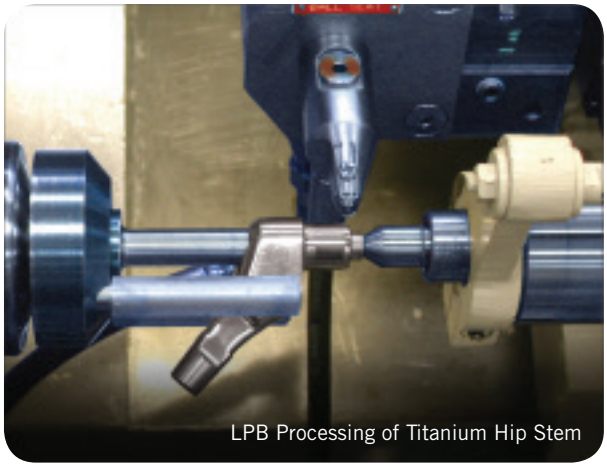
LAMBDA Technologies Group

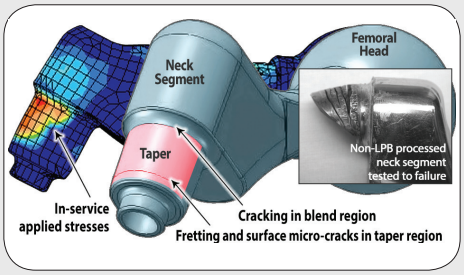
www.lambdatechs.com

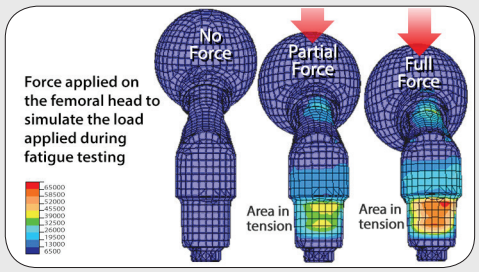
Improving Component Life and Performance

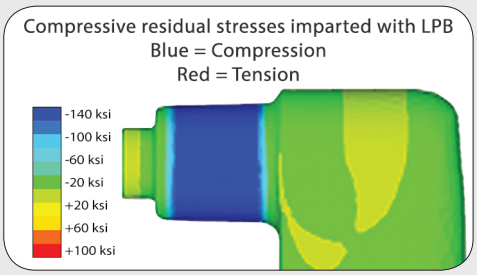
Modular Hip & Knee Prostheses

Over seven million United States citizens have regained their mobility because of hip or knee implant technology. However, the popular modular titanium prosthesis systems can be vulnerable to fretting fatigue in the edge-of-contact region of the tapered joint. Day-to-day activities of the patient can cause fretting from repeated metal-to-metal sliding contact. Shallow shear cracks may then form at the fretting boundary, leaving the implant vulnerable to fatigue fracture and, potentially, failure. In cases where failure does occur, follow up or "revision" surgeries are typically required, significantly affecting the quality of life of patients.

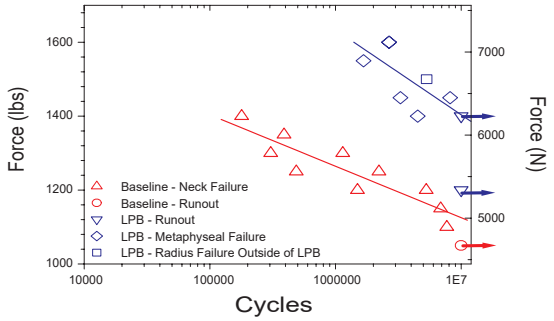




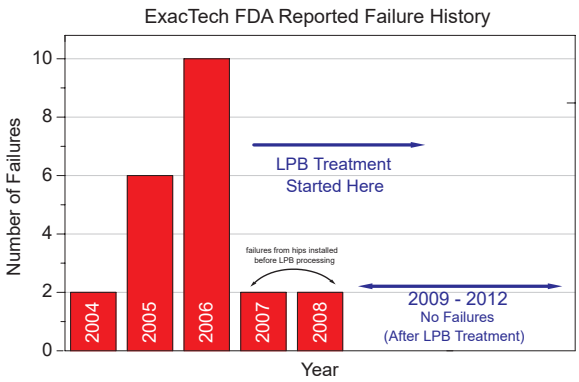




SOLUTION: LPB provides both the deep, stable residual compression sufficient to arrest fatigue cracks and the high quality surface finish needed for the tapered joints, all in a single operation on the same CNC lathes currently used in manufacturing. Coupon studies in several laboratories established that LPB treatment completely mitigates fretting damage and restores fatigue properties. An LPB process was developed for treating the tapered section of modular hip and knee stems. Fatigue testing of the modular prosthesis systems by original manufacturers showed that LPB treatment improved the baseline fatigue strength by nominally 40% and completely eliminated the occurrence of fretting induced failure.



IMPACT: In the US, the FDA has approved Lambda's LPB process for extending the life of modular prostheses. Over 1,000,000 hip and knee replacement surgeries are performed in the US each year. During the twelve-plus years that orthopedic surgeons have been using LPB treated hip implants, and approximately three years of LPB treated knee implants, no LPB processed implant has failed from fretting fatigue. The cost savings and improvement in the quality of life for patients is immeasurable. The ease of implementation of LPB into existing production environments in CNC mills or lathes has made it very cost-effective for the manufacturers.[1]



1 Application of Low Plasticity Burnishing (LPB) to Improve the Fatigue Performance of Ti-6Al-4V Femoral Hip Stems http://www.lambdatechs.com/documents/263.pdf

Lambda Technologies 3929 Virginia Avenue, Cincinnati, OH 45227 • Tel (513) 561-0883 • Toll Free/U.S. (800) 883-0851 • Fax (513) 322-7186