

Example No. 8: Modelling of medical and biomaterials – living long with long living artificial body parts

With increasing life time, life quality, and activity in today’s societies, biocompatible as well as durable materials for orthopaedic implants become more and more essential. But how to guarantee long lasting functionality and stability?

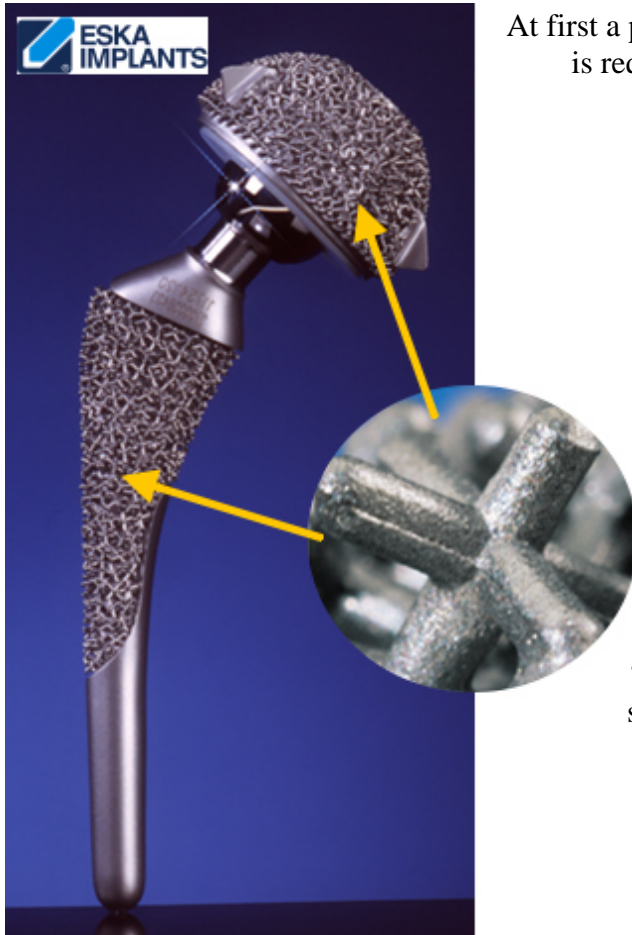


Fig. 1 High-end hip implant of ESKA with 3D structure for optimum implant-bone interfaces

At first a proper analysing of the human body materials is required in order to find the perfect replacement structures and materials.

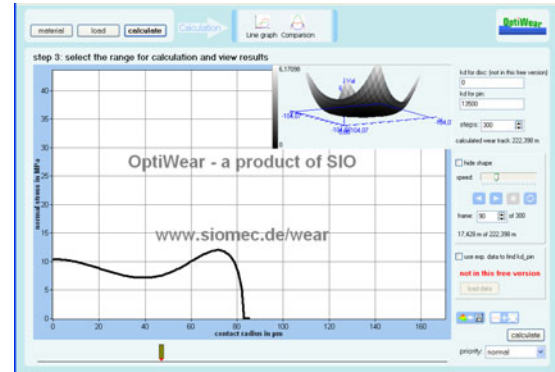


Fig. 2: Wear track modelling for a contact pairing example of an implant (evaluation was performed for ESKA Implants)

Then the currently applied materials are “ranked”. Here SIO analysing procedures and software can dramatically improve “classical” methods (Fig. 2 and 3).

Fig. 3



Finally SIO optimisation procedures (e.g. the FilmDoctor®, Fig. 4) can be applied in order to find weak points and the crucial physical parameters for even better materials and structures. By clearly identifying the physical effects responsible for certain failure mechanisms one can lengthen the lifetime of these implants and avoid additional operations as shown in Fig. 5.



Fig. 4 Load definition for the simulation of mechanical contact situations with FilmDoctor® (www.siomec.de)

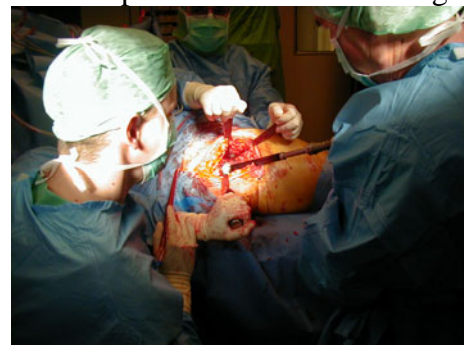


Fig. 5: Setting a hip implant by Dr. med. B. Schwarzer