Future of Fracture Fixation: A Generative Design Approach to Surgical Implants

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Sanjeevan has a Masters in mechanical engineering, currently pursuing a doctorate with the biomedical engineering group at University of Birmingham (UK), sponsored by Manufacturing Technology Centre (UK). His areas of interest are around the design and application of additive manufacturing in the medical industry, with a particular focus on patient-specific implants.

UNIVERSITY OF BIRMINGHAM

NATIONAL CENTRE ADDITIVE MANUFACTURING

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Peter is a technical consultant working out of the Autodesk technology center in Birmingham UK. He is a specialist in additive manufacturing and generative design, and works alongside Autodesk customers to help them implement emerging MAKE processes into their day to day workflows.

Description

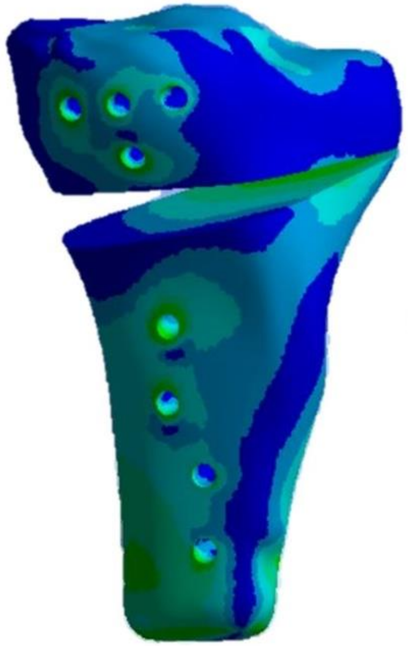
Bone is a living material that remodels in the presence of mechanical stimuli. Although biocompatible, metallic implants are 10 times stiffer than actual bone. In essence, they reduce the load transferred through bone, resulting in loss of bone density as well as affecting the biological healing process. Therefore it is imperative to design an implant which can optimally distribute the load with minimum material as possible, whilst allowing the patient to engage in daily activities.

This industry talk will focus on an innovative workflow comprising generative design and advanced manufacturing methods to produce patient-specific bone fixations from a CT scan. Unlike conventional fixation devices, the design is informed of patient factors such as age, weight, bone density, bone morphology, 3D alignment of the knee joint and activity levels. The generative design approach allows the fixation device to be designed not only to custom fit the contour of bone, but also tailored to patient’s pathology and physiology.

Workflow

Patient CT scan

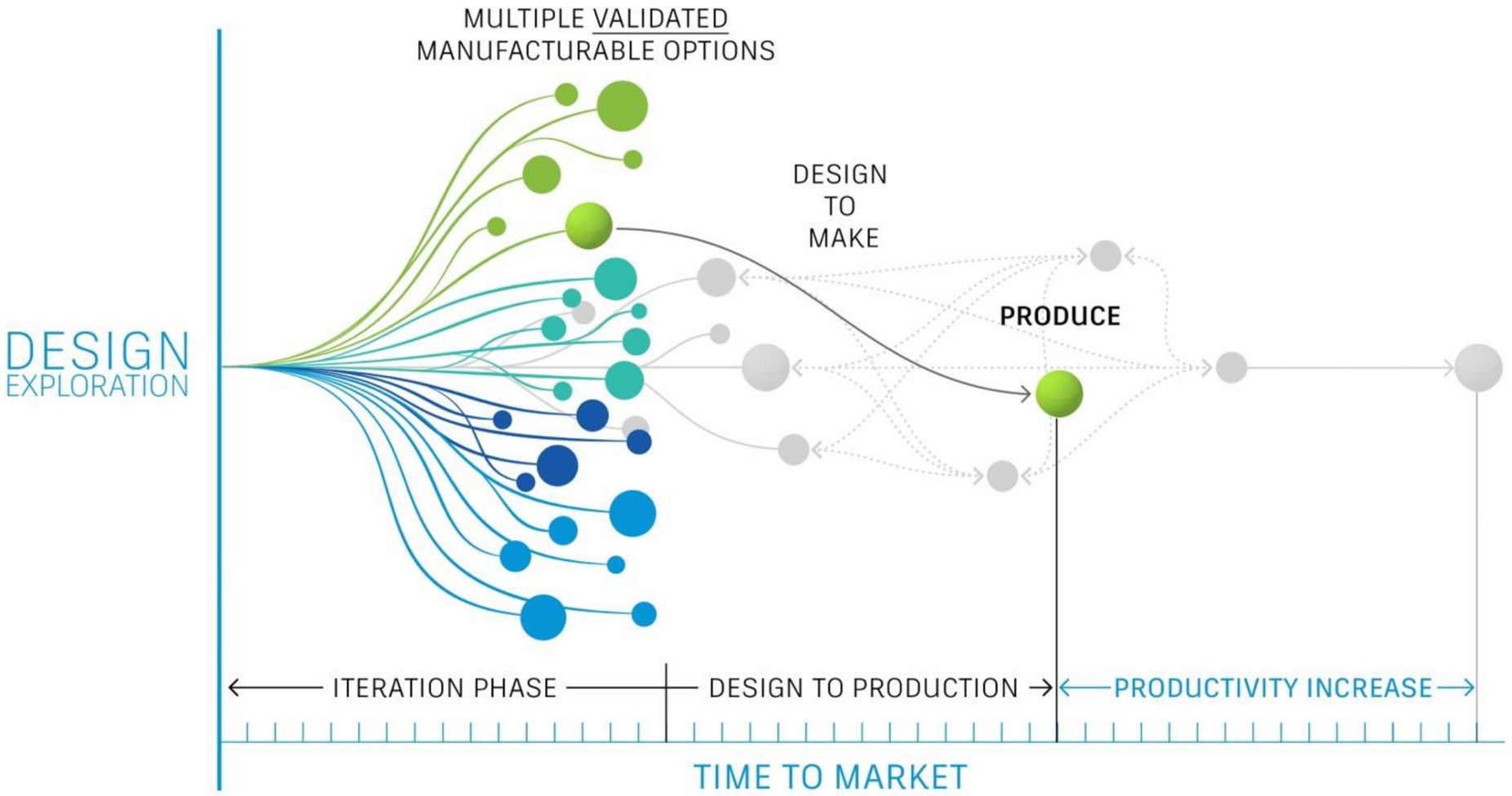
3D Geometry Reconstruction



Biomechanical Analysis

Generatively Designed Implant

GENERATIVE DESIGN



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