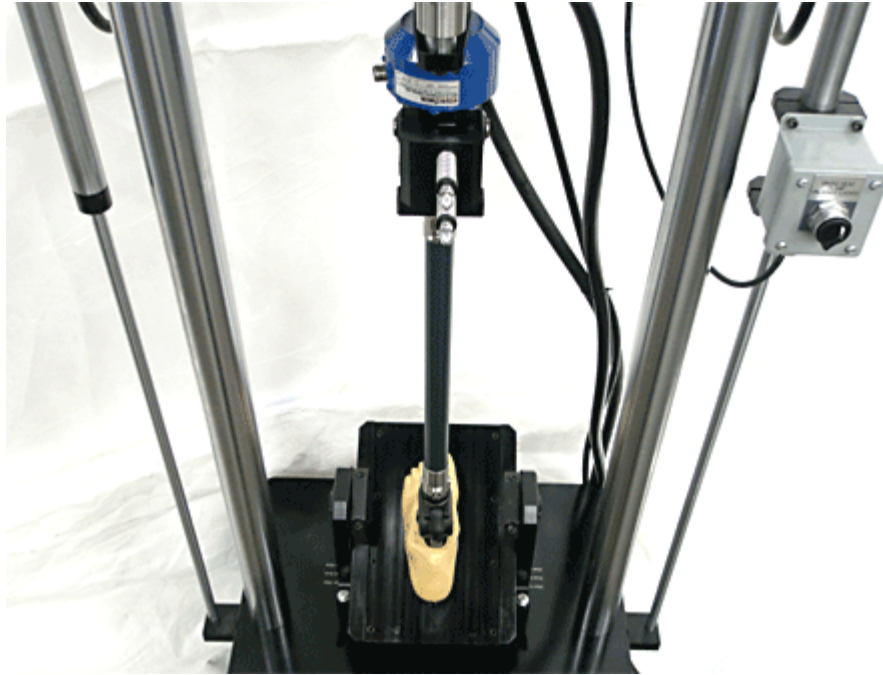


Ankle-Foot Prosthesis Simulator



The Shore Western Ankle-Foot simulator is a new line of simulator in our biomedical systems portfolio running in accordance with ISO/DIS 22675. Recent data from the Amputee Coalition of America puts approx. 2 million people with some sort of limb loss within the USA (not including toes or fingers), combined with growth of new amputations performed annually at 185,000 - performance investigation, design assessment and simulations of these prosthetics is evolving and growing rapidly. The Shore Western Ankle-Foot Prosthesis Simulator was designed to accomplish the growing demand that manufacturers of these devices demand.

The two axis ankle-foot simulator using servo hydraulic power runs under closed loop control feedback implementing displacement control for the angular movement of the tilting platform and load limited displacement control for the axial load. Load limited displacement control is a powerful control logic that enables dynamic load scenarios to run under the safe and stable control of a displacement environment while maintaining the programmed load level. Axial loads are available up to 6.8kN (1.5kip) supporting testing to the P6 level. Tilting platform can produce 700Nm (6,000inlbs) of torque and has a total range of motion

(ROM) of 60° (-20° to +40°). The tilting platform has changeable heel blocks to preserve the optimum heel height and the specimen holder has adjustable spring rates to return the foot to home after toe-off, its anterior to posterior slope is adjustable $\pm 5^\circ$ from the transverse plane. Test cycle speeds of 1.6Hz are achievable and can run 24 hours a day seven days a week with load/rotation and specimen failure detection shutdown.



SPECIFICATIONS

Single station ankle-foot simulator.

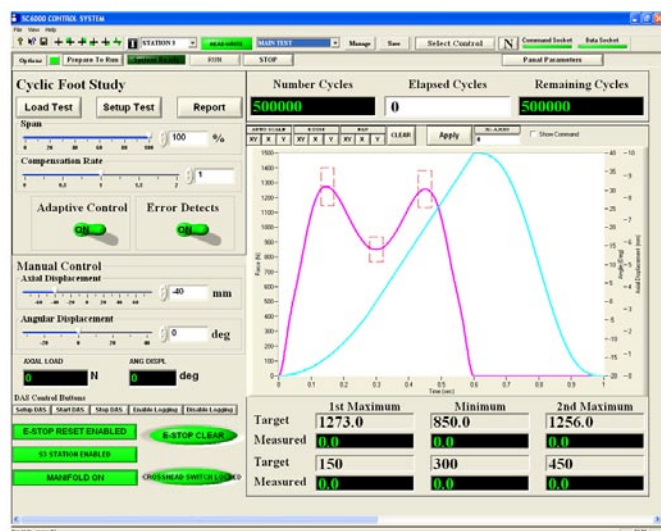
- **Two Axes** – Two channel ankle-knee simulator orientated in one axial load and second controlling a tilting foot platform; each channel individually controlled.
- **Actuator Axes** – Two separate actuator axes using servo hydraulic power under closed loop control feedback in displacement (tilting platform) and load limited displacement (axial load).
- **Axial load** – Axial load (Fz) up to 6800N (1500lb), to support loading levels up to P6 with 152mm (6”) of axial travel.
- **Fatigue rated** – up to 9.8kN (2.2kip).
- **Tilting foot platform** – Capable of producing 700Nm (6,000inlb) of torque, with a total range of motion (ROM) -20° to +40° from horizontal home position and lockable for static load testing at +20° and -15°.
- **Adjustable heel block** – Changeable heel blocks to preserve optimum heel height.
- **Specimen holder** – Adjustable spring rate controlled holder for return of foot to home position after toe-off combined with an adjustable anterior to posterior slope of ±5° from the transverse plane.
- **Speed** – Up to 1.6Hz cycle speed, computer adjusted.
- **Access** – Open load frame allows ease of sample assembly/disassembly.
- **Compact Footprint** – Approx. footprint 610mm (24”) long X 735mm (30”) wide X 2515mm (99”) high.
- **24/7** – Continuous 24 hour operation seven days a week with load/rotation and specimen failure detection shutdown.
- **Independent Control** – Each actuator can be independently controlled under manual mode outside its normal automatic operation

CONTROL SYSTEM

The Ankle-Foot Prosthesis Simulator controller system is based on Shore Western’s new SC6000 platform running in a Windows XP environment. Running in accordance with ISO/DIS 22675 specification the controller operates in displacement and load control using Shore Western’s Mixed Input-Real Time Adaptive Control (MI-RTAC) algorithm. The MI-RTAC algorithm compensates for cumbersome servo-hydraulic tuning while monitoring and correcting via a point-by-point basis amplitude and phase of the control waveform(s). The load control MI-RTAC takes advantage of load limited displacement control which enables dynamic load scenarios to run under the safe and stable control of a displacement environment while maintaining the control waveform levels. The controller monitors user definable peak and valley error detects combined with gait synchronization across all channels to the control waveform.

OPTIONS

- **Protective Lexan Shields** Transparent cover from the length of the tilting foot platform to maximum height of load frame, obstructing ruptured material.
- **Calibration fixture** A single axis calibration cell is used to calibrate the Fz load to full scale.



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