

J-MLIT Flex-GT Simplified Car Test Results
Repeatability Check

Materials and Methodologies

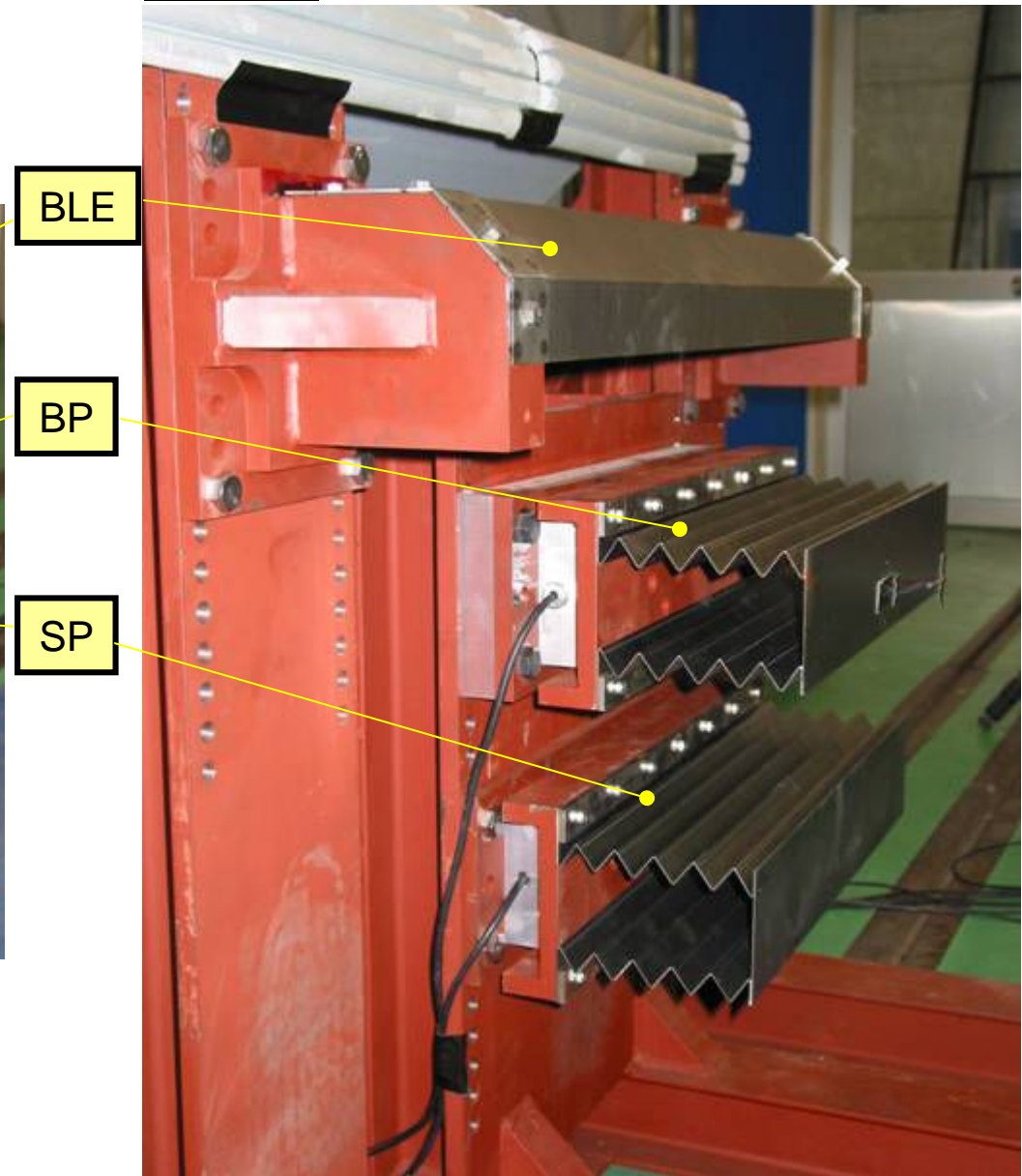
Simplified Car (Photo)

