

Appendix

Accuracy

The accuracy of the Opti_Knee system to allocate points in 3D spaces was within 0.3 mm of the root mean square (RMS) in the overall measurement volume, as reported by the stereo infrared stereoscopic camera¹². This is based on a single marker that was stepped through more than 900 positions throughout the measurement volume, using the mean of 30 samples at each position at 20°C. The accuracy of the system was further confirmed by a peer-reviewed paper¹³, which demonstrated a measurement error of 0.17 ± 0.09 mm.

Repeatability

Validation tests were performed at the national authorized third-party biomechanical laboratory at Shanghai Jiaotong University. The repeatability of the Opti_Knee system, as affected by skin motion and at different rigid body attachment locations, was assessed. Ten markers were attached to the thigh and the lower leg for treadmill gait tests (5 for the femur and 5 for the tibia); 4 of the 5 markers were selected to represent a standard 4-point marker set. A total of 25 (5×5) pairs of marker sets were generated for the same gait experiment, which accounted for errors from skin motion and different marker attachment locations. Standard deviation was calculated for all 6 DOF with the use of knee motion curves to demonstrate the repeatability of the system. The repeatability was within 1.3 mm in translation and 0.9° in rotation (**Fig. E-1**). The results were included in a previously published article¹⁴.

Fig. E-1

Repeatability test in 6 DOF in a gait cycle with use of the Opti_Knee system.

