Knee Wear Simulator (Independent Stations)
Overview

The mobility of the knee joint presents significant problems for effective and rigorous in-vivo testing. Working together with Biomet , the Prosim Knee Wear Simulator (Independent Stations) was designed and developed to give full force and displacement control for individual stations, to enable each one to be run autonomously. The key objectives when developing the simulator can be summarised as follows:

- Design and build a simulator that fully meets the requirements of both ISO 14243-1 (2009) and ISO 14243-3 (2004)
- Capable of going well beyond existing ISO requirements for adverse wear testing
- Each station fully independent and capable of running its own demand waveforms
- Capable of replicating deep knee bending
- Incorporating soft tissue virtual springs

The Prosim Knee Wear Simulator (Independent Stations) is a multi-station machine designed for the reliable and repeatable testing of knee implants, providing designers and developers of replacement knee joints with a cost-effective and accurate means of generating wear and friction data under realistic in-vivo simulated conditions.

All axes of the Prosim Knee Wear Simulator (Independent Stations) are electromechanically driven, using a combination of motors, drives and gear boxes. This enables the simulator very closely follow any demand waveform however demanding it may be.

Empirical data generated by our simulators over the last ten years supports the assertion that the patterns of wear of knee implants tested in Prosim Knee Wear Simulators accurately mirrors that of the wear of implants extracted from humans after years of use.

A three-station independently controlled knee wear simulator with a close-up of a soak station

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Overview

The Prosim Knee Wear Simulator (Independent Stations) includes numerous features and benefits:

- Up to six knee implants can be tested simultaneously
- Five independent axes of articulation for each station
- Single load axis per station
- Each station equipped with a six axis loadcell
- Load soak incorporated into each station
- Simple user programmability of any articulation/load cycle
- Operating frequency of motions programmable up to 2.0 Hz
- Capable of running programmed sequences of walking, jogging, running and periods of rest
- Test fluid temperature is maintained at 37°C ±2°C
- Axial loading of up to 5kN per station

- Up to +/-90 degrees of programmable motion on the flexion extension axis
- Up to +/-15mm of programmable anterior-posterior translation
- Up to +/- 30° of programmable motion on the tibial rotation axis
- Up to +/-10° of prgrammable motion on adduction/abduction axis
- Up to +/-10mm of medial/lateral translation
- Able to run both force and displacement control
- Can incorporate deep flexion bending
- Easy to use Windows operator screen
- Real-time logging of position and load allows instant verification of test cycle
- Clinically and physiologically representative testing

Prosim is able to offer customisation of its simulators to meet client's specific testing requirements, including additional stations and different configurations (i.e single bank of six stations, two banks of three stations, etc).

Axial force is controlled using a servo-motor driven eccentric cam.