

Flex-GTR-prototype Evaluation Test Results

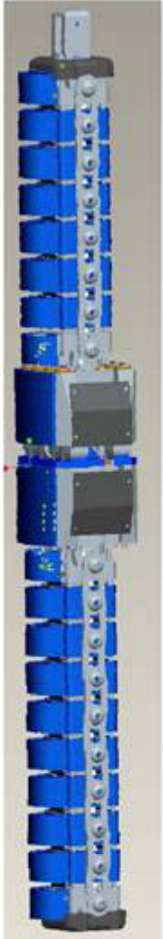
Reproducibility & Repeatability of Flex-GTR-prototype,
and Comparisons of Flex-GTR-prototype and Flex-GT

**Collaboration Test Report from J-MLIT, JAMA, and JARI
(Preliminary Report)**

Materials

Impactors

Flex-GTR-prototype (SN01, SN02, SN03)



Measurement items: 12ch

Femur-1: Bending Moment (Nm)
Femur-2: Bending Moment (Nm)
Femur-3: Bending Moment (Nm)

Knee-ACL: Elongation (mm)
Knee-PCL: Elongation (mm)
Knee-MCL: Elongation (mm)
Knee-LCL: Elongation (mm)
Knee-Acc: Acceleration (g)

Tibia-1: Bending Moment (Nm)
Tibia-2: Bending Moment (Nm)
Tibia-3: Bending Moment (Nm)
Tibia-4: Bending Moment (Nm)

Flex-GT (SN03)



Measurement items: 10ch

Femur-1: Bending Moment (Nm)
Femur-2: Bending Moment (Nm)
Femur-3: Bending Moment (Nm)

Knee-ACL: Elongation (mm)
Knee-PCL: Elongation (mm)
Knee-MCL: Elongation (mm)

Tibia-1: Bending Moment (Nm)
Tibia-2: Bending Moment (Nm)
Tibia-3: Bending Moment (Nm)
Tibia-4: Bending Moment (Nm)

Impactors, contd.

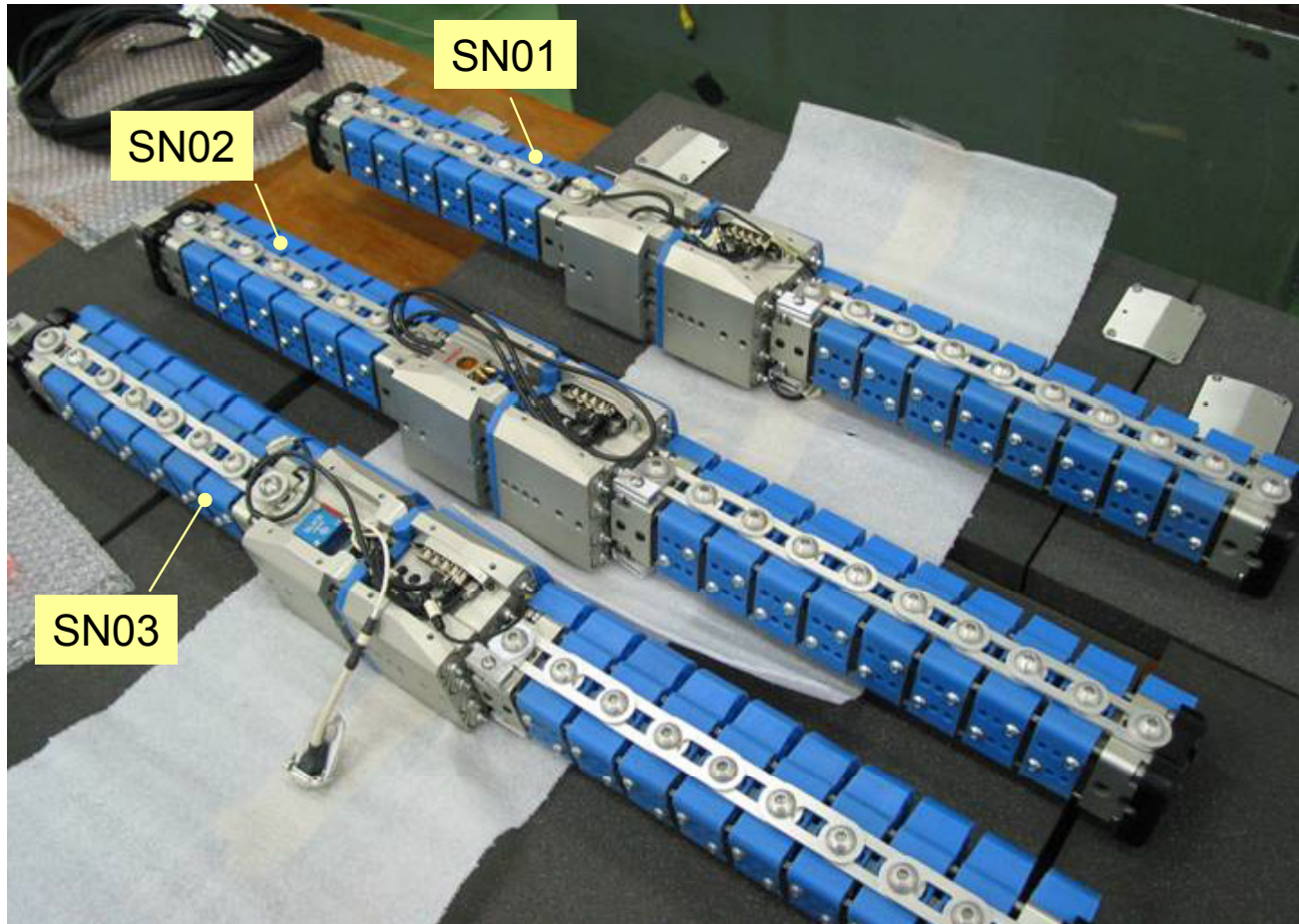
Flex-GTR-prototype (SN01, SN02, SN03)

Measurement systems

SN01: Off-board DAS

SN02: Can select On-board DAS (M=BUS) or Off-board DAS

SN03: Can select On-board DAS (Slice) or Off-board DAS



Flex-GT (SN03)

Measurement systems

Off-board DAS



Test Rigs

Dynamic Assembly Calibration Test Rigs

Flex-GTR-prototype Test Rig



Flex-GT Test Rig



Test Rigs, contd.

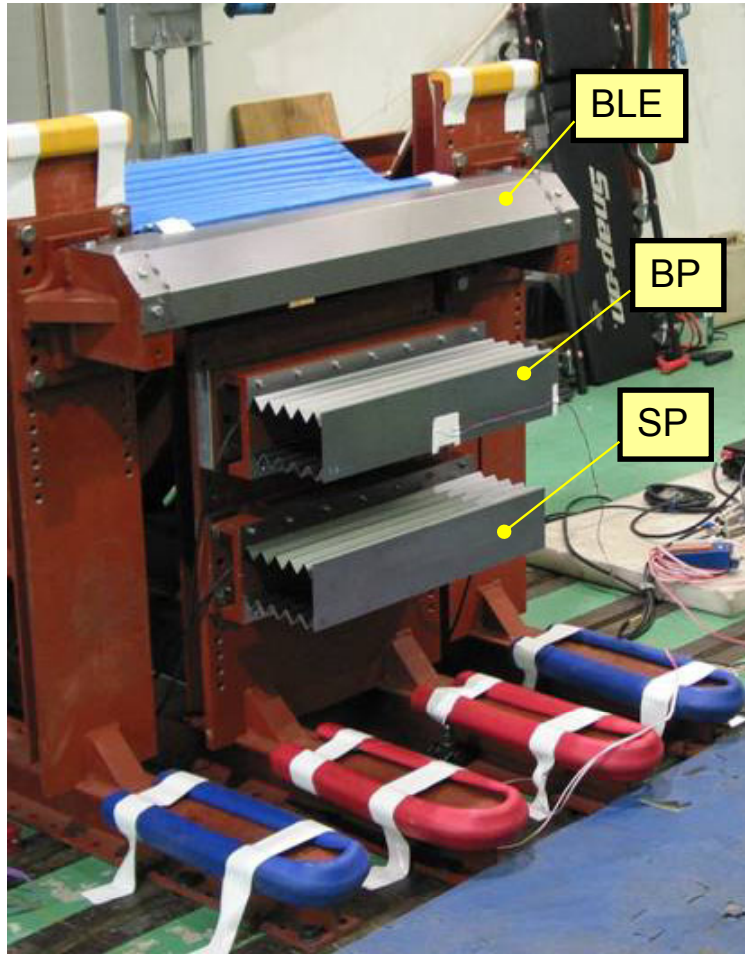
Dynamic Assembly Calibration Test Rigs

Modified Flex-GT Test Rig
(to conduct Flex-GTR dynamic assembly calibration test)



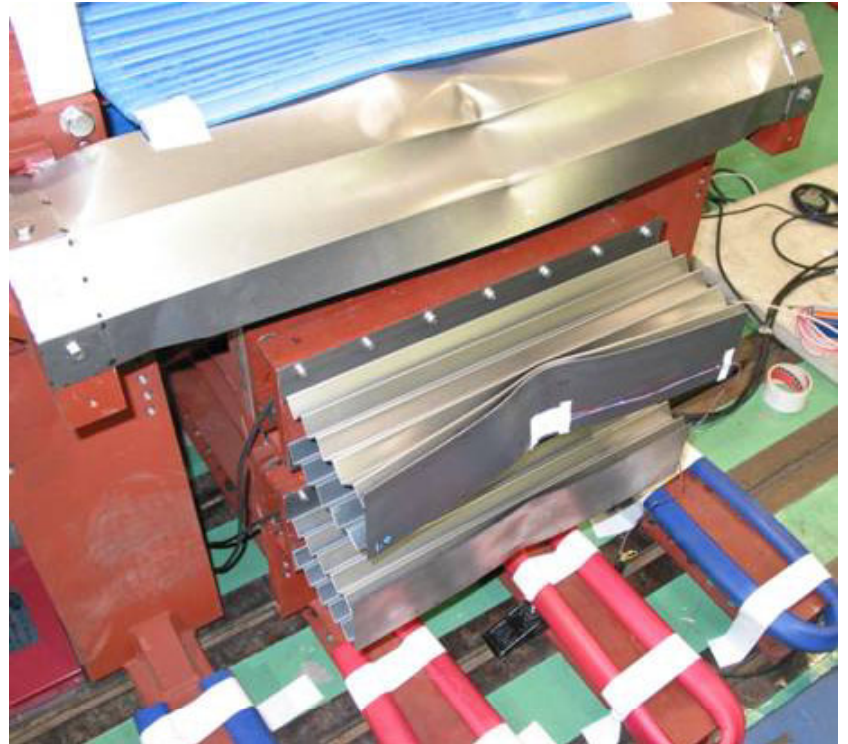
Simplified Car (Photo)

Overview



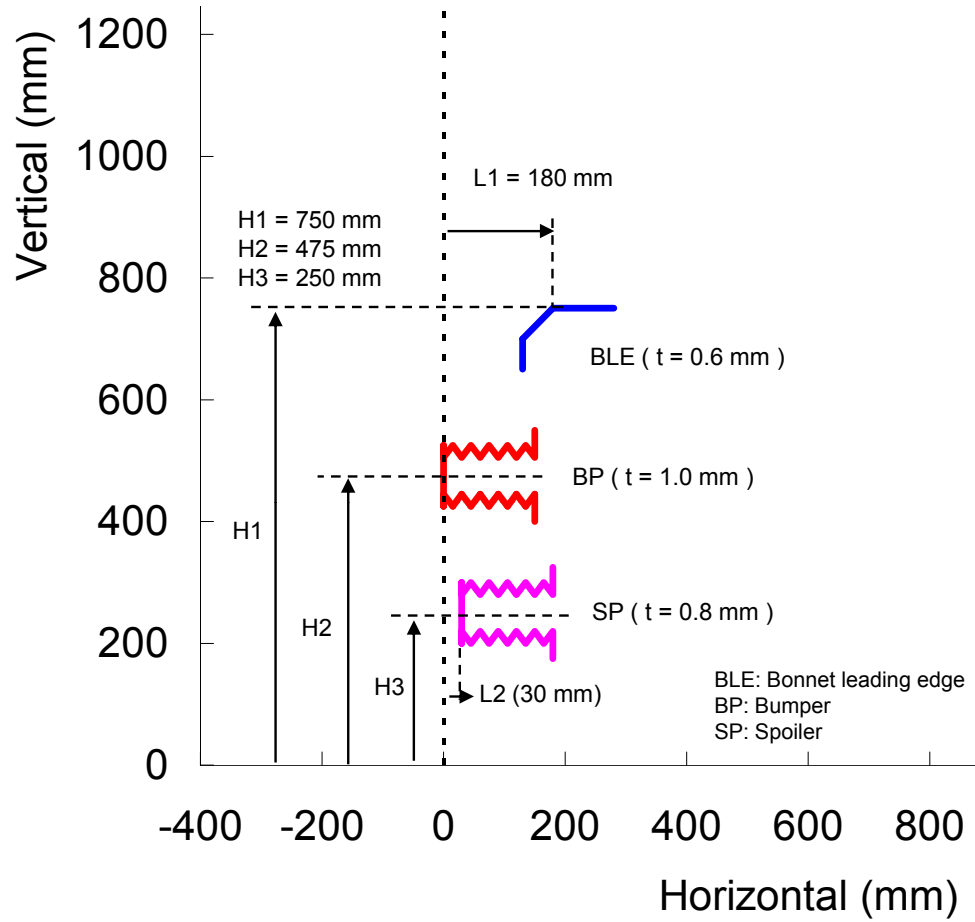
BLE: Bonnet leading edge
BP: Bumper
SP: Spoiler

After the test



New lot of the BLE, BP,
and SP are used
(different from the TEG-
045 ones)

Simplified Car (Dimensions)



Dimensions are same with the TEG-045. However, different lot of the BLE, BP, and SP are used (New lot).

