



# The Prosim Universal Joint Simulator: Machine Specification

The **Prosim Universal Joint Simulator** pushes the mechanical envelope of adverse wear testing of biomechanical implants much further than it had gone before.

## The Six Axis Universal Joint Simulator meets the following apparatus requirements:

- **ISO 14242-1** – Implants for surgery – wear of total hip-joint prostheses – Part 1: loading and displacement parameters for wear-testing machines with load control and corresponding environmental conditions for test
- **ISO 14243-1** – Implants for surgery – wear of total knee-joint prostheses – Part 1: loading and displacement parameters for wear-testing machines with load control and corresponding environmental conditions for test
- **ISO 14243-3** – Implants for surgery – wear of total knee-joint prostheses – Part 3: loading and displacement parameters for wear-testing machines with displacement control and corresponding environmental conditions for test
- **ISO 14242-4** – Implants for surgery – wear of total hip-joint prostheses – Part 4: testing hip prostheses under variations in component positioning that results in direct edge loading
- **ISO 18192-1** – Implants for surgery – wear of total intervertebral spinal disc prostheses ('TDR' hereafter) – Part 1: loading and displacement parameters for wear-testing machines and corresponding environmental conditions for test (Lumbar Spine)
- **ISO 22622** – Implants Wear of total ankle-joint prostheses – Loading and displacement parameters for wear-testing machines with load or displacement control and corresponding environmental conditions for test
- **ISO 16436-1** – Implants for surgery – Wear of total shoulder-joint prostheses – Loading and displacement parameters for wear-testing machines and corresponding environmental conditions for test – Part 1: Anatomic total shoulder-joint prostheses
- **ISO 16436-2** – Implants for surgery – Wear of total shoulder-joint prostheses – Loading and displacement parameters for wear-testing machines and corresponding environmental conditions for test – Part 2: Reverse total shoulder-joint prostheses
- **ISO 7206-6** – Endurance properties of stemmed femoral components
- **ISO 14879-1** – Endurance of tibial trays
- **ISO 16402** – Flexural fatigue testing of acrylic resin cement
- **ASTM F2790** – Characterisation of motion preserving lumbar total facet prostheses
- **ASTM F2777-10** – Tibial insert endurance and deformation under high flexion
- **ASTM F2028** – Dynamic evaluation of glenoid loosening

## The Prosim Universal Joint Simulator includes numerous features and benefits:

- Can be used for the study of both cadaveric and non-cadaveric samples
- Six independent axes of articulation
- Equipped with a novel six-axis loadcell rated to 12kN that allows the mounting of a complete femoral stem
- Simple user programmability of any articulation/load cycle
- Operating frequency of motions programmable up to 0.01 Hz to 2.5 Hz
- Capable of running programmed sequences of walking, jogging, running and periods of rest
- Peak axial loading of up to 11kN
- Up to  $+40^{\circ}/-120^{\circ}$  of programmable motion on the flexion-extension axis
- Up to  $\pm 25$ mm of programmable medial-lateral translation applying up to 1.5kN force
- Up to  $\pm 25$ mm of programmable anterior-posterior translation applying up to 1.5kN force
- Up to  $\pm 40^{\circ}$  of programmable motion on the axial rotation axis
- Up to  $\pm 40^{\circ}$  of programmable motion on the adduction/abduction axis
- Able to adjust acetabular cup angulation from  $+30^{\circ}$  to  $+65^{\circ}$  in situ
- Able to adjust retroversion-anteversion angulation from  $\pm 35^{\circ}$  in situ
- Able to adjust tibial tray declination from  $0^{\circ}$  to  $-15^{\circ}$  in situ
- Able to run both force and displacement control of all axes
- Test fluid temperature is maintained at  $37^{\circ}\text{C} \pm 2^{\circ}\text{C}$
- Clinically and physiologically representative testing