Overview

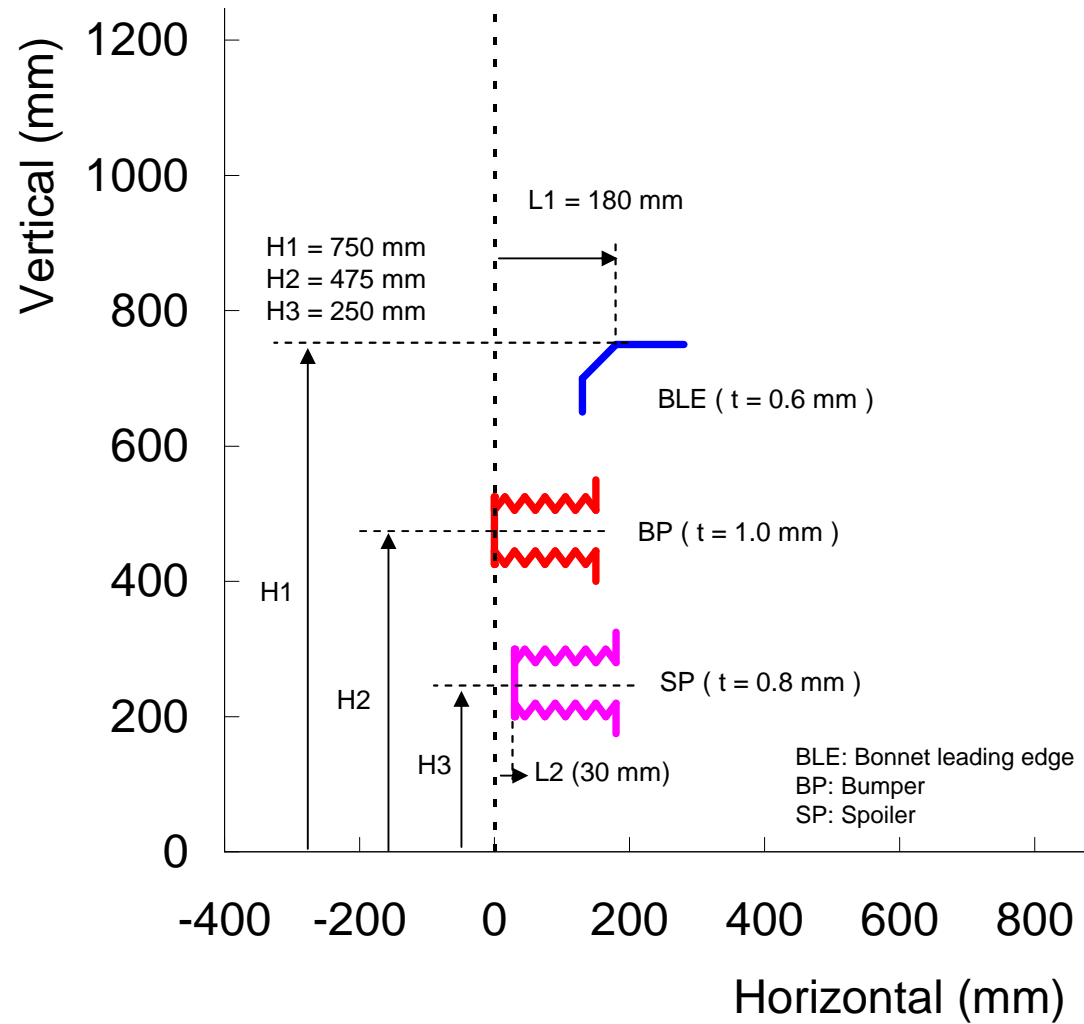


BLE: Bonnet leading edge
BP: Bumper
SP: Spoiler

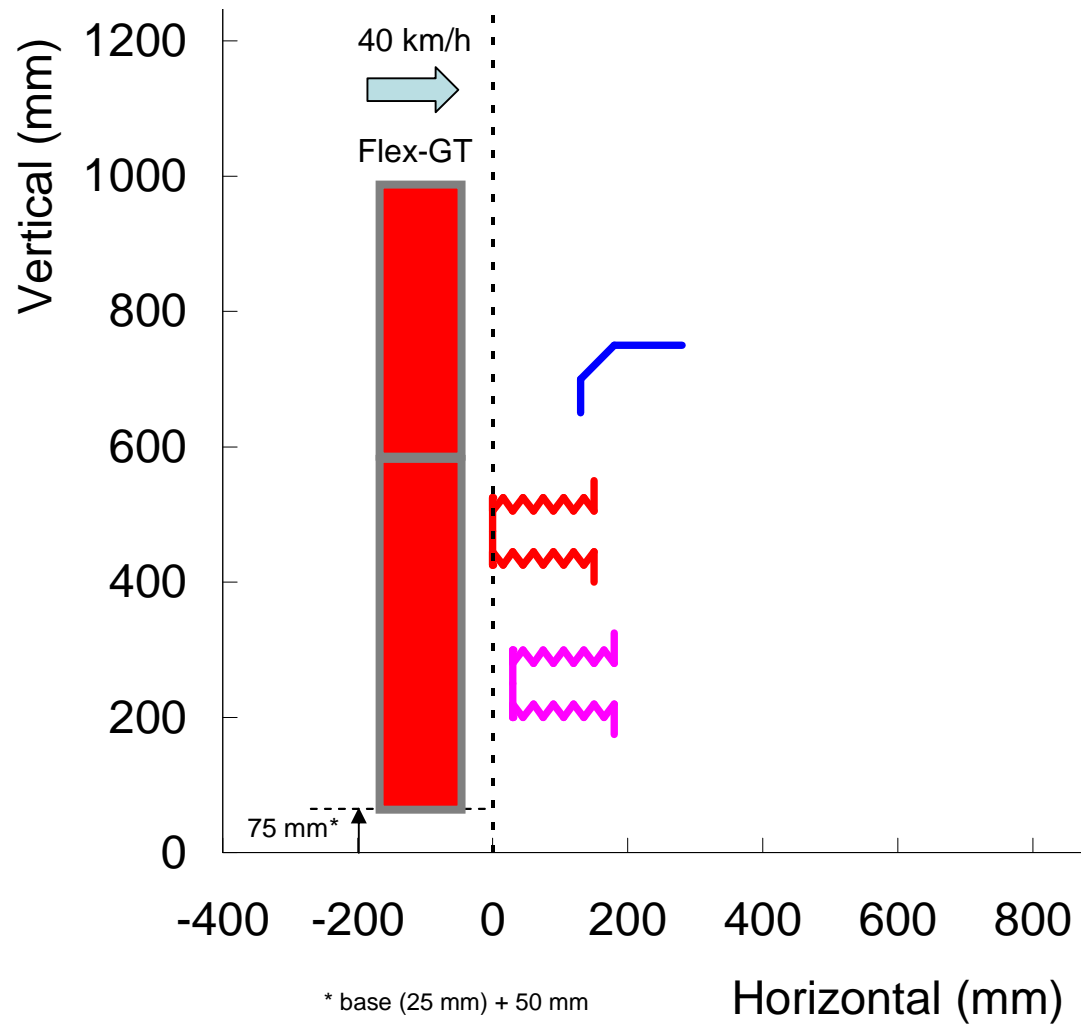
Close view



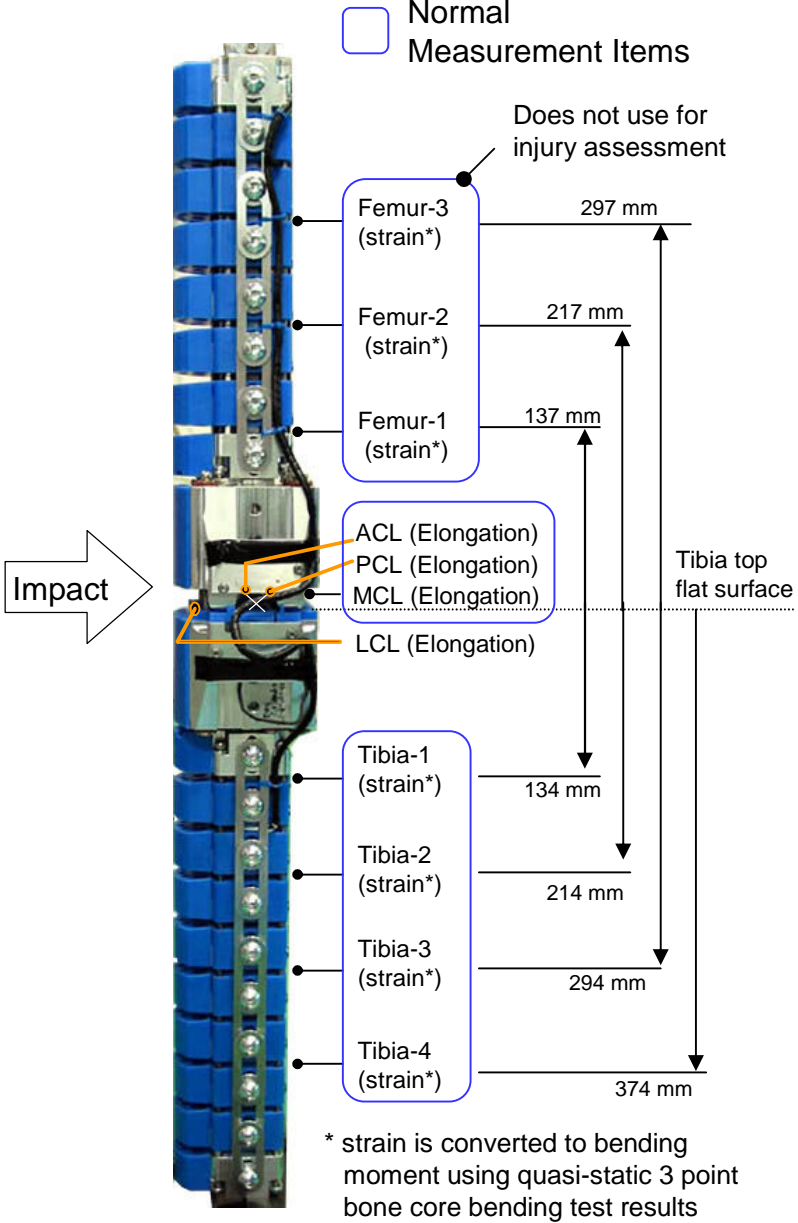
Simplified Car (Dimensions)



Impact Conditions Targets



Flex-GT Measurement Items



Test Results

Impact Conditions Targets and Results (actual)

Car	Test ID	Impactor	Impact Position (target)		Impact Speed		Impact Position (actual)		Conducted Time (hours:minutes)
			Horizontal Position	Vertical Position	target	actual	Horizontal	Vertical	
					(km/h)	(km/h)	(mm)	(mm)	
Simplified Car	T01	Flex-GT(SN01)	Center	+ 75 mm (base + 50 mm)	40	40.7	R5	0	13:39
-	T02	-	-	-	-	40.1	L10	D3	14:30
-	T03	-	-	-	-	40.0	L10	D3	15:18
-	T04	-	-	-	-	40.0	R3	D4	16:06
-	T05	-	-	-	-	39.9	0	D2	16:49
-	T06	-	-	-	-	40.0	R2	D2	17:55