Test Matrix

Test Matrix

Dynamic Assembly Certification Test Series

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Flex-GTR-prototype Test Rig	√	√	√	
Flex-GT Test Rig	√	√	√	√
Modified Flex-GT Test Rig		√		

1. Reproducibility Check
(Flex-GTR-prototypes)

2. Comparability Check
(Flex-GTR-prototypes and Flex-GT)

3. Comparability Check
(Flex-GTR-prototype Test Rig and Modified Flex-GT Test Rig)

Simplified Car Test Series

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Simplified Car	√	√	√	√

3. Comparability Check
(Flex-GTR-prototypes and Flex-GT)

2. Repeatability Check
(Flex-GTR-prototypes)

1. Reproducibility Check
(Flex-GTR-prototypes)

Test Results

Dynamic Assembly Certification Test Series

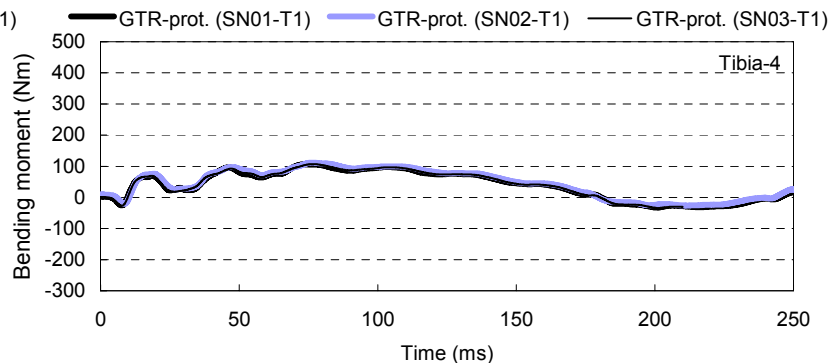
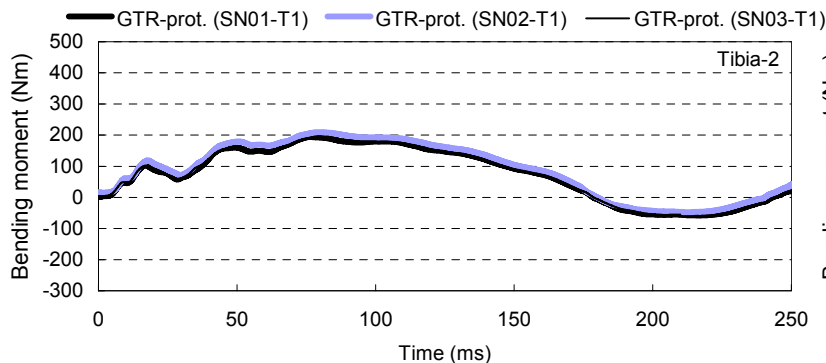
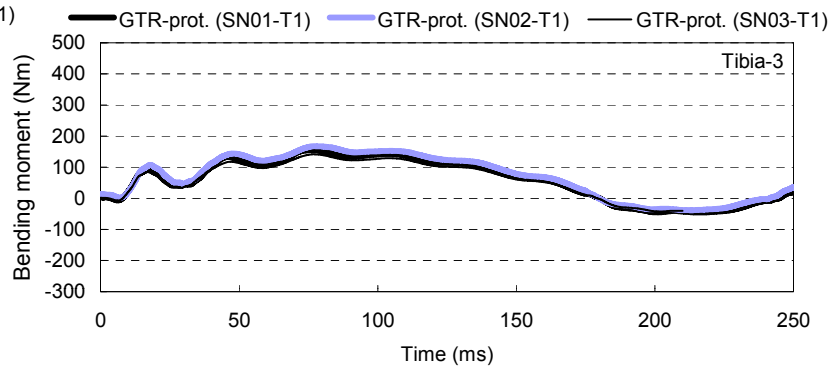
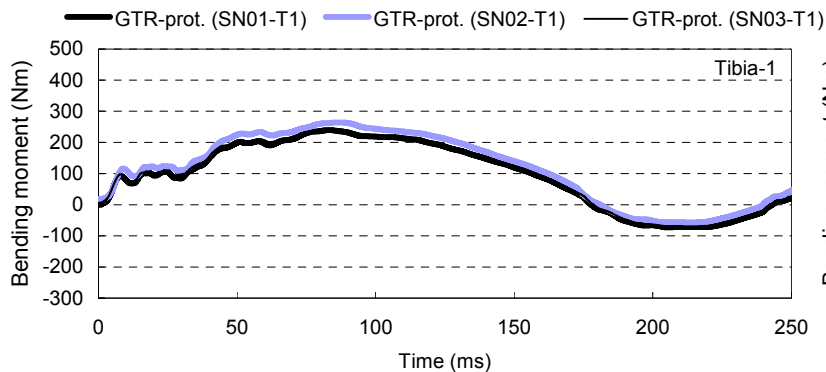
1. Reproducibility Check

(Flex-GTR-prototypes)

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

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Flex-GTR-prototype Test Rig	√	√	√	
Flex-GT Test Rig	√	√	√	√
Modified Flex-GT Test Rig		√		

Filter: CFC180



Dynamic Assembly Certification Test Series

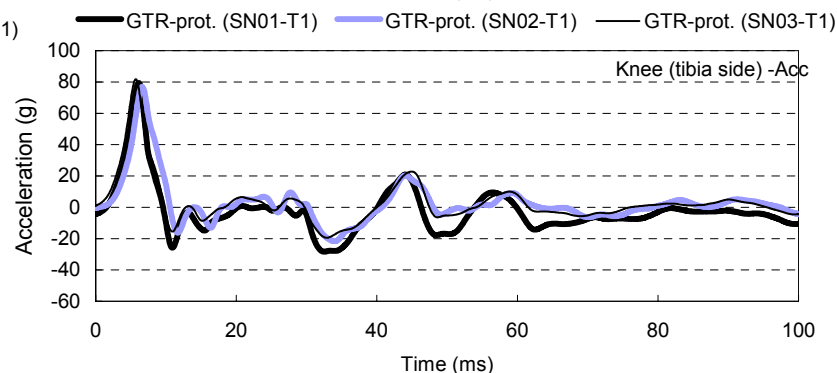
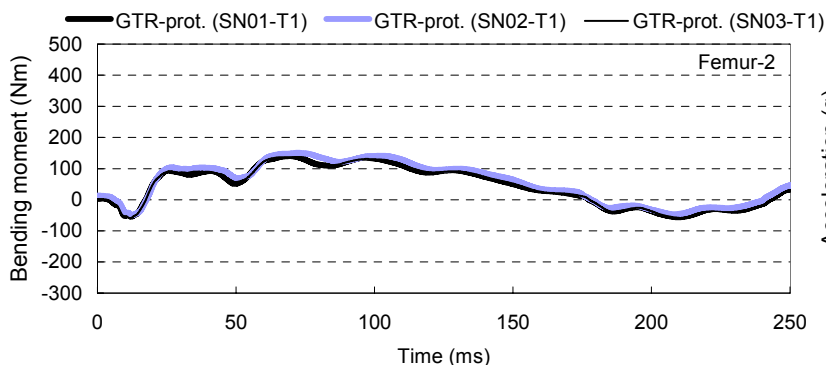
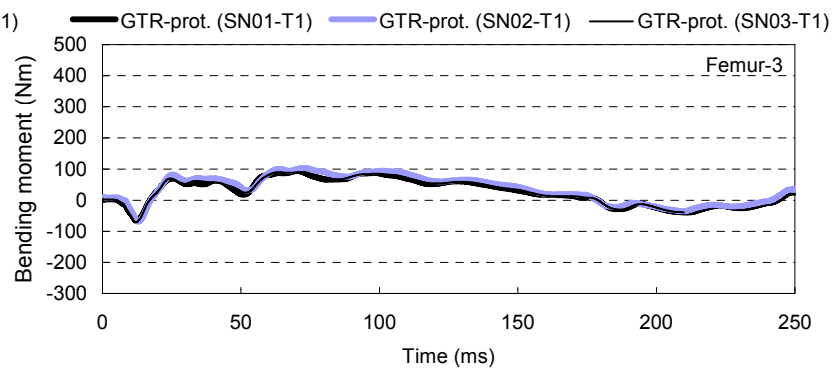
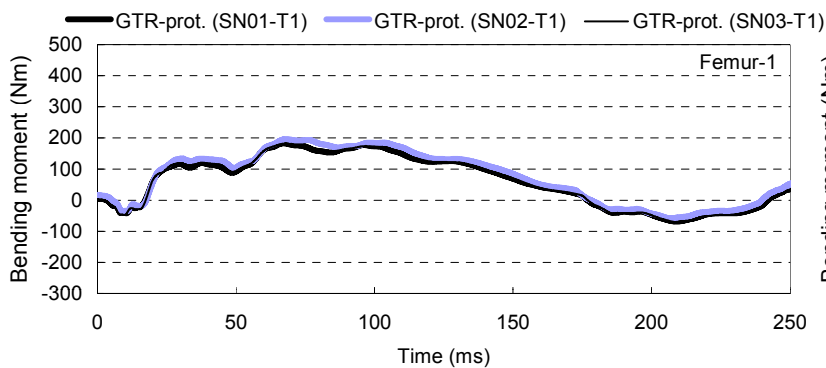
1. Reproducibility Check

(Flex-GTR-prototypes)

- Femur-1
- Femur-2
- Femur-3
- Knee (tibia side) – Acc.

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Flex-GTR-prototype Test Rig	√	√	√	
Flex-GT Test Rig	√	√	√	√
Modified Flex-GT Test Rig		√		

Filter: CFC180



Dynamic Assembly Certification Test Series

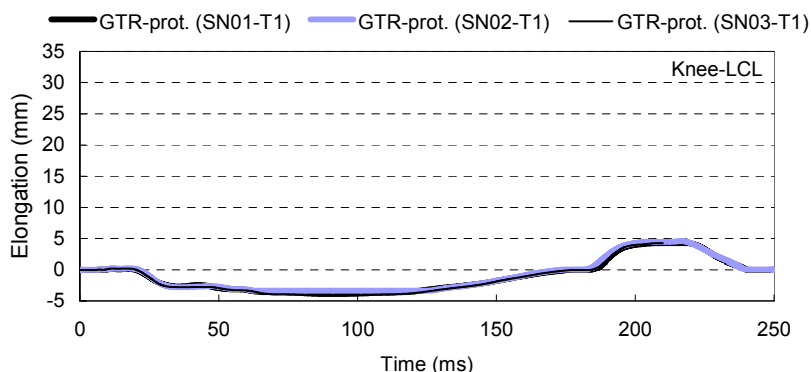
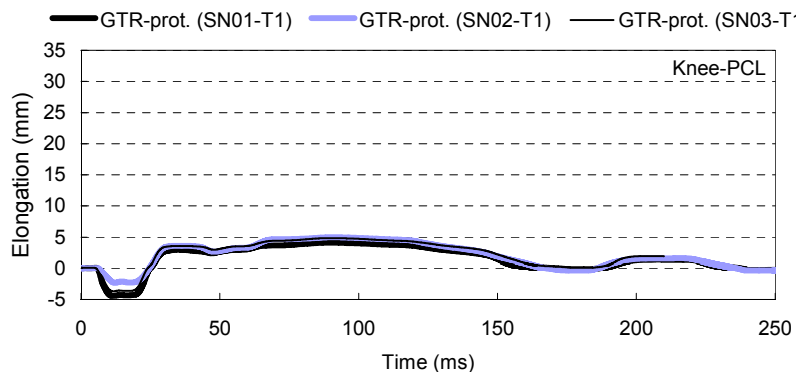
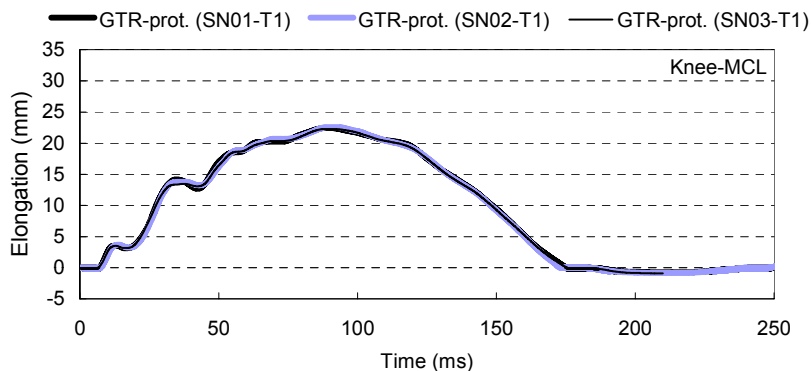
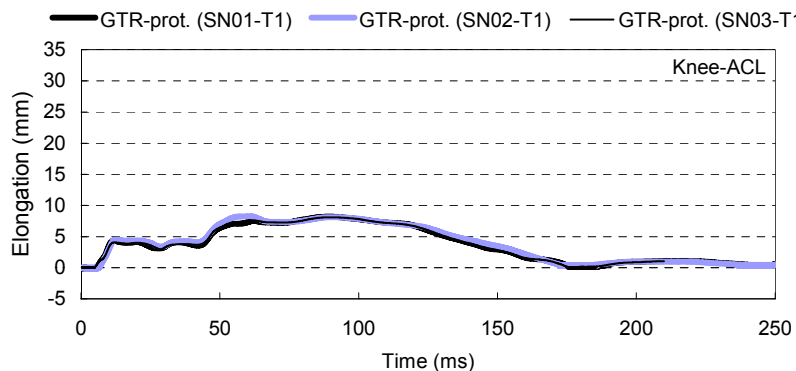
1. Reproducibility Check

(Flex-GTR-prototypes)

- Knee- ACL
- Knee-PCL
- Knee-MCL
- Knee-LCL

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Flex-GTR-prototype Test Rig	√	√	√	
Flex-GT Test Rig	√	√	√	√
Modified Flex-GT Test Rig		√		

