Development of A Dynamic Assembly Calibration Test Procedure for Flex-GTR using an FE Flex-GT-prototype model

Computer Simulation Analysis
Conditions of the Computer Simulation Analysis
Stopper angle: 5 deg, 7 deg., 10 deg., 12 deg.
Type A-2-PAD5-5 (5deg.)

Mount pivot at tibia
Revolutional Joint
(One degree of freedom)

Pad
(Neoplane & Rubber30)

Stopper (rigid)

Fixed

Initial angular velocity
6.44 rad/s

Additional weight: 5 kg

0 30 60 90 120 150
Time (ms)

SimFemur-1ave
SimFemur-2ave
SimFemur-3ave
SimTibia-1ave
SimTibia-2ave
SimTibia-3ave
SimTibia-4ave

Elongation (mm)
ACL  PCL  MCL

-100 0 100
Moment
(Nm)
-100 0 100
-100 0

SimFemur-ave
SimTibia-ave

-100 0 100 200
Moment
(Nm)
Type A-2-PAD5-5 (5deg.)

0 ms 10 ms 20 ms 30 ms 40 ms 50 ms 60 ms 70 ms 80 ms 90 ms 100 ms 110 ms 120 ms 130 ms 140 ms 150 ms

80 ms

13 ms

No Contact

Femur side of Knee
Type A-2-PAD5-6 (7deg.)

Mount pivot at tibia
Revolutional Joint
(One degree of freedom)

Pad
(Neoplane & Rubber30)
Stopper (rigid)
Fixed

Initial angular velocity
6.44 rad/s

Additional weight: 5 kg

30 mm
7 deg

5 deg
Type A-2-PAD5-6 (7deg.)

0 ms 10 ms 20 ms 30 ms 40 ms 50 ms 60 ms 70 ms
80 ms 90 ms 100 ms 110 ms 120 ms 130 ms 140 ms 150 ms

Pad
Femur side of Knee
No Contact

13ms

80 ms

Stress pressure (Pa)

No Contact
Femur side of Knee
Type A-2-PAD5-7 (10deg.)

Mount pivot at tibia
Revolutional Joint (One degree of freedom)

Pad (Neoplane & Rubber30)
Stopper (rigid)
Fixed

Initial angular velocity 6.44 rad/s

Additional weight: 5 kg

Revolutional Joint

Initial angular velocity 6.44 rad/s

Additional weight: 5 kg

Mount pivot at tibia
Type A-2-PAD5-7 (10 deg.)

No Contact
Femur side of Knee

Pad

No Contact
Femur side of Knee

80 ms
Type A-2-PAD5-8 (12 deg.)

- Mount pivot at tibia
- Revolutionary Joint (One degree of freedom)

Pad (Neoplane & Rubber30)
Stopper (rigid)
Fixed

- Initial angular velocity 6.44 rad/s
- Additional weight: 5 kg

Revolutional Joint

 glorinated Joint

ACL PCL MCL

Knee-ACL Knee-PCL Knee-MCL

Moment MAX. (Nm)

- Femur-3 Femur-2 Femur-1 Tibia-1 Tibia-2 Tibia-3 Tibia-4

Knee-ACL Knee-PCL Knee-MCL

Ligament elongation MAX. (mm)

- 5 deg

- 12 deg
JAMA-JARI recommendation