- Around 1 hour interval
- No change any parts

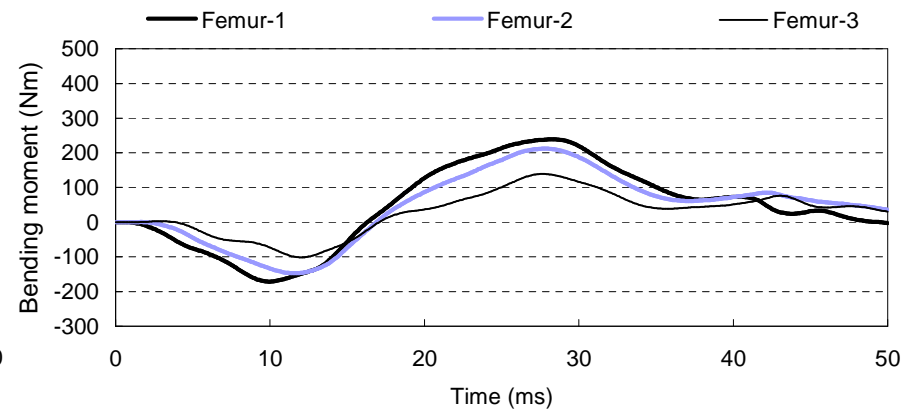
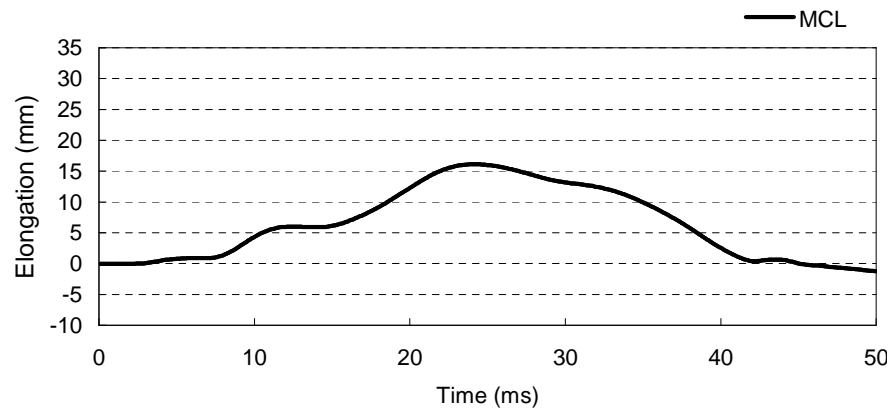
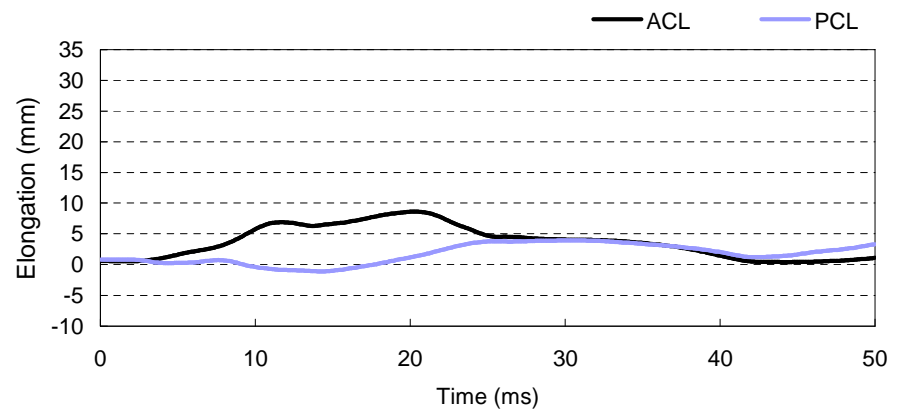
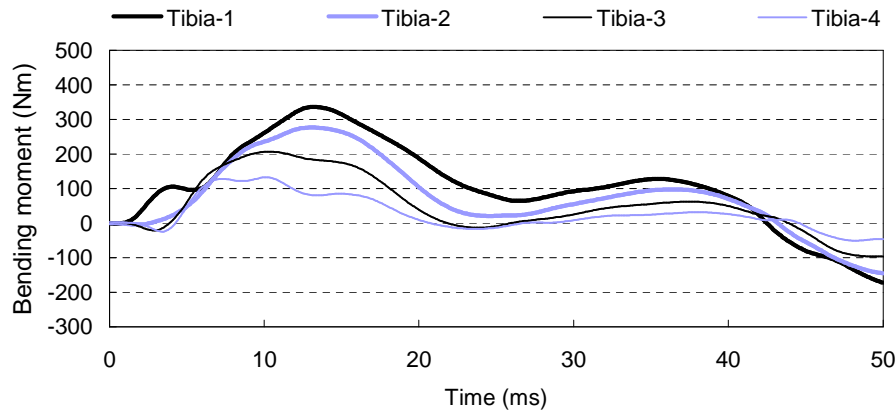
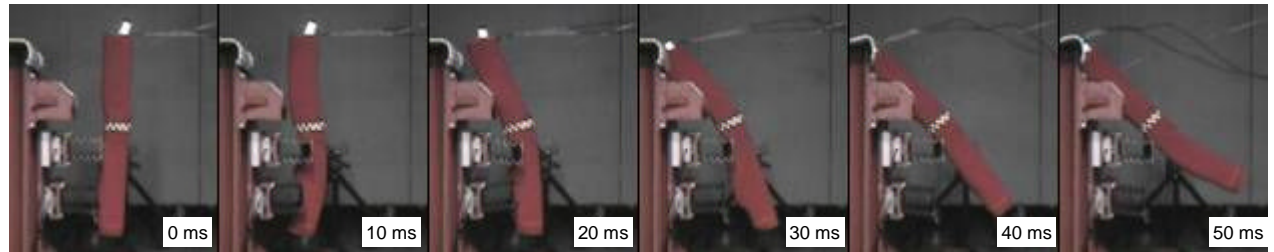
base: + 25 mm from ground level (+: Up)

Impact Position: R: Right, L: Left, U: Up, D: Down (Driver's point of view)

Test Results

Simplified Car Model (T01) \Leftarrow Flex-GT, $H_1 = \text{base} + 50 \text{ mm}$