Filter: CFC180



Dynamic Assembly Certification Test Series

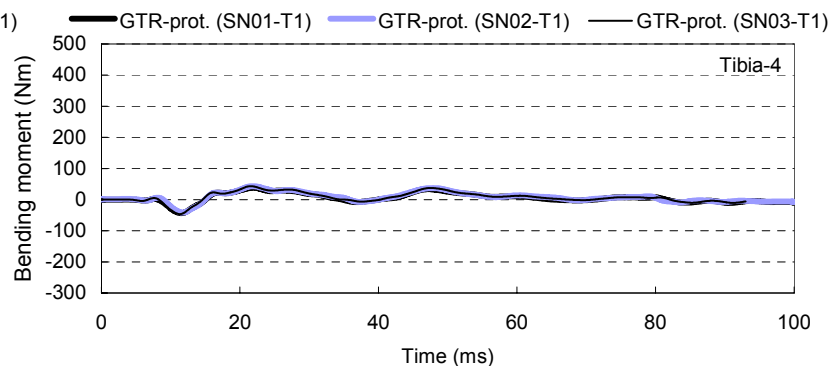
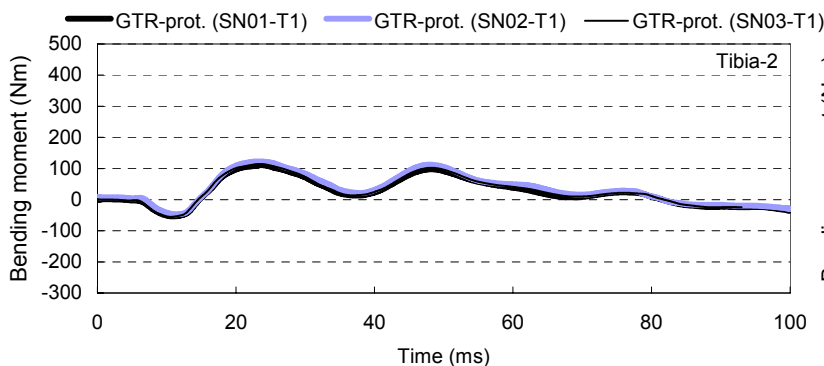
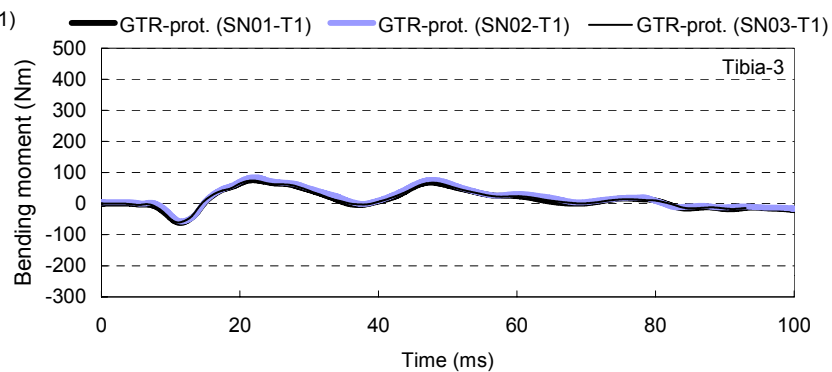
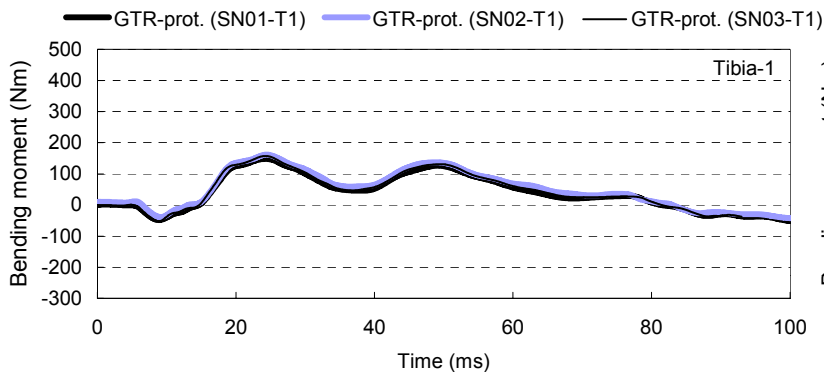
1. Reproducibility Check

(Flex-GTR-prototypes)

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

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Flex-GTR-prototype Test Rig	√	√	√	
Flex-GT Test Rig	√	√	√	√
Modified Flex-GT Test Rig		√		

Filter: CFC180



Dynamic Assembly Certification Test Series

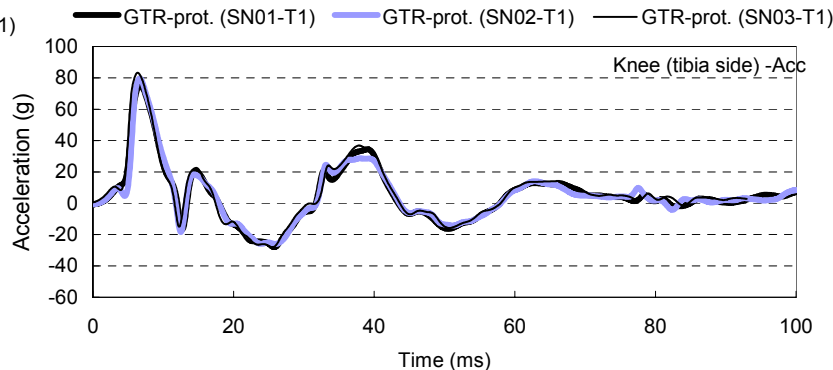
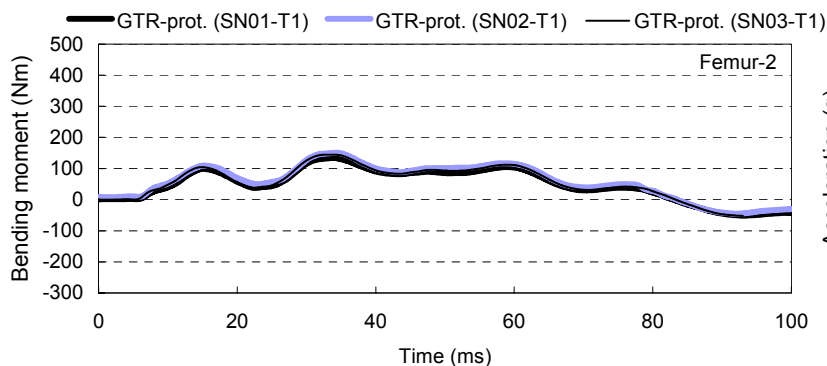
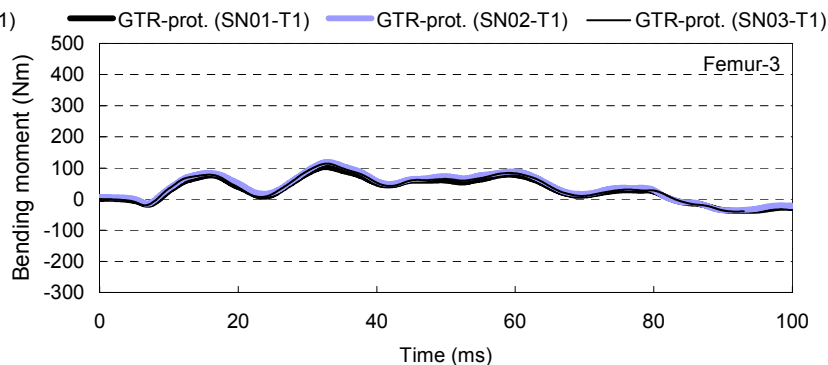
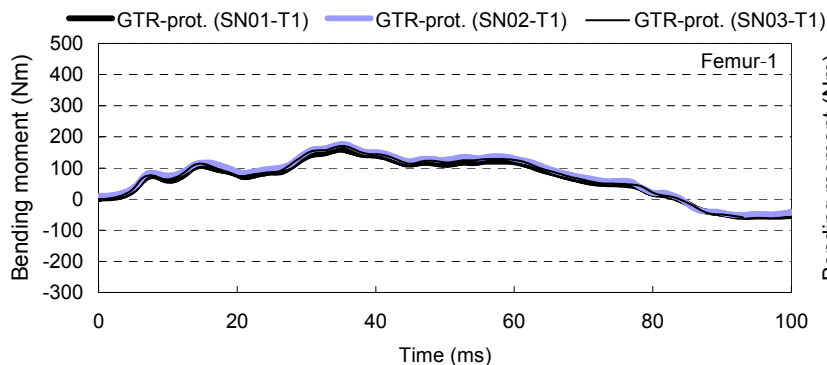
1. Reproducibility Check

(Flex-GTR-prototypes)

- Femur-1
- Femur-2
- Femur-3
- Knee (tibia side) – Acc.

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Flex-GTR-prototype Test Rig	√	√	√	
Flex-GT Test Rig	√	√	√	√
Modified Flex-GT Test Rig		√		

Filter: CFC180



Dynamic Assembly Certification Test Series

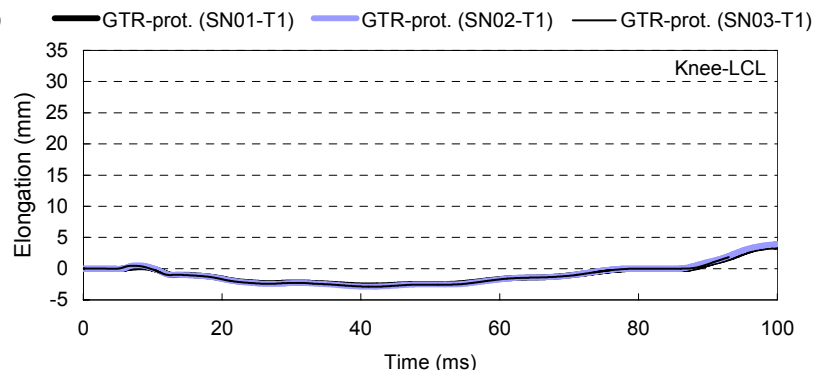
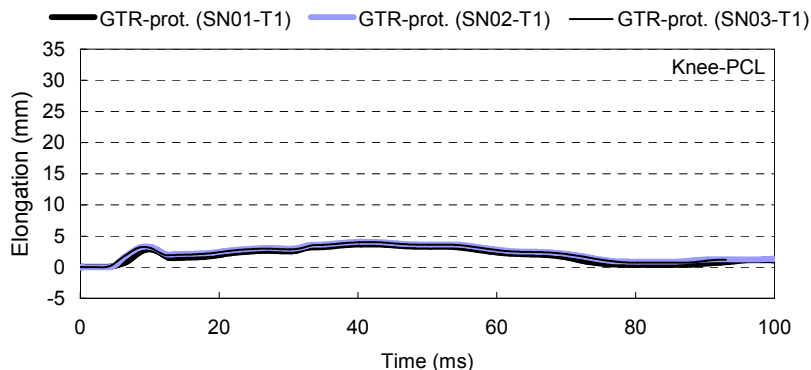
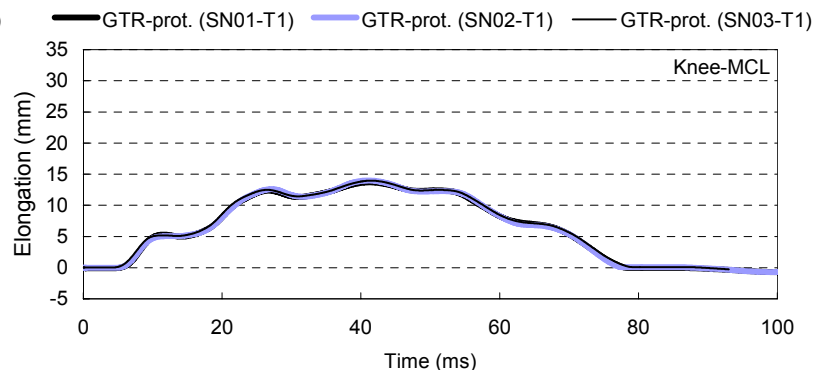
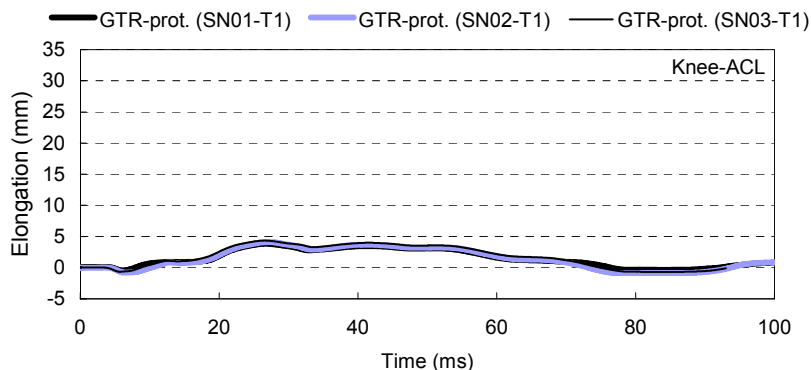
1. Reproducibility Check

(Flex-GTR-prototypes)

- Knee- ACL
- Knee-PCL
- Knee-MCL
- Knee-LCL

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Flex-GTR-prototype Test Rig	√	√	√	
Flex-GT Test Rig	√	√	√	√
Modified Flex-GT Test Rig		√		

