osteosynthesis plates". *Frontiers in Bioengineering and Biotechnology* 11 (2023): 1133869.
3. Żukowska M., *et al*. "Additive Manufacturing of 3D Anatomical Models-Review of Processes, Materials and Applications". *Materials* 16.2 (2023): 880.

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