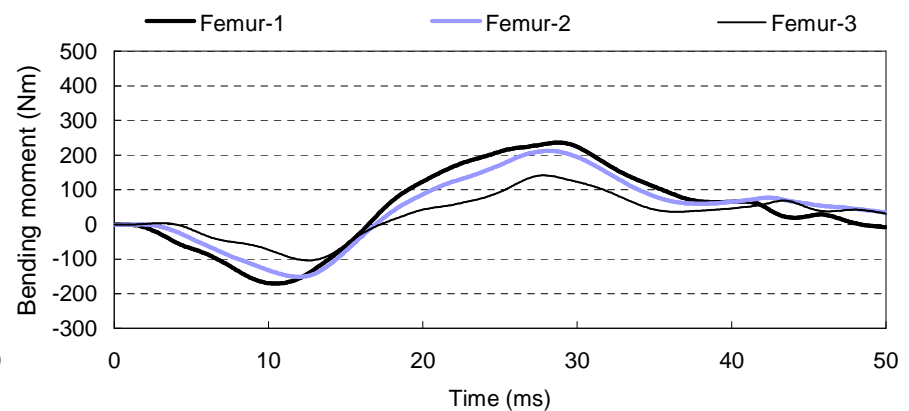
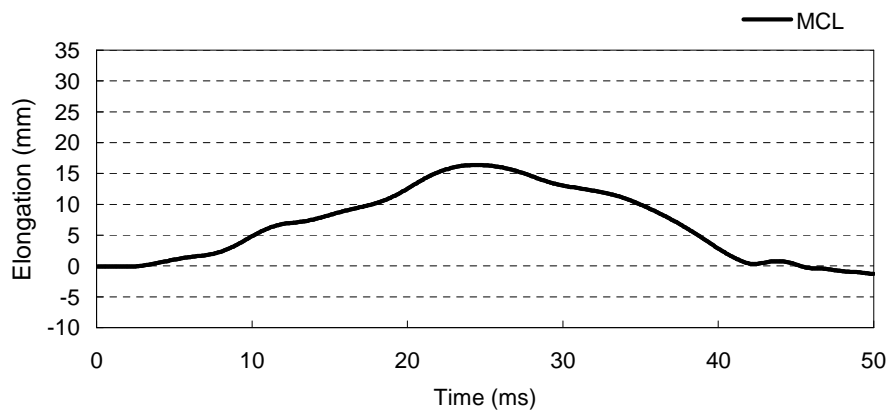
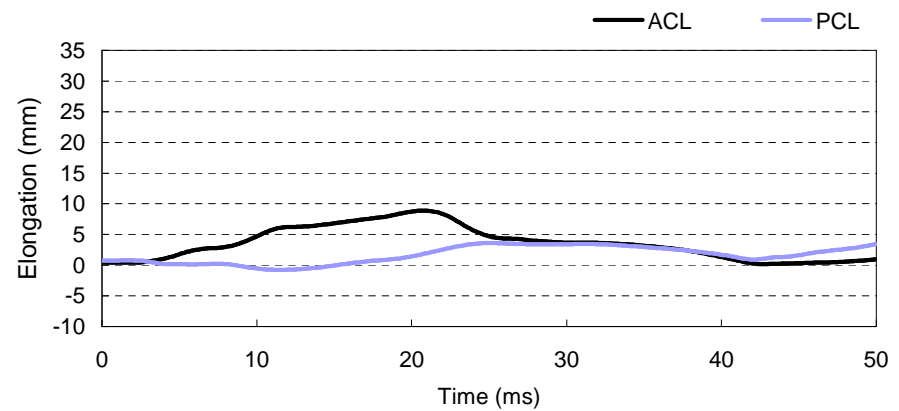
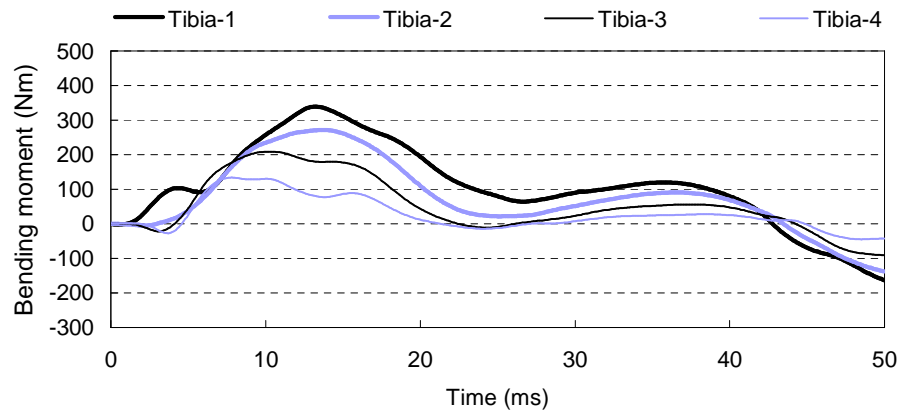
	unit	Max.
Femur-3	(Nm)	139.1
Femur-2	(Nm)	212.0
Femur-1	(Nm)	238.8
Tibia-1	(Nm)	336.4
Tibia-2	(Nm)	277.2
Tibia-3	(Nm)	206.4
Tibia-4	(Nm)	132.8
Knee-ACL	(mm)	8.6
Knee-PCL	(mm)	4.0
Knee-MCL	(mm)	16.1



Test Results

Simplified Car Model (T02) \Leftarrow Flex-GT, $H_1 = \text{base} + 50 \text{ mm}$