Filter: CFC180



Dynamic Assembly Certification Test Series

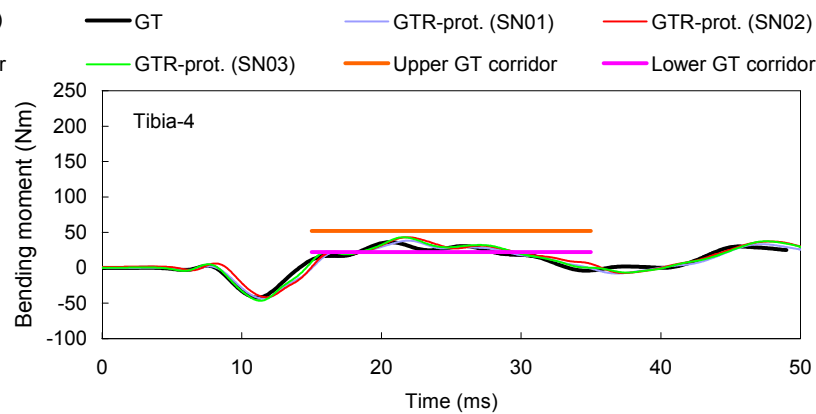
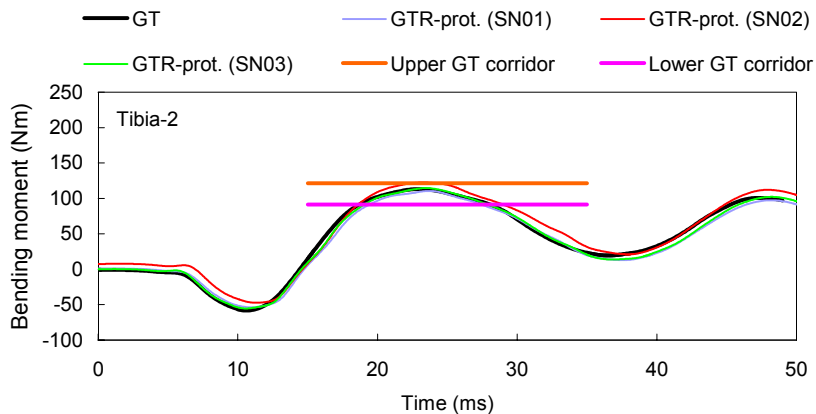
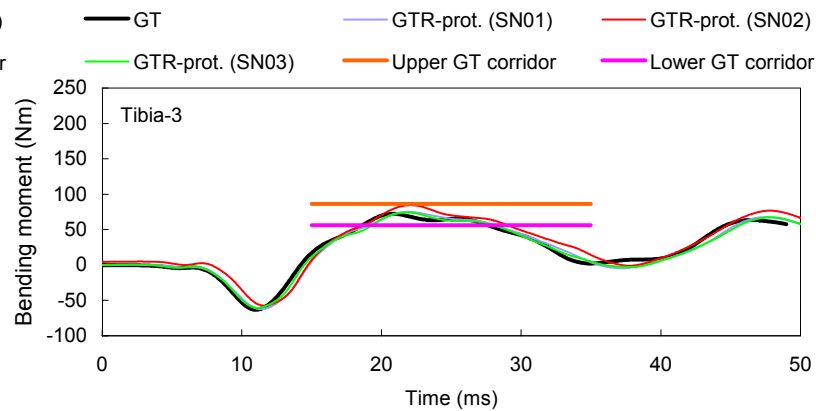
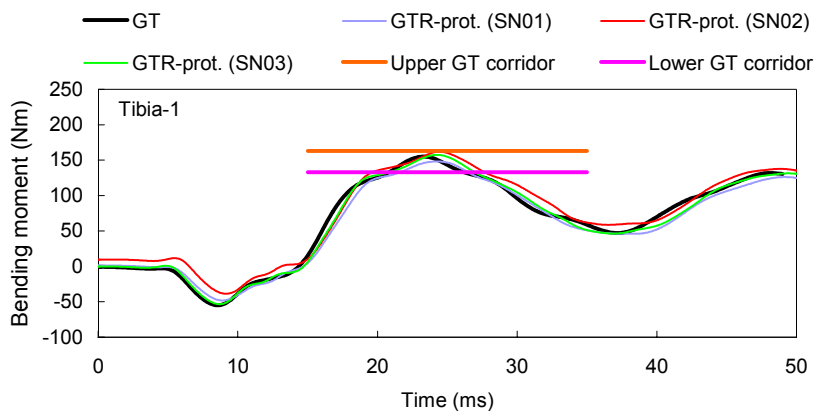
2. Comparability Check

(Flex-GTR-prototypes and Flex-GT)

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

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Flex-GTR-prototype Test Rig	✓	✓	✓	
Flex-GT Test Rig	✓	✓	•	•
Modified Flex-GT Test Rig		✓		

Filter: CFC180



Dynamic Assembly Certification Test Series

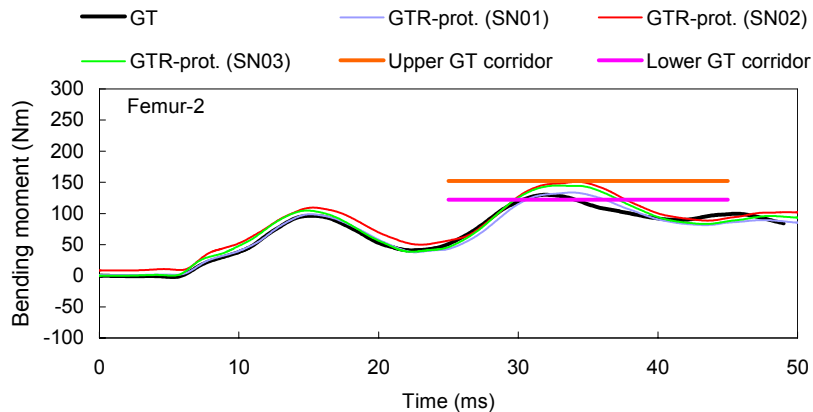
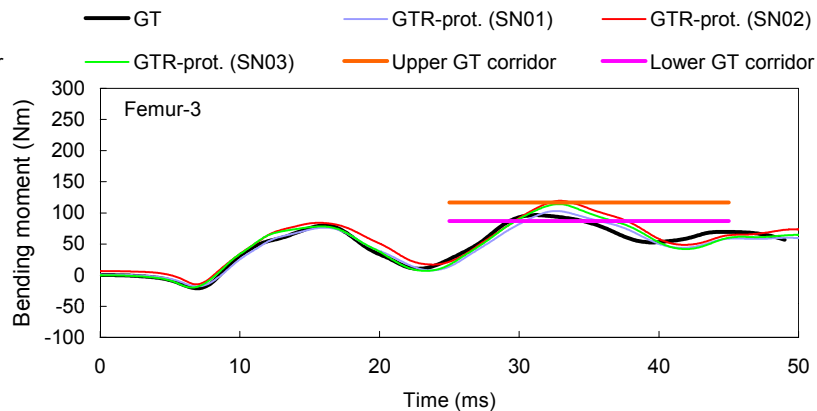
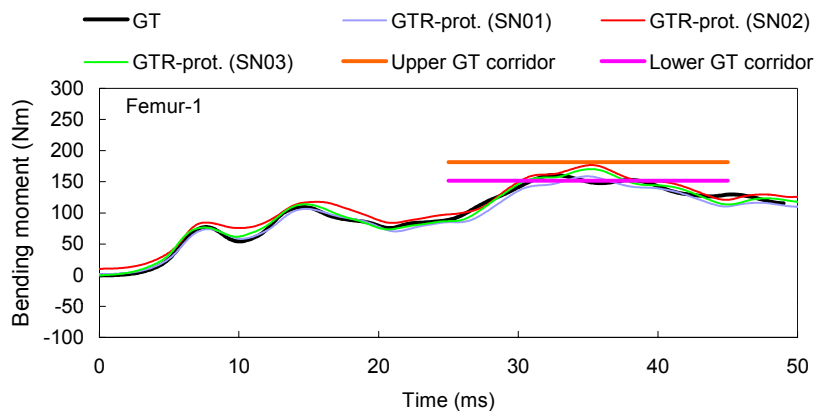
2. Comparability Check

(Flex-GTR-prototypes and Flex-GT)

- Femur-1
- Femur-2
- Femur-3

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Flex-GTR-prototype Test Rig	✓	✓	✓	
Flex-GT Test Rig	✓	✓	✓	✓
Modified Flex-GT Test Rig		✓		

Filter: CFC180



Dynamic Assembly Certification Test Series

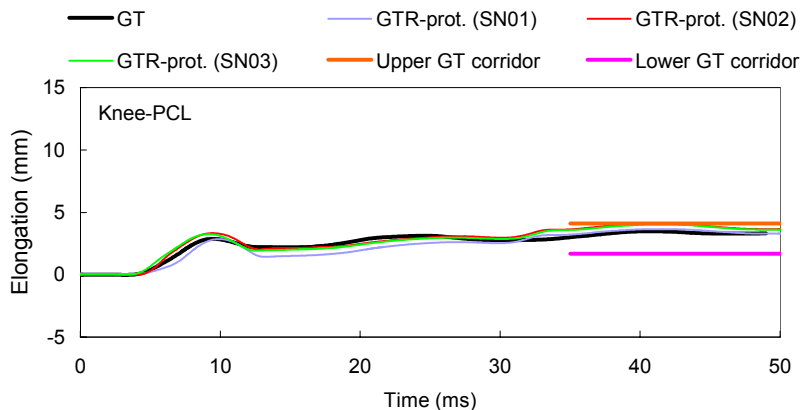
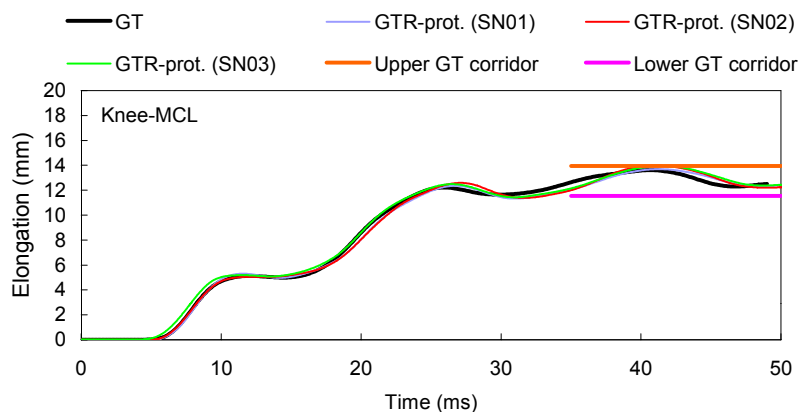
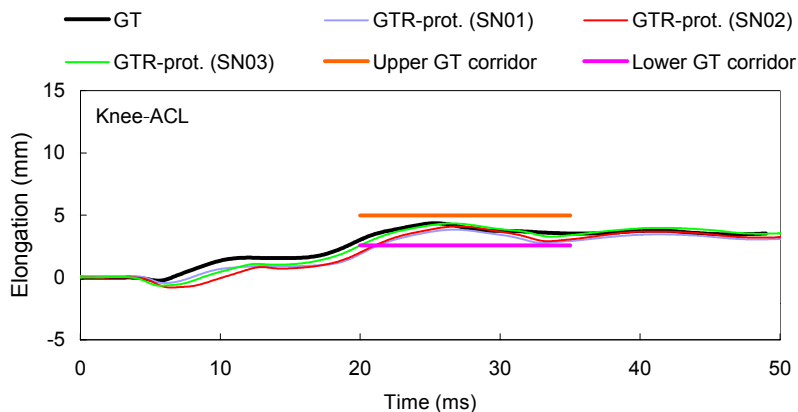
2. Comparability Check

(Flex-GTR-prototypes and Flex-GT)

- Knee- ACL
- Knee-PCL
- Knee-MCL

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Flex-GTR-prototype Test Rig	✓	✓	✓	
Flex-GT Test Rig	✓	✓	✓	✓
Modified Flex-GT Test Rig		✓		

Filter: CFC180



Dynamic Assembly Certification Test Series

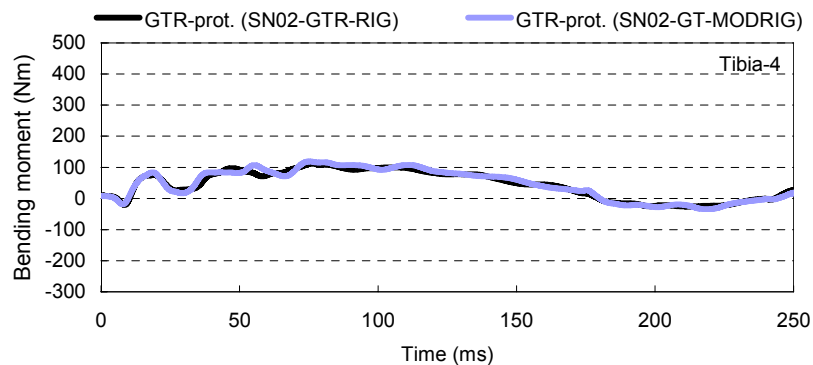
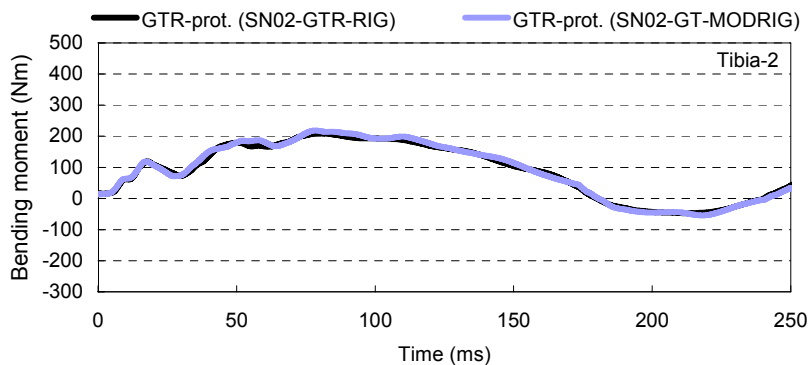
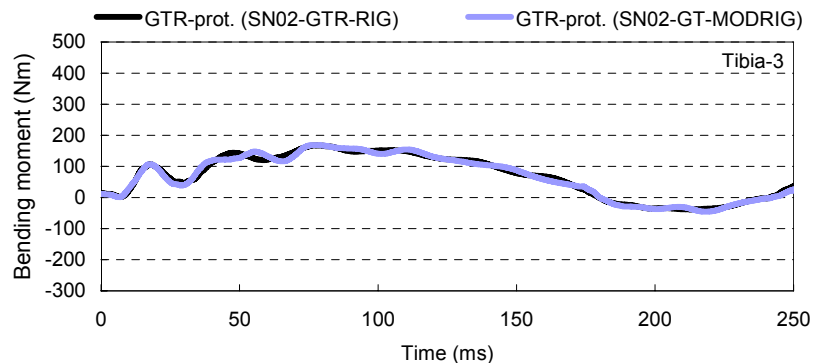
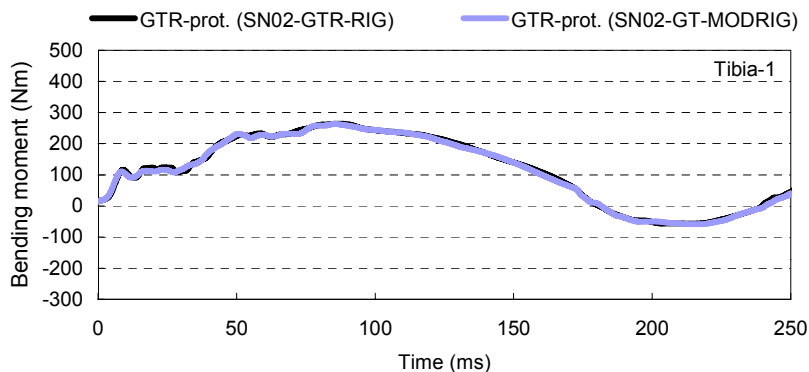
3. Comparability Check

(Flex-GTR-prototype Test Rig and Modified Flex-GT Test Rig)

