DEP MeshWorks

Fatigue evaluation for femoral stems of two total hip replacement implants

About the Client

The client is a pioneer in the manufacturing and distribution of superlative orthopedic implants in India including exporting them abroad.

The Challenge

The client approached DEP consultants with two goals in mind:

1. Generation of 3D CAD models for implants based of manufacturing drawings

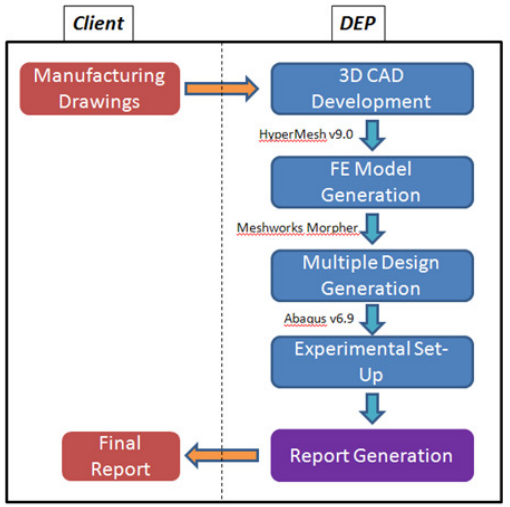
2. The fatigue evaluation of the implants.

'Total Hip Replacement' (THR) implants are prescribed for osteoarthritis, one of the most common and severe joint inflictions. As a load bearing implant, it is critical to ensure that the implant is able to withstand the load for sufficient duration.

The Solution

The first goal was accomplished by DEP's in-house design team, which converted the manufacturing drawings into 3D CAD models using CAD software. In addition to the CAD package, DEP was able to generate multiple designs of the implants for different head-neck offset based on the client's requirements using DEP's proprietary in-house developed morphing tool. Following the completion of the design generation, the models were verified with the manufacturing drawings.

The healthcare team at DEP then used the CAD data to develop finite element models of the implants and analyze them. DEP used its in house Hex Mesher tool in its Proprietary MeshWorks platform to build the FE Model of implants. To evaluate the fatigue life of the implants DEP recommended ASTM F1612-95.



ASTM F1612-95 is a recommended test to validate and verify the life of the implant by the FDA and other regulatory bodies. The ASTM standard is primarily focused at cemented implants, to

The Result

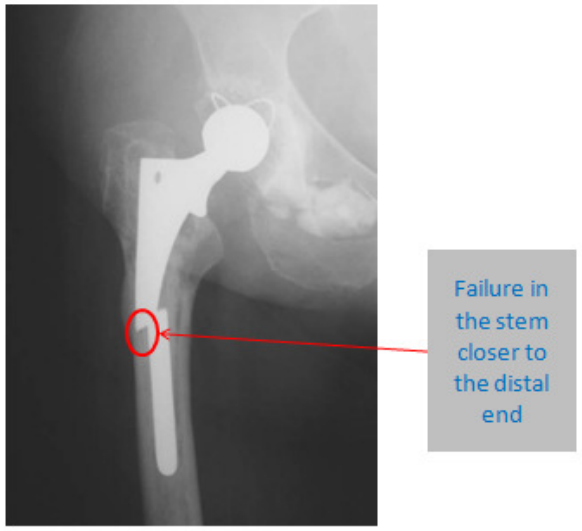
DEP was successfully able to determine the life of the implant as per set-up. In addition to obtaining the fatigue life cycles, DEP was able to convert the life cycle into approximate number of years based on research literature.

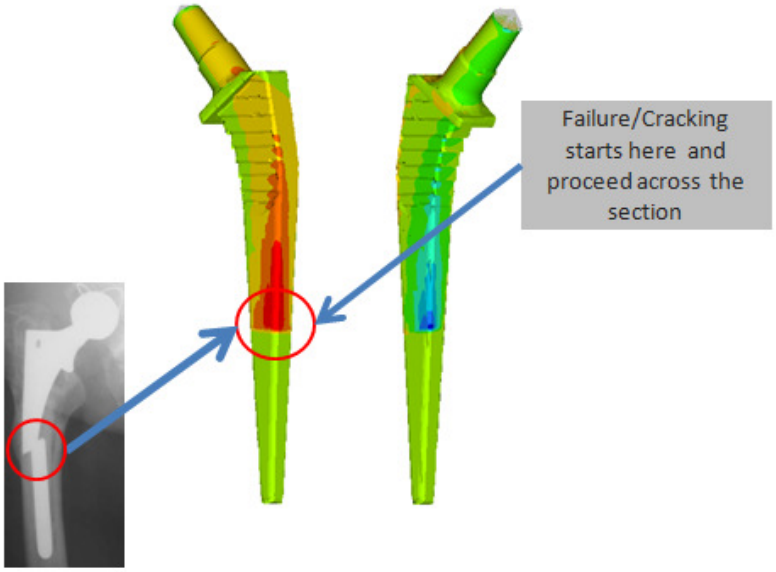
understand the life of implant under the worst-case scenario (loosening of proximal cement & loading of dorsal stem of implant).

The schematic of the DEP's benchmarked CAE development/ simulation process through ABAQUS/ Standard is illustrated in the figure alongside.

The DEP Advantage

- Access to in-house tools and proprietary MeshWorks platform, allowed for generation of multiple designs based on client's requirements.
- Reduction in design time compared to traditional method of device design.
- Reduced cost due to CAE derived design process for the client.
- Comparative tool for the client, to compare results with other competitive products.





Read more online at
www.depusa.com