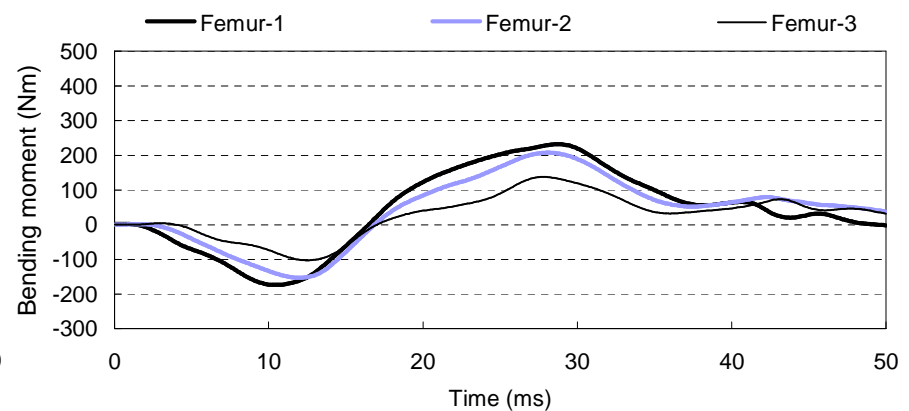
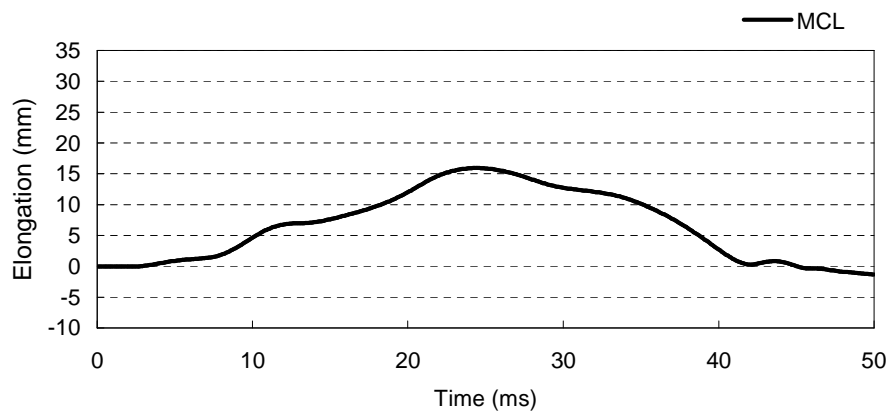
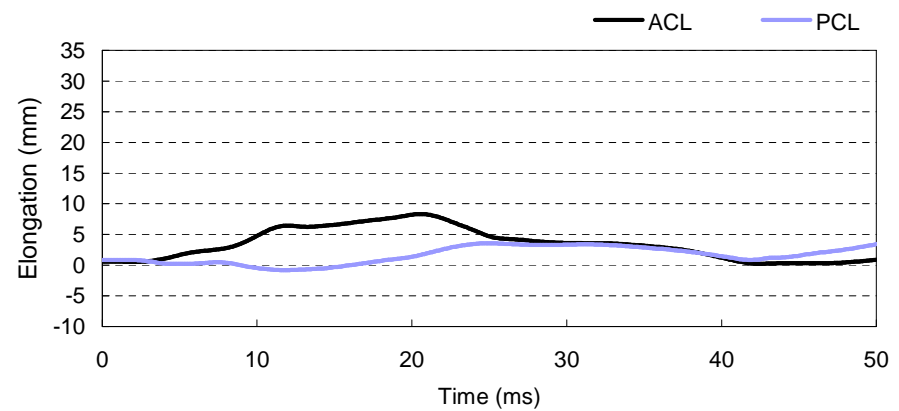
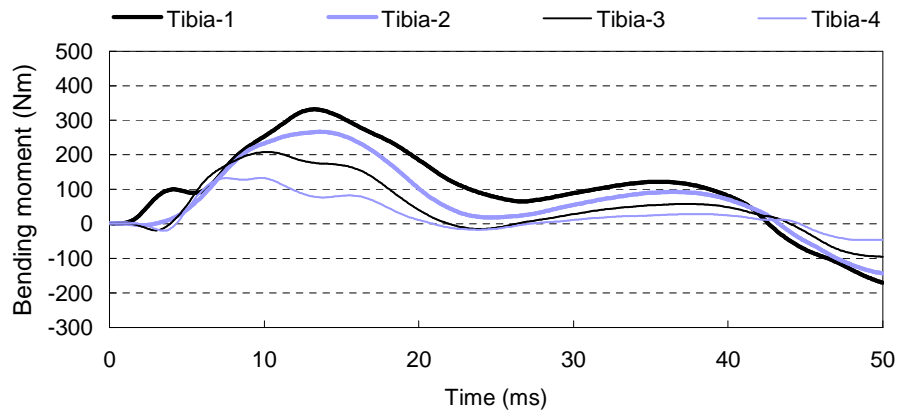
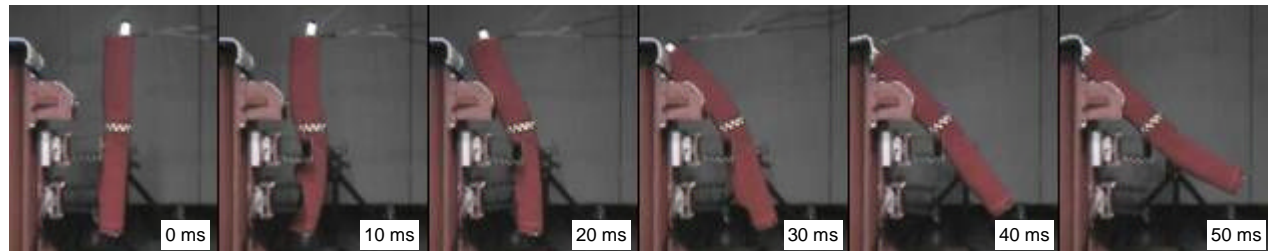
	unit	Max.
Femur-3	(Nm)	141.4
Femur-2	(Nm)	211.8
Femur-1	(Nm)	235.8
Tibia-1	(Nm)	339.3
Tibia-2	(Nm)	272.0
Tibia-3	(Nm)	209.1
Tibia-4	(Nm)	133.5
Knee-ACL	(mm)	8.9
Knee-PCL	(mm)	3.6
Knee-MCL	(mm)	16.4



Test Results

Simplified Car Model (T03) \Leftarrow Flex-GT, $H_1 = \text{base} + 50 \text{ mm}$