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

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Flex-GTR-prototype Test Rig	✓	✓	✓	
Flex-GT Test Rig	✓	✓	✓	✓
Modified Flex-GT Test Rig		✓		

Filter: CFC180



Dynamic Assembly Certification Test Series

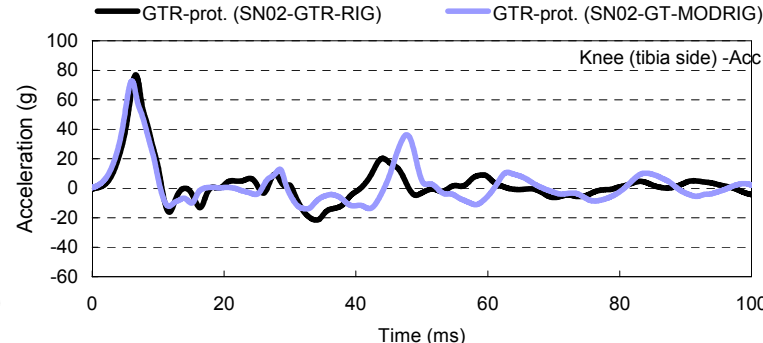
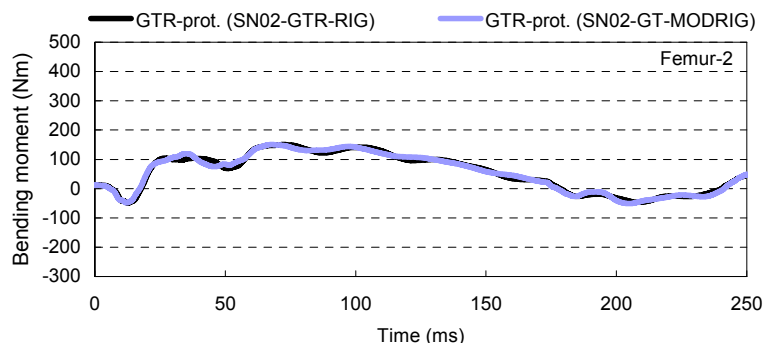
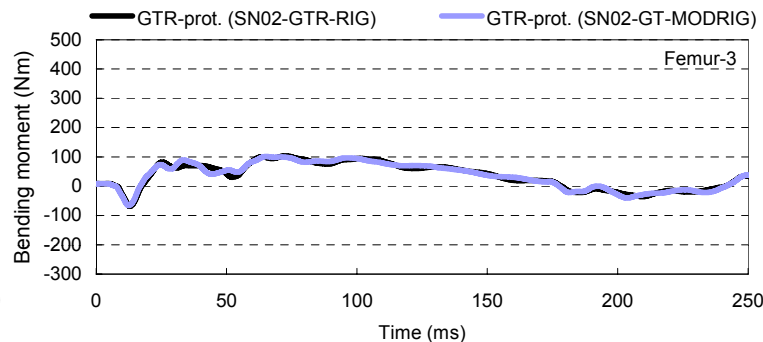
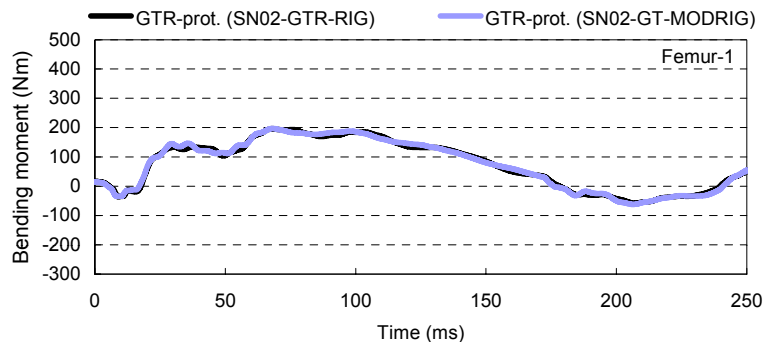
3. Comparability Check

(Flex-GTR-prototype Test Rig and Modified Flex-GT Test Rig)

- Femur-1
- Femur-2
- Femur-3
- Knee (tibia side) – Acc.

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Flex-GTR-prototype Test Rig	✓	✓	✓	
Flex-GT Test Rig	✓	✓	✓	✓
Modified Flex-GT Test Rig		✓		

Filter: CFC180



Dynamic Assembly Certification Test Series

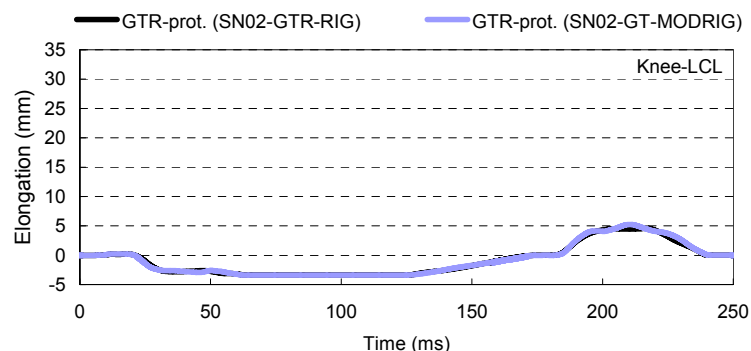
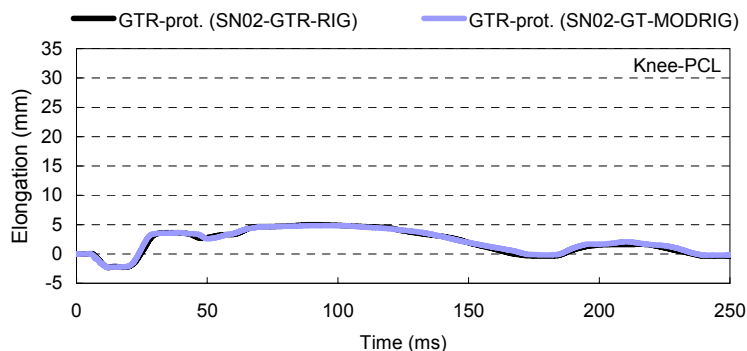
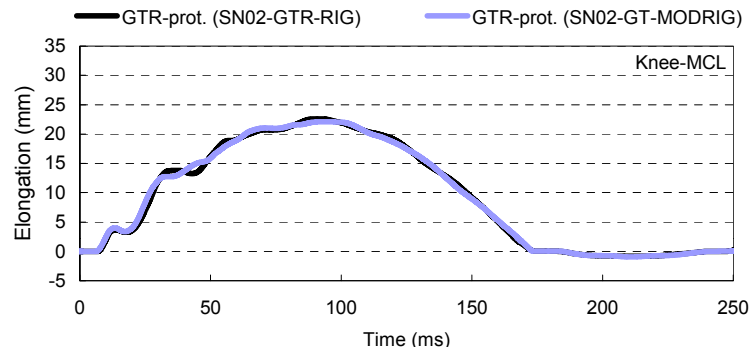
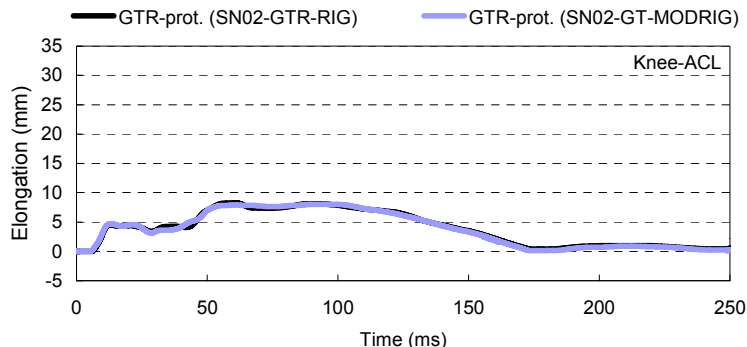
3. Comparability Check

(Flex-GTR-prototype Test Rig and Modified Flex-GT Test Rig)

- Knee- ACL
- Knee-PCL
- Knee-MCL
- Knee-LCL

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Flex-GTR-prototype Test Rig	✓	✓	✓	
Flex-GT Test Rig	✓	✓	✓	✓
Modified Flex-GT Test Rig		✓		

Filter: CFC180

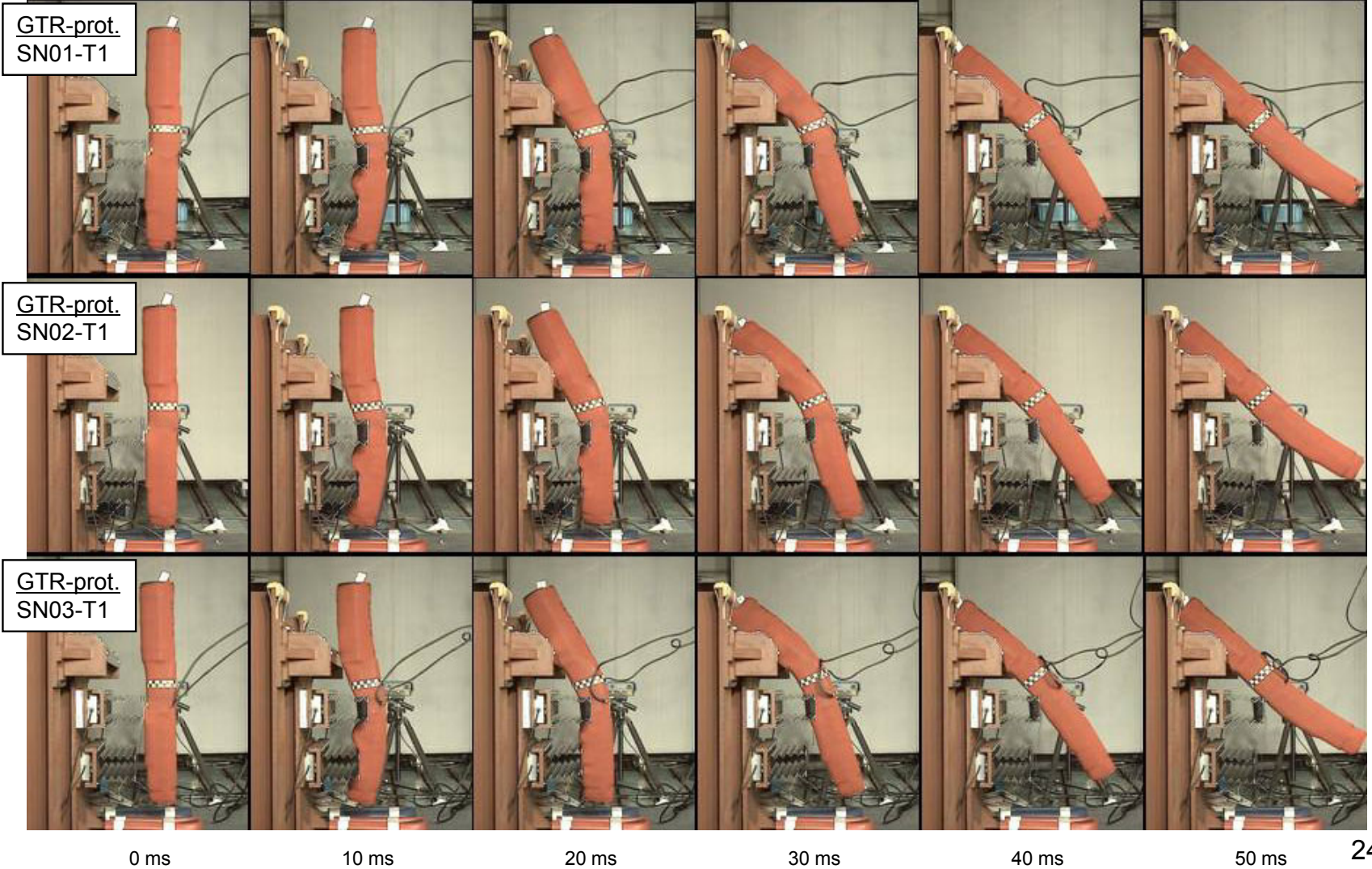


Simplified Car Test Series

1. Reproducibility Check

(Flex-GTR-prototypes)

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Simplified Car	√	√	√	√



Simplified Car Test Series

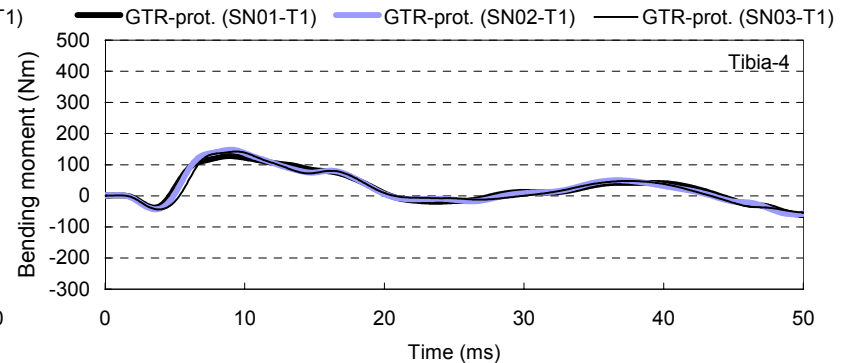
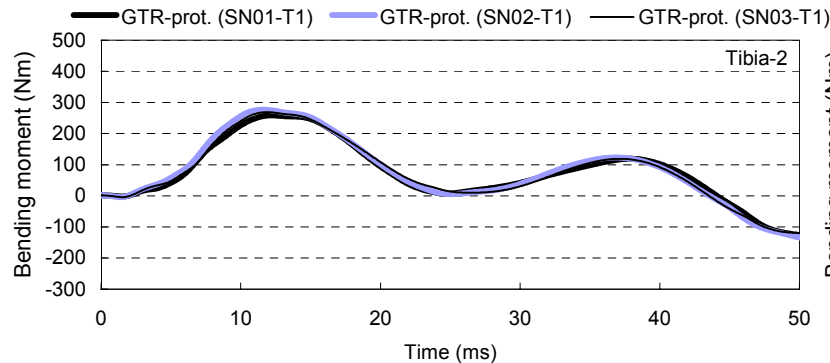
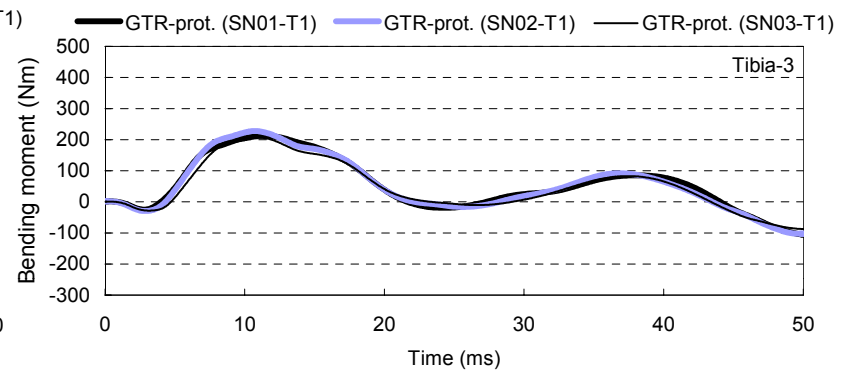
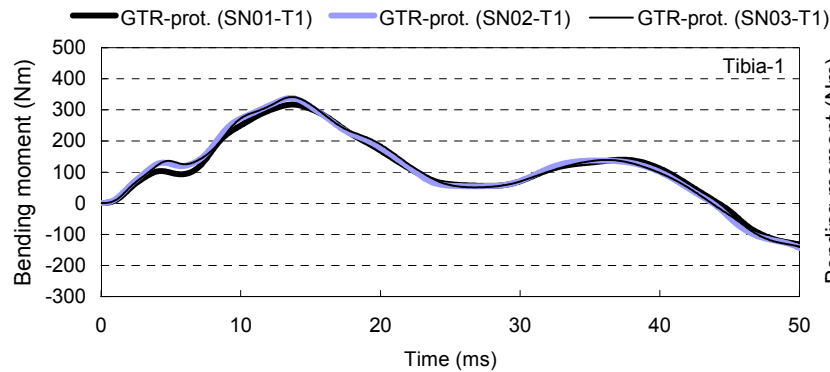
1. Reproducibility Check

