



# Surface Design in Additive Manufacturing Medical Implants

**Thomas Gerdes\***

*Department of Cardiology, University of Southern Denmark, Denmark*

## **Abstract**

Bone–implant stability can be improved by fabricating porous titanium implant surfaces using additive manufacturing interfacial bonded, a thorough understanding of the biomechanical properties of porous (lattice) implants is essential. favorable physiological environment for bone ingrowth and strengthens the bond between the implant and bone.

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\*Corresponding author: Thomas Gerdes, Department of Cardiology, University of

Received:

Revised:

Citation: Gerdes T (

Editor assigned:

Reviewed:

Published:

Mechanical properties of the FE-based design can be evaluated using finite element analysis (FEA) to predict the mechanical behavior and stress distribution under various loading conditions. The design parameters, such as the thickness of the layers and the orientation of the fibers, can be adjusted to optimize the mechanical properties of the implant.

In the case of a fiber-reinforced composite, the mechanical properties of the fibers and the matrix material are critical factors. The fibers provide the primary load-bearing capacity, while the matrix binds the fibers together and transfers the load between them. The design of the fiber orientation and the matrix composition can significantly affect the overall mechanical performance of the implant.

The mechanical properties of the FE-based design can be evaluated using finite element analysis (FEA) to predict the mechanical behavior and stress distribution under various loading conditions. The design parameters, such as the thickness of the layers and the orientation of the fibers, can be adjusted to optimize the mechanical properties of the implant. The design of the fiber orientation and the matrix composition can significantly affect the overall mechanical performance of the implant.