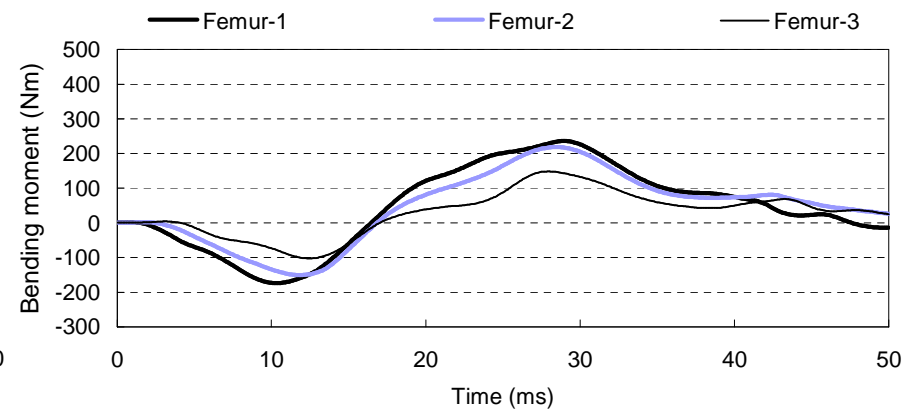
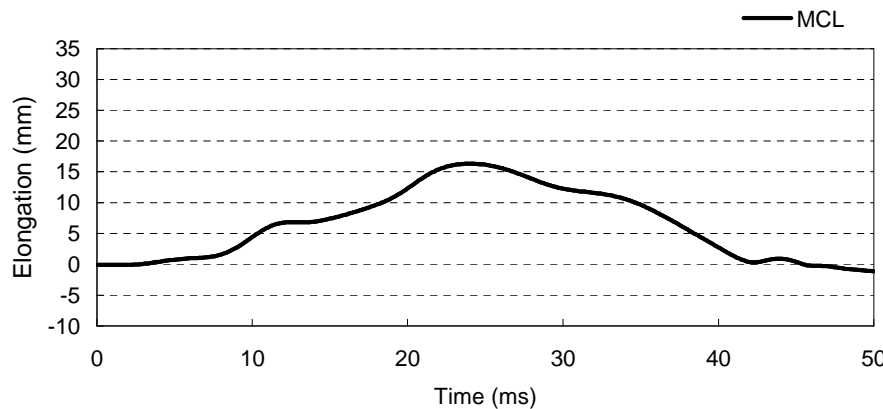
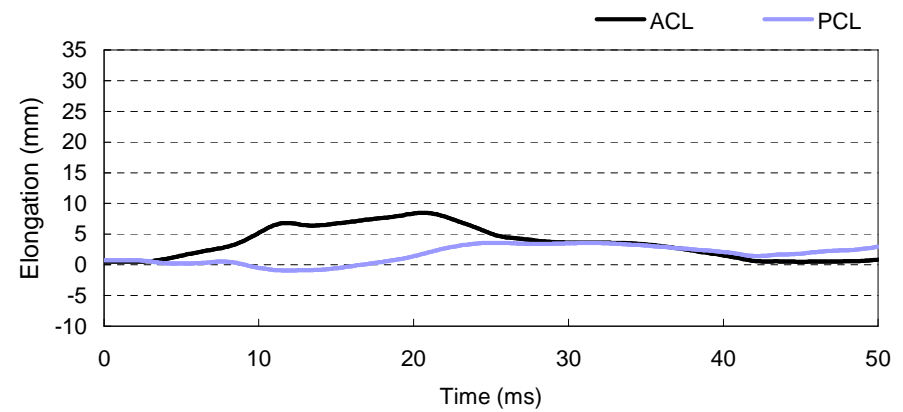
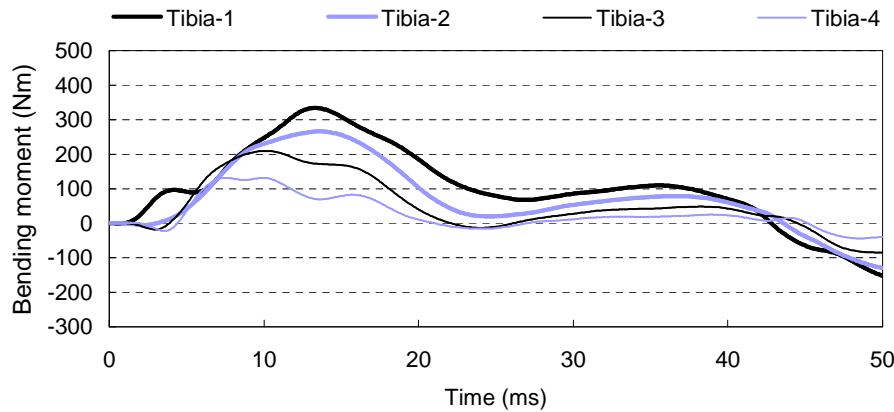
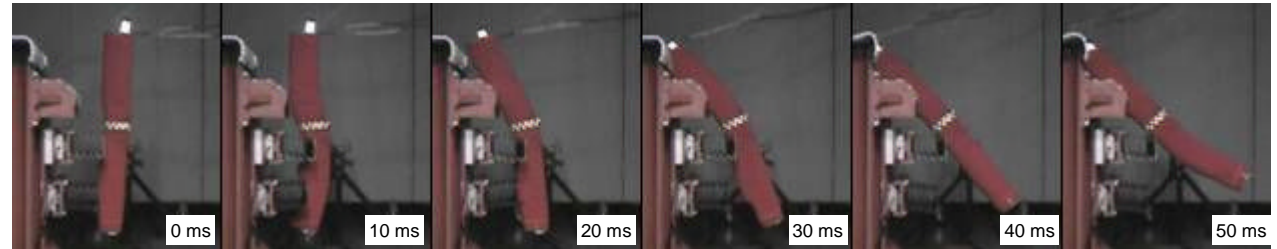
	unit	Max.
Femur-3	(Nm)	137.9
Femur-2	(Nm)	207.1
Femur-1	(Nm)	231.8
Tibia-1	(Nm)	331.2
Tibia-2	(Nm)	266.5
Tibia-3	(Nm)	208.1
Tibia-4	(Nm)	132.5
Knee-ACL	(mm)	8.3
Knee-PCL	(mm)	3.6
Knee-MCL	(mm)	15.9