(Flex-GTR-prototypes)

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

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Simplified Car	√	√	√	√

Filter: CFC180



Simplified Car Test Series

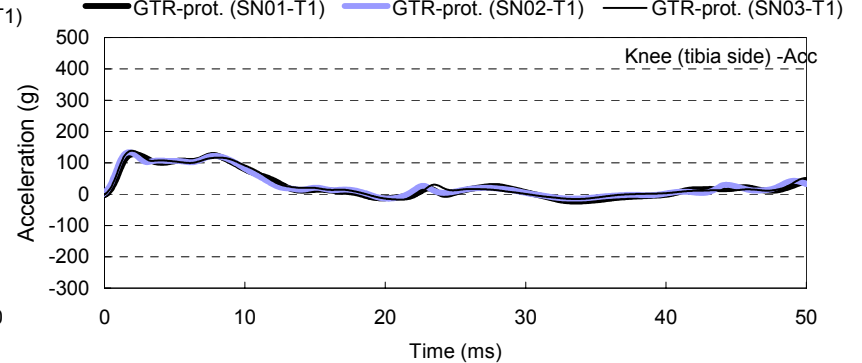
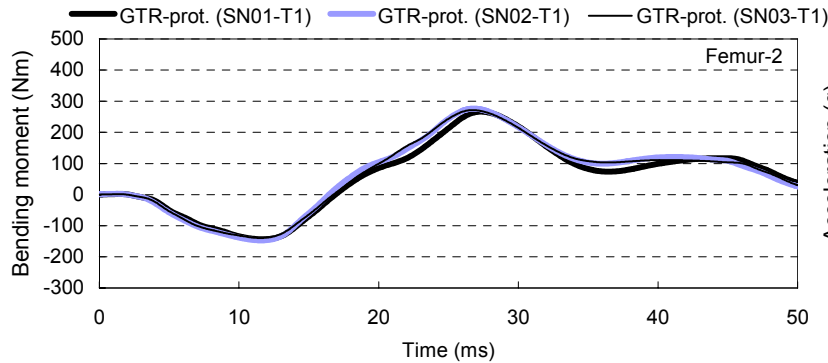
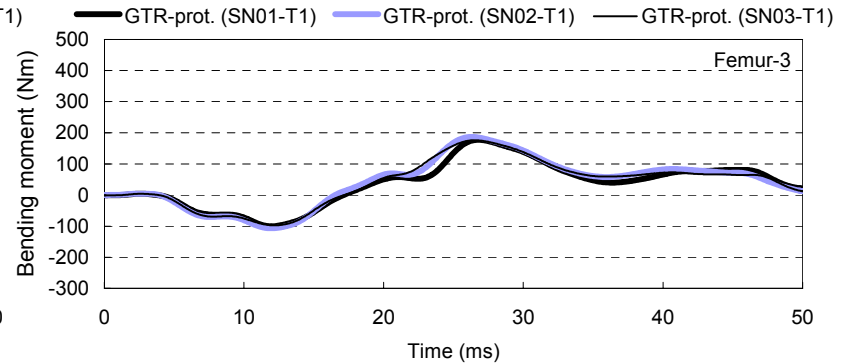
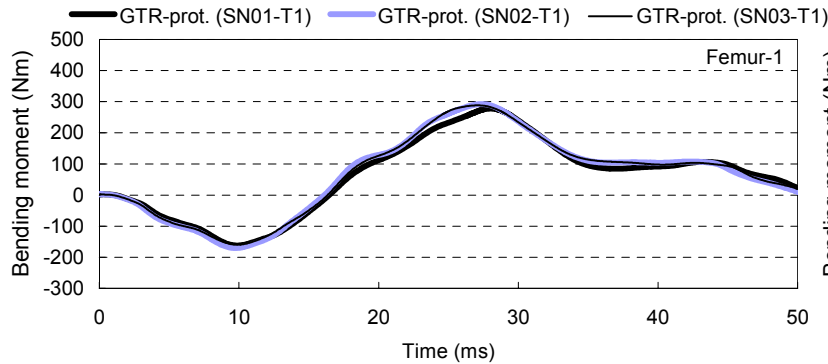
1. Reproducibility Check

(Flex-GTR-prototypes)

- Femur-1
- Femur-2
- Femur-3
- Knee (tibia side) – Acc.

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Simplified Car	√	√	√	√

Filter: CFC180



Simplified Car Test Series

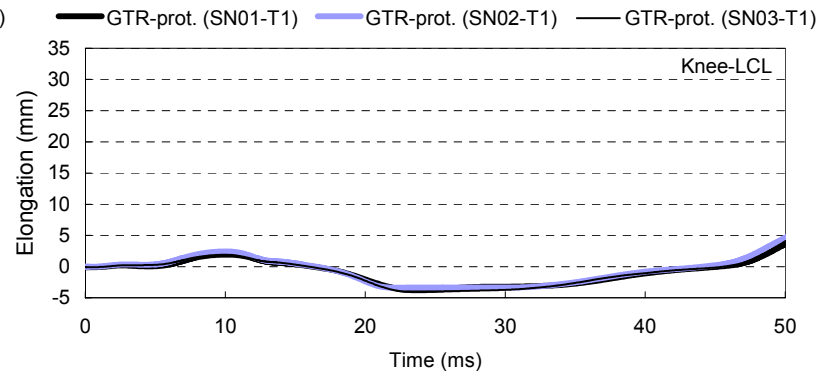
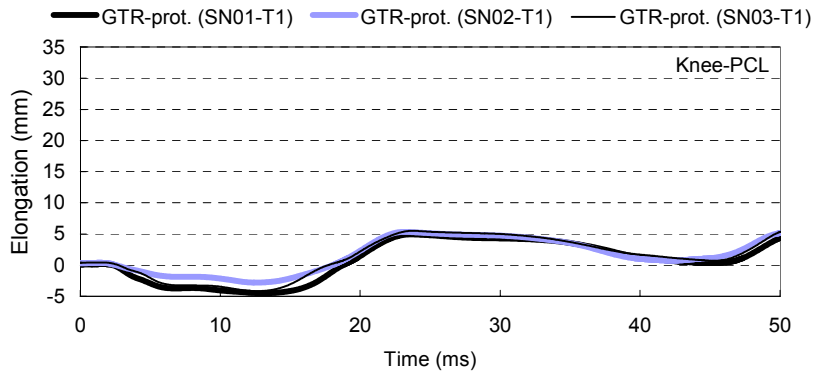
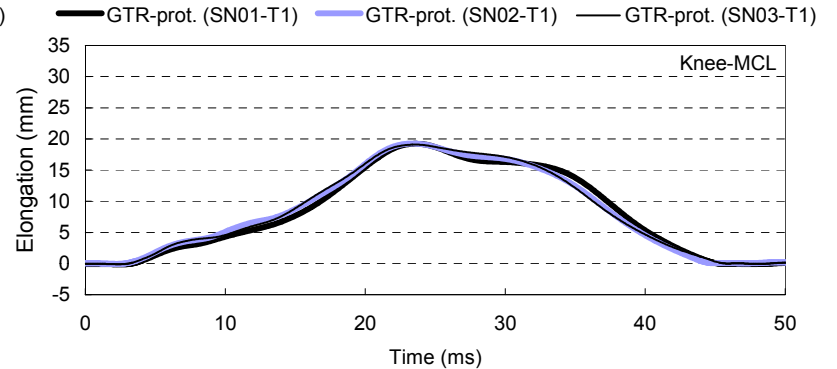
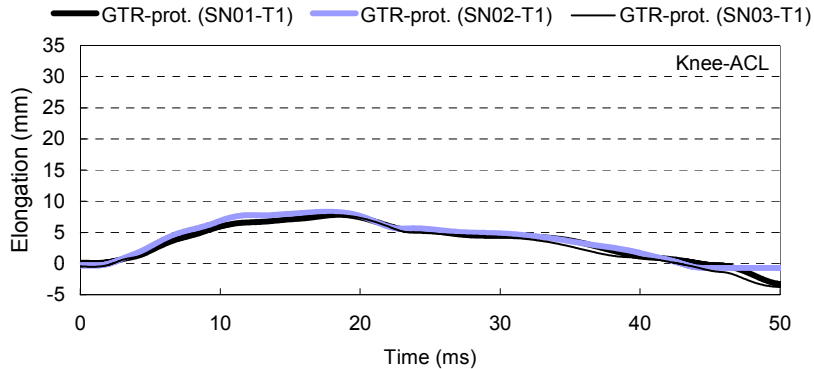
1. Reproducibility Check

(Flex-GTR-prototypes)

- Knee- ACL
- Knee-PCL
- Knee-MCL
- Knee-LCL

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Simplified Car	√	√	√	√

Filter: CFC180



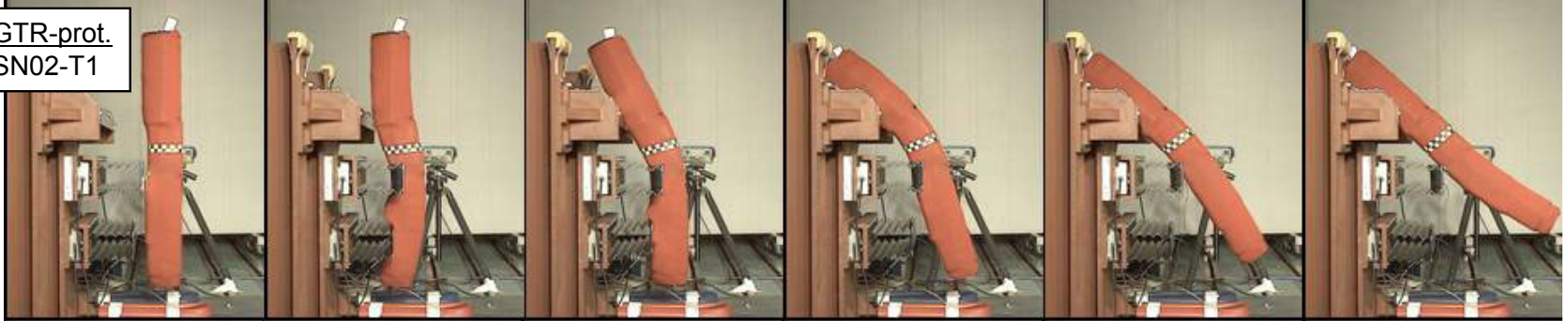
Simplified Car Test Series

2. Repeatability Check

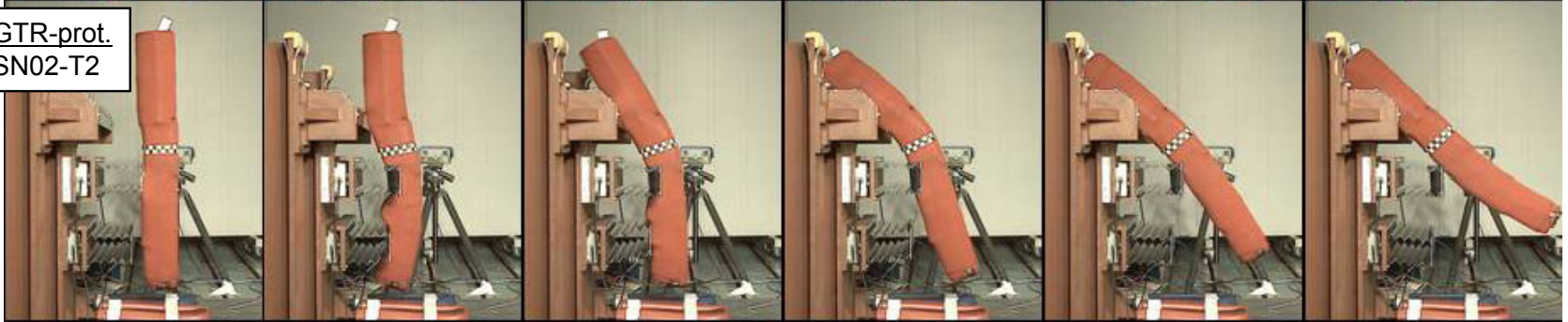
(Flex-GTR-prototypes)

