Soft Tissue – Device Simulation Setup

FE-Model of Transfemoral Amputee

Biomechanical In-Silico Analysis

Investigation of Tissue Deformation

Assessment of Structural Compatability

Optimizing Tissue Stress in Orthopaedic Device

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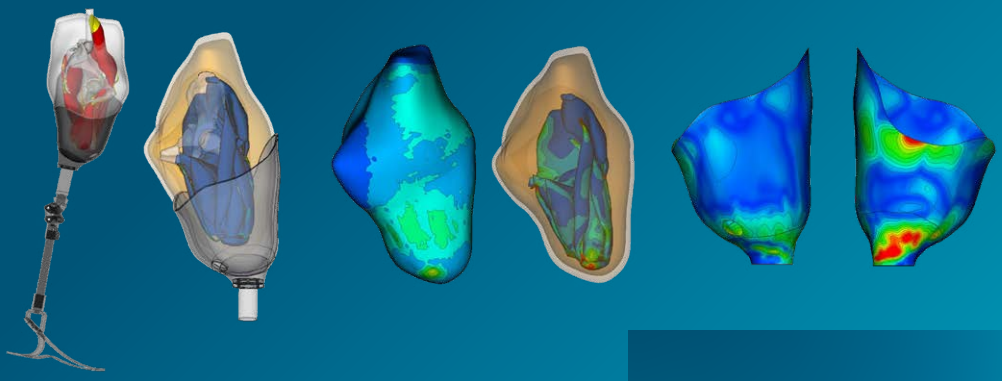

Virtual FE-based planning of prosthetic sockets

The development and manufacturing of comfortable prosthetic sockets is a complex process, involving several subject-specific factors. Designing a comfortable socket mandates the understanding of the interplay between soft-tissue properties and the biomechanics of the residual limb with the socket. Such complex Know-How is ingrained within the experience of highly professional and trained prosthetists. Even then, the process of designing a final socket geometry is very cumbersome and involves multiple adjustments and iterations since every modification of the geometry affects the deformation of soft-tissues in the residual limb and vice-versa. The computation of a comfortable socket design can be performed only using a detailed FE-analysis of the socket-limb interaction with validated subject-specific models of the residual limb. Additionally, the level of comfort under subject-specific dynamic loads during swing phase can be analysed and reported using detailed musculoskeletal residual limb models. This, along with additive manufacturing, opens the door to product innovation using fully digital Design & Development (D&D) processes. Such processes are cost-effective and would lead to personalised sockets, which are tested virtually for comfort and structural integrity.

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Service Portfolio

- Development of detailed, subject-specific residual limb models representing accurate anatomy, physiology and biomechanics of joints.
- Virtual Optimization of socket geometry of prosthesis and orthosis based on comfort criteria, derived using tissue deformation under static (single- and double-limb support phase) and dynamic loadcases (flexion-extension, adduction-abduction)
- Load-compliant structural design of 3D-printed (or composite material) products

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