Test Results

Simplified Car Model (T04) \Leftarrow Flex-GT, $H_1 = \text{base} + 50 \text{ mm}$

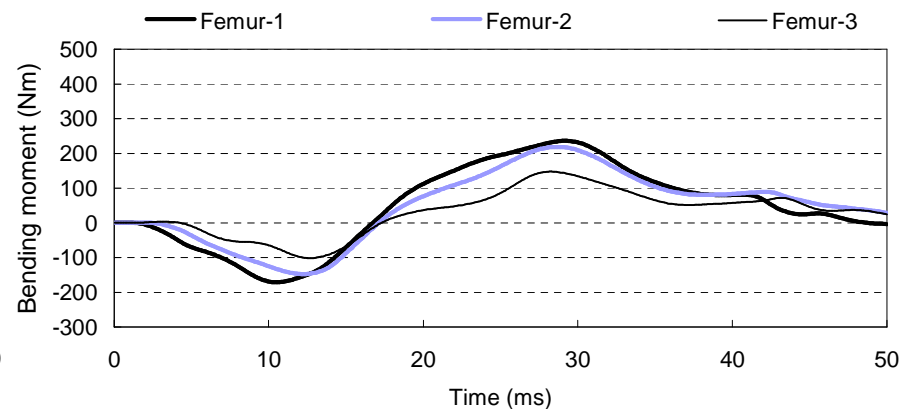
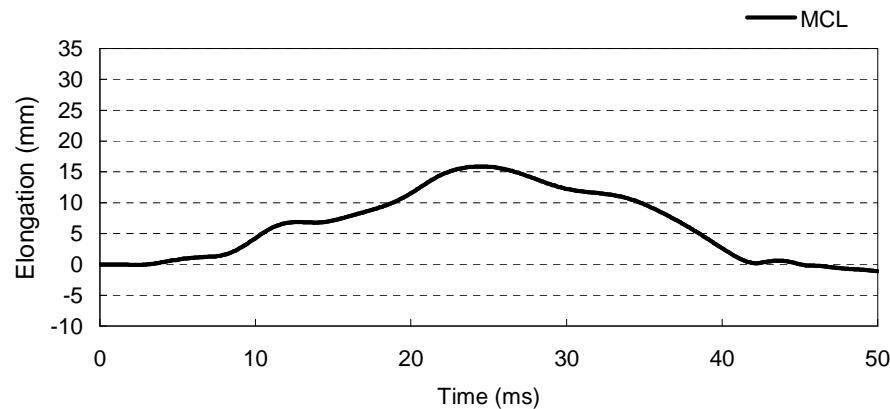
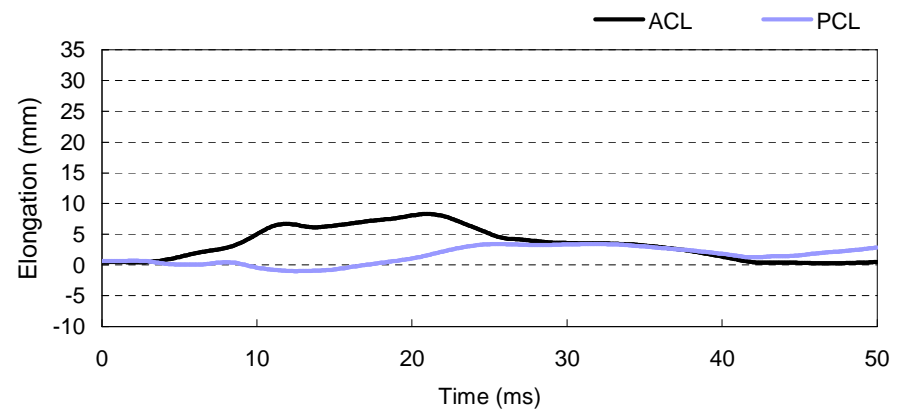
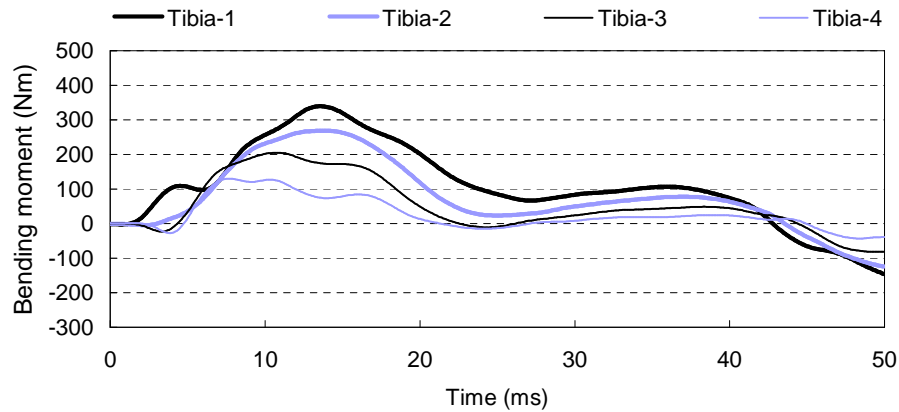
