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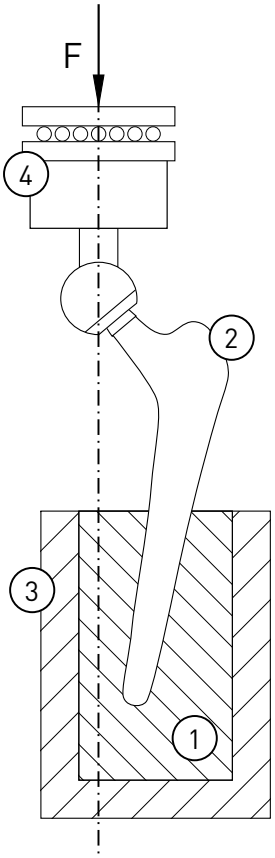
Application Note

ISO 7206-4 and -6 – Hip Stem Testing

Background

The endurance properties of stemmed femoral components of hip joint prostheses have to be mechanically tested during implant development and for market approval. This test can be performed according to ISO 7206-4 and -6, which specify test methods for determining the endurance properties under specified laboratory conditions.



Test Setup and Environment

Using a solid medium (1), the lower portion of the hip implant test specimen (2) is embedded into a sample holder (3). This approach poses a worst-case scenario, where the implant experiences proximal loosening of the implant-bone-interface. A cyclic, sinusoidal load (F) is applied to the head of the test specimen until the specimen exhibits failure or until the chosen number of cycles has been attained. Combining the load sensor with a side load bearing assures plain uni-axial forces along the desired load line (4). To add physiologic relevance, the test can be performed in a (heated) water bath immersing the specimen in saline solution or other appropriate lubricant. Load and displacement values (deflection of the test specimen) shall be recorded throughout the test.

Equipment

Fatigue testing according to ISO 7206-4 and -6 can be easily, reliably, and safely performed using the following equipment:

- **THELKIN Servo-Electric Load Frame** (e.g. SELmaxi-055) - This system is in accordance with ISO 4965[1] and allows for easy and safe sample setup, profile and data acquisition programming, and test execution.
- **Hip Test Specimen Holder** - helps the quick and precise mounting of the test sample when used together with the optionally available **Sample Potting Fixture**.
- **Fluid Bath** – implements the environmental simulation. Bath temperature can be controlled up to 50°C using the external temperature controller or connecting the heating plate directly to the THELKIN controller and user interface software.

The system can be optionally equipped with an **Uninterrupted Power Supply** that is connected to the THELKIN testing software. This setup allows for continuous testing in case of a power outage and for test stop and shut down in a controlled manner to protect the sample.

[1] ISO 4965: ISO 4965-1 Metallic materials - Dynamic force calibration for uniaxial fatigue testing - Part 1: Testing system.

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