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Simplified Car	√	√	√	√

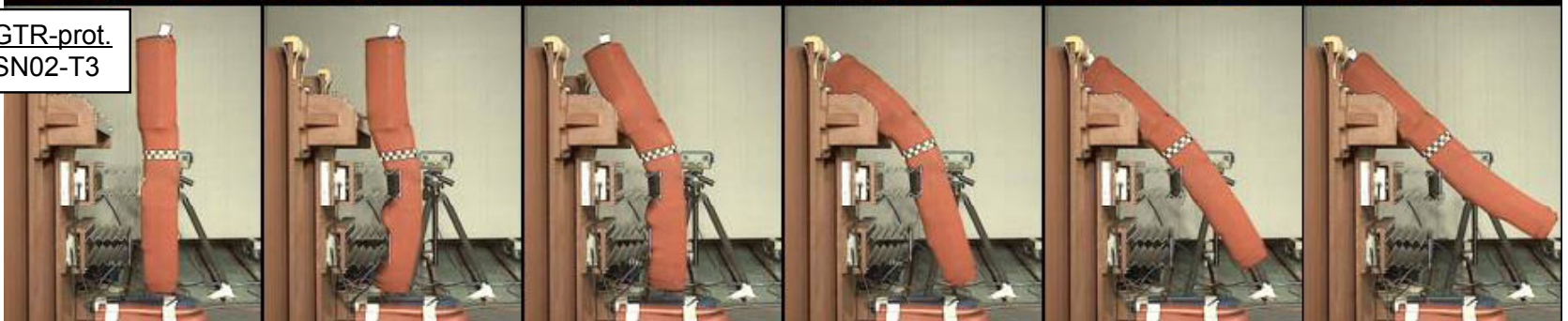
GTR-prot.
SN02-T1



GTR-prot.
SN02-T2



GTR-prot.
SN02-T3



0 ms

10 ms

20 ms

30 ms

40 ms

50 ms

Simplified Car Test Series

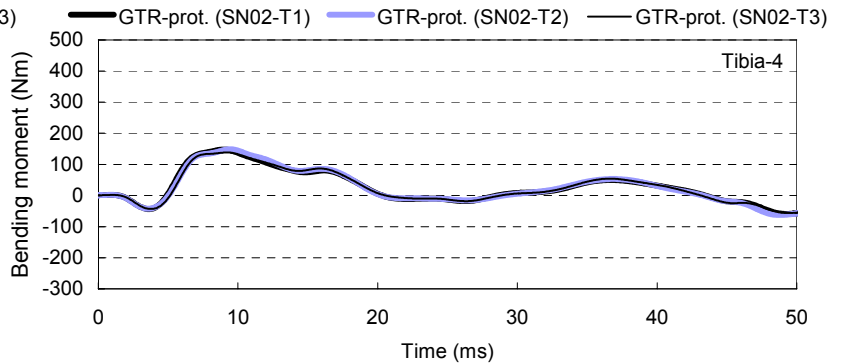
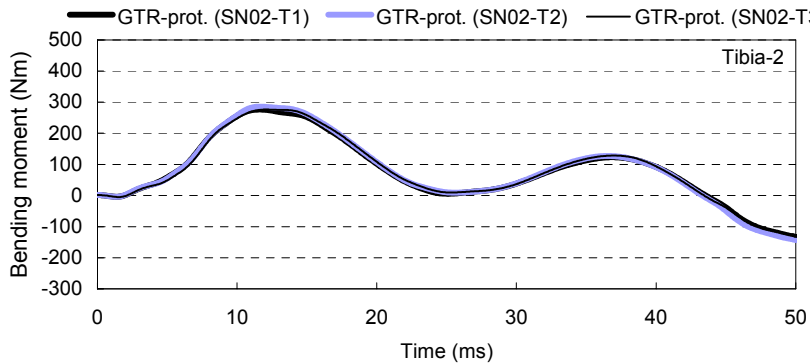
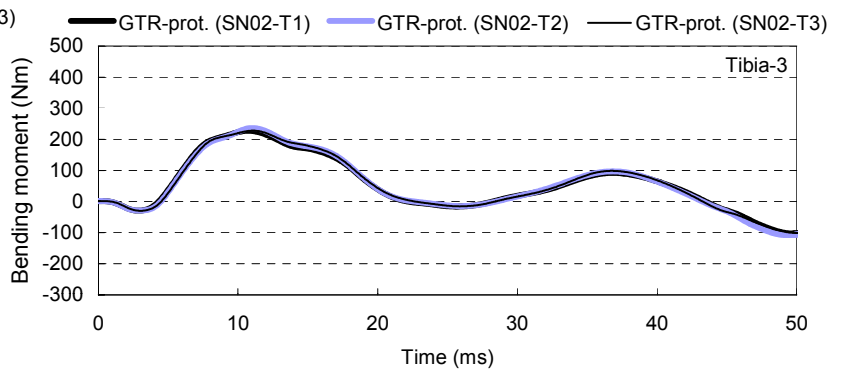
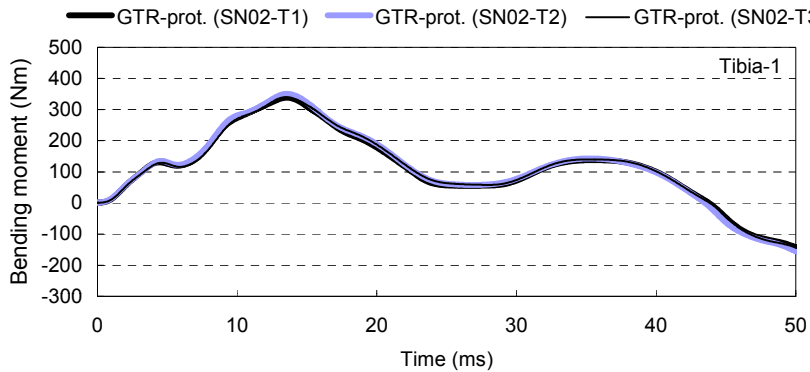
2. Repeatability Check

(Flex-GTR-prototypes)

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

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Simplified Car	√	√	√	√

Filter: CFC180



Simplified Car Test Series

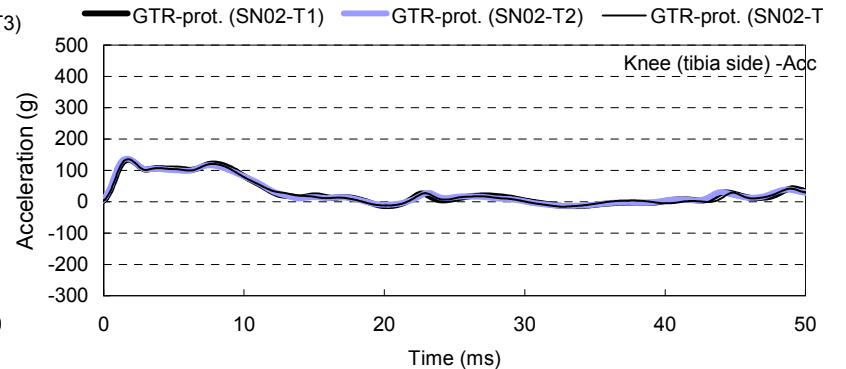
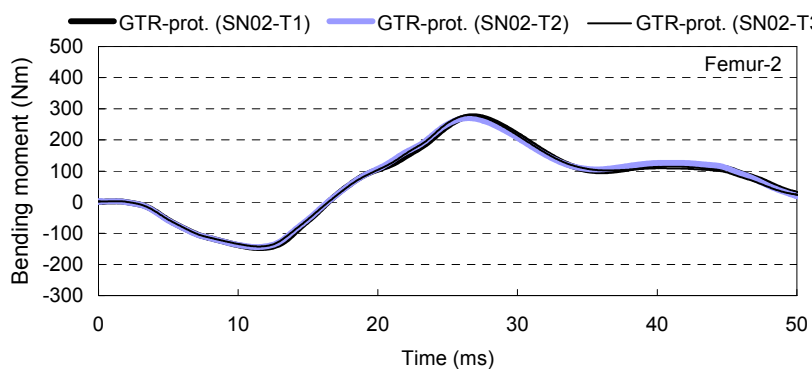
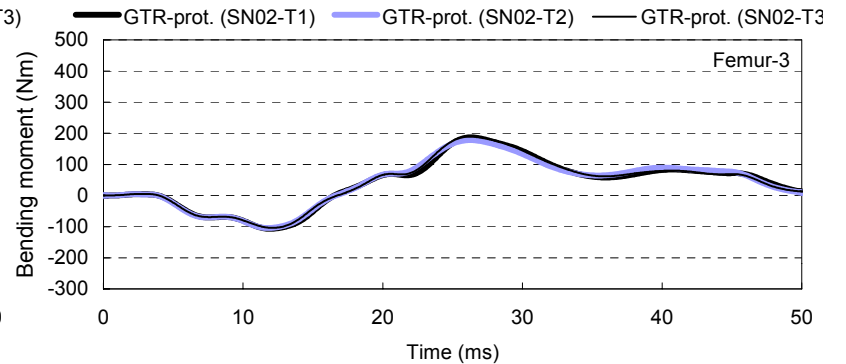
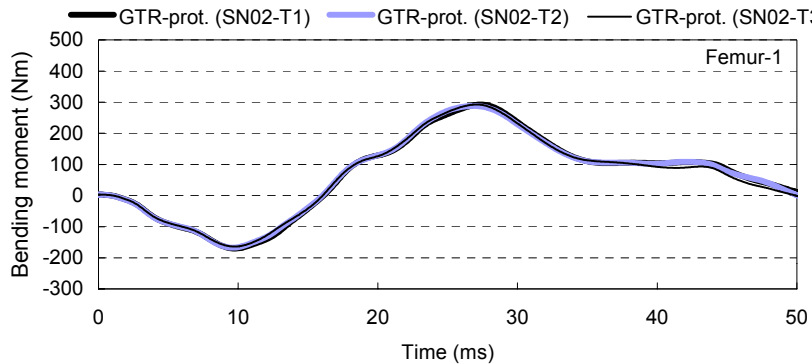
2. Repeatability Check

(Flex-GTR-prototypes)

- Femur-1
- Femur-2
- Femur-3
- Knee (tibia side) – Acc.

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Simplified Car	√	√	√	√

Filter: CFC180



Simplified Car Test Series

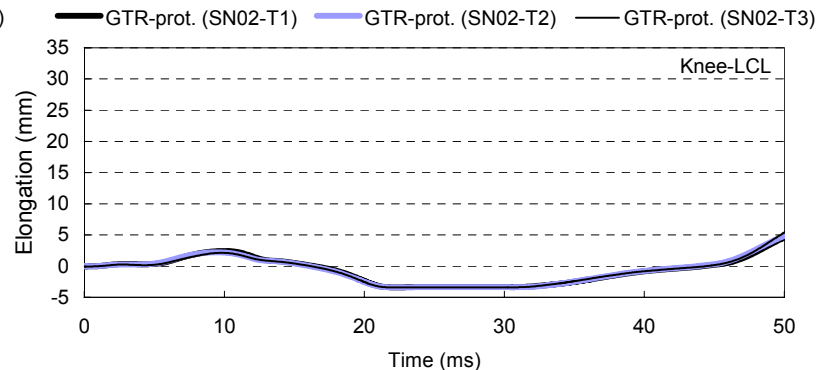
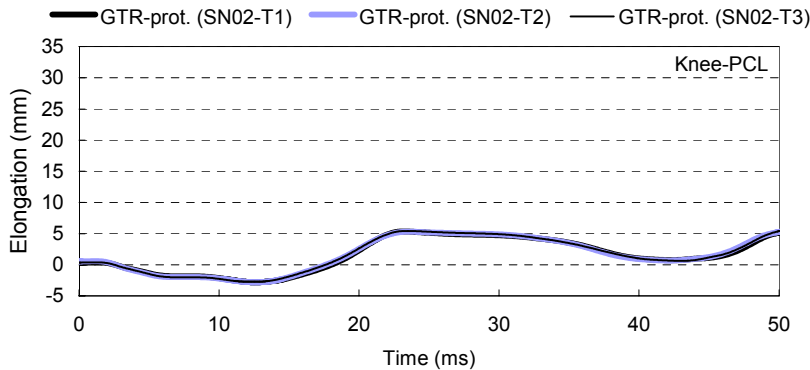
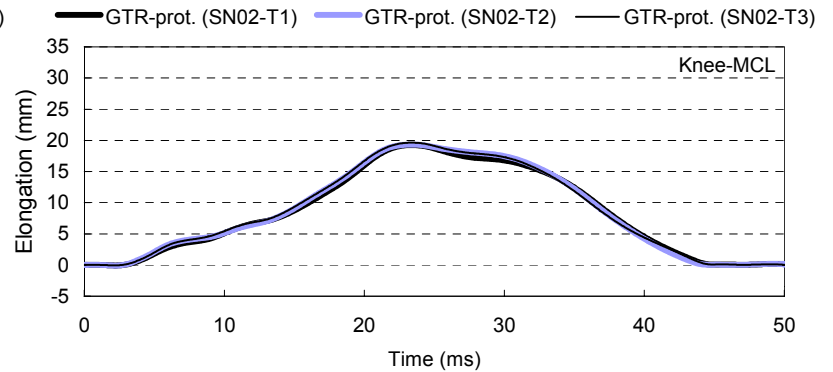
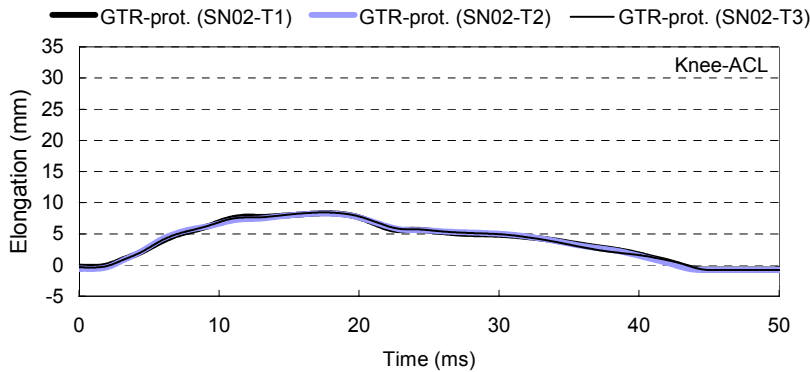
2. Repeatability Check

(Flex-GTR-prototypes)

- Knee- ACL
- Knee-PCL
- Knee-MCL
- Knee-LCL

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Simplified Car	✓	✓	✓	✓

Filter: CFC180



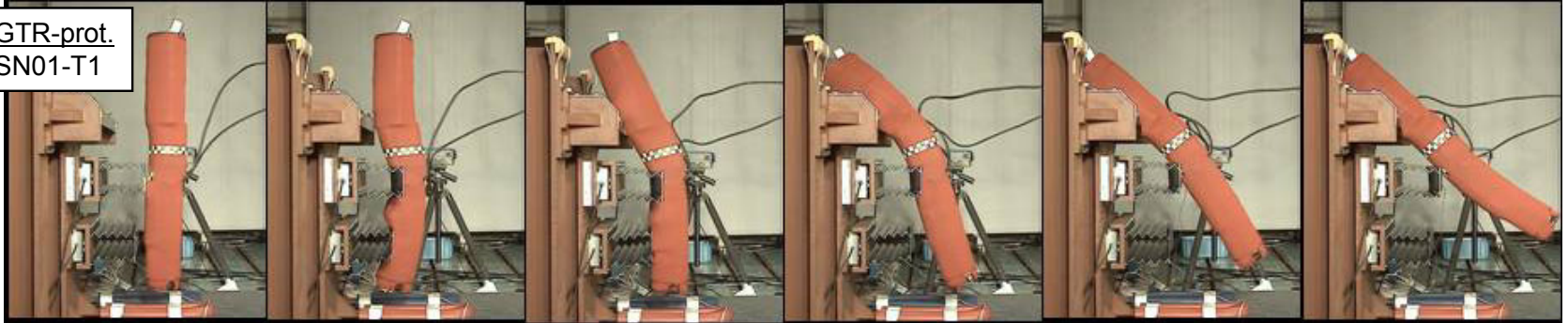
Simplified Car Test Series

3. Comparability Check

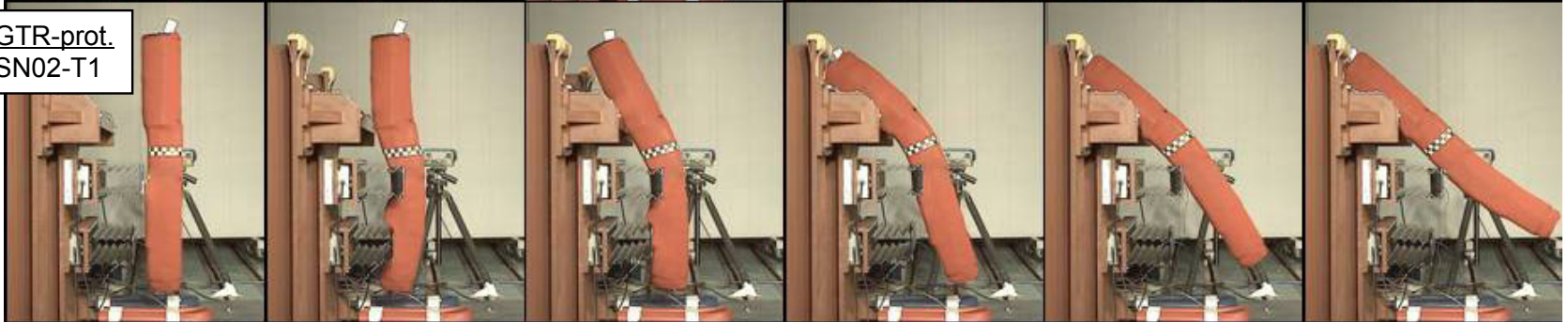
(Flex-GTR-prototypes and Flex-GT)

	Flex-GTR-prototype			Flex-GT
	SN01	SN02	SN03	SN03
Simplified Car	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

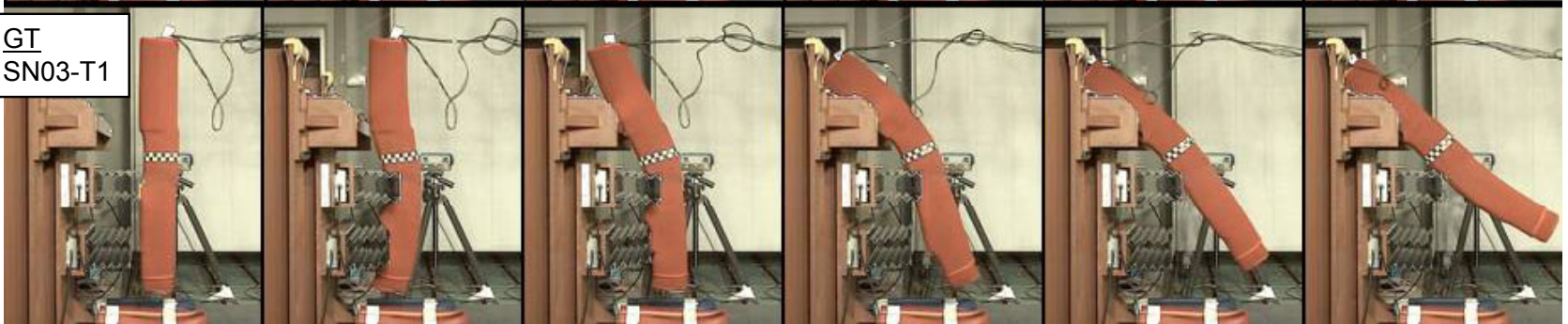
GTR-prot.
SN01-T1



GTR-prot.
SN02-T1



GT
SN03-T1



0 ms

10 ms

20 ms

30 ms

40 ms

50 ms

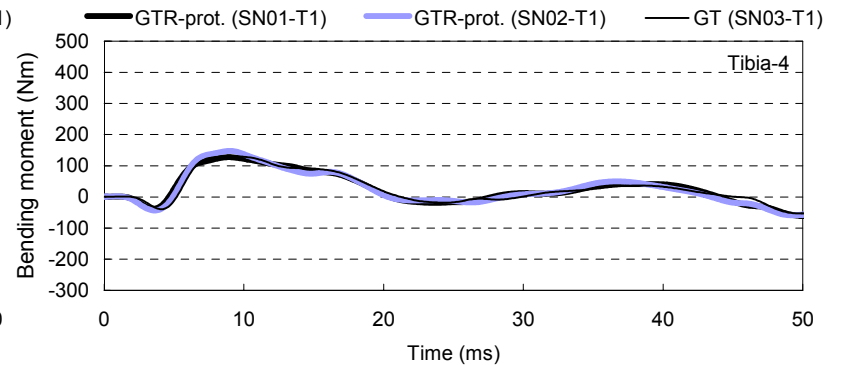
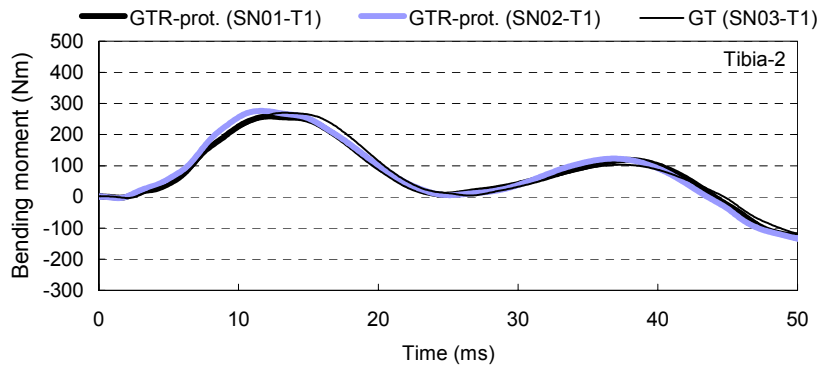
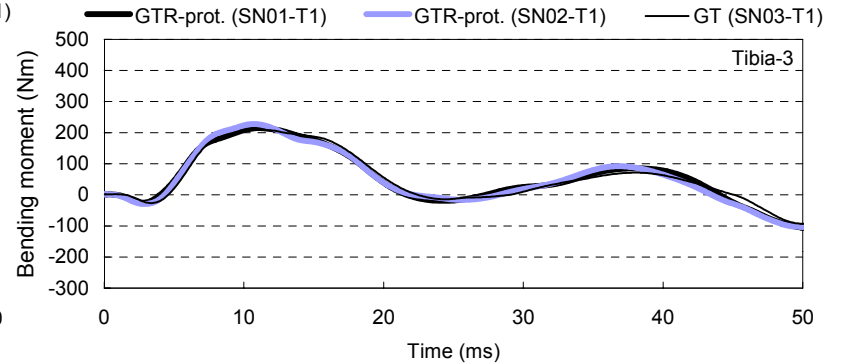
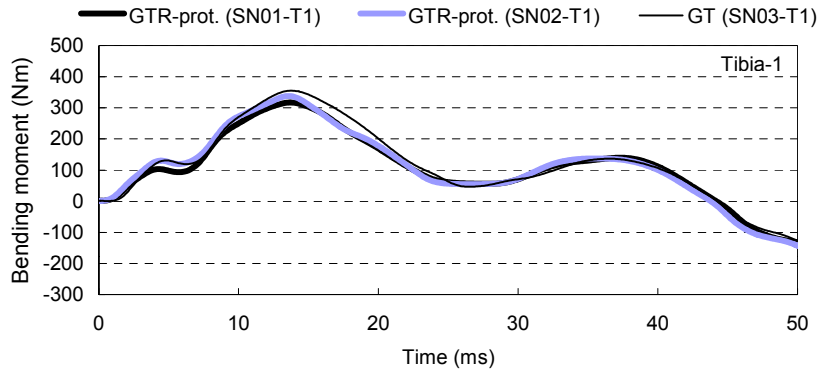
Simplified Car Test Series

3. Comparability Check

(Flex-GTR-prototypes and Flex-GT)

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

	Flex-GTR-prototype			Flex-GT	Filter: CFC180
	SN01	SN02	SN03	SN03	
Simplified Car	✓	✓	✓	✓	



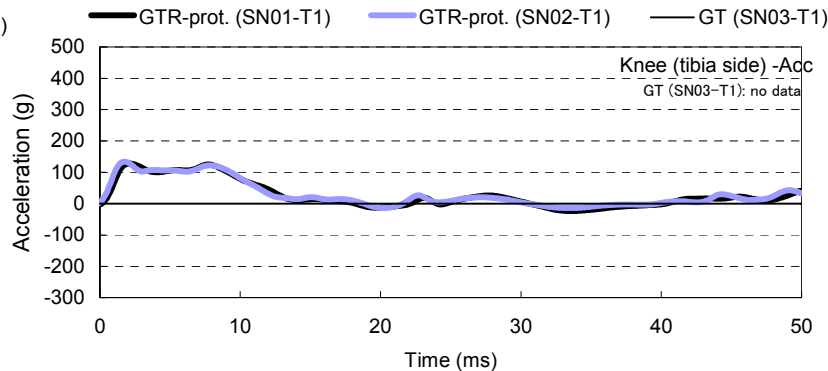
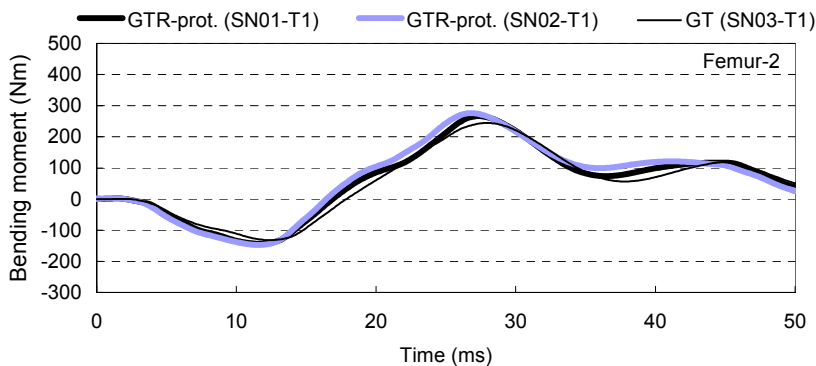
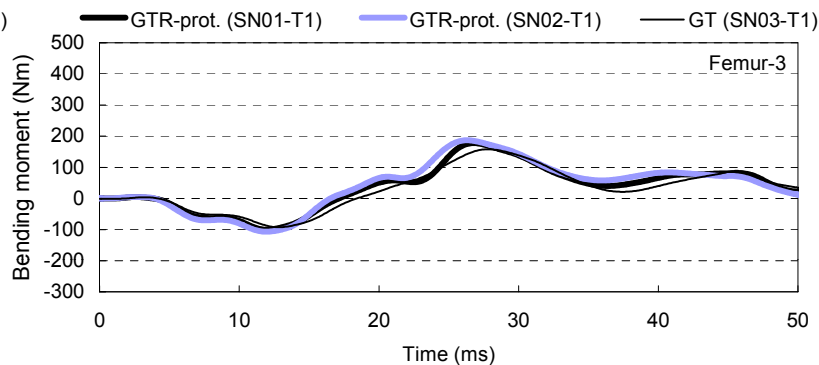
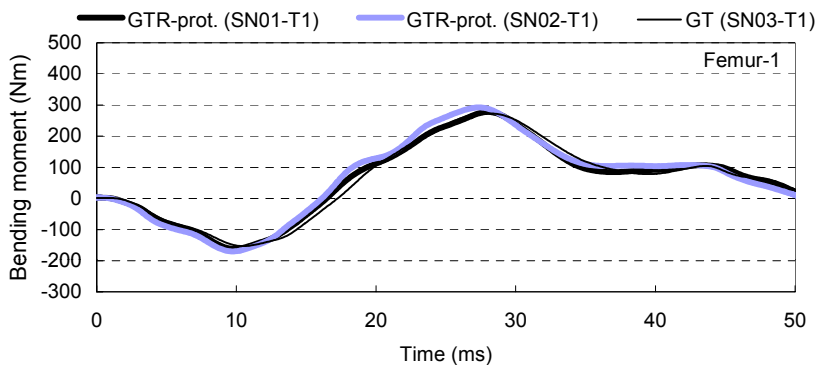
Simplified Car Test Series

3. Comparability Check

(Flex-GTR-prototypes and Flex-GT)

- Femur-1
- Femur-2
- Femur-3
- Knee (tibia side) – Acc.

	Flex-GTR-prototype			Flex-GT	Filter: CFC180
	SN01	SN02	SN03	SN03	
Simplified Car	✓	✓	✓	✓	



Simplified Car Test Series

3. Comparability Check

(Flex-GTR-prototypes and Flex-GT)

- Knee-ACL
- Knee-PCL
- Knee-MCL
- Knee-LCL

	Flex-GTR-prototype			Flex-GT	Filter: CFC180
	SN01	SN02	SN03	SN03	
Simplified Car	✓	✓	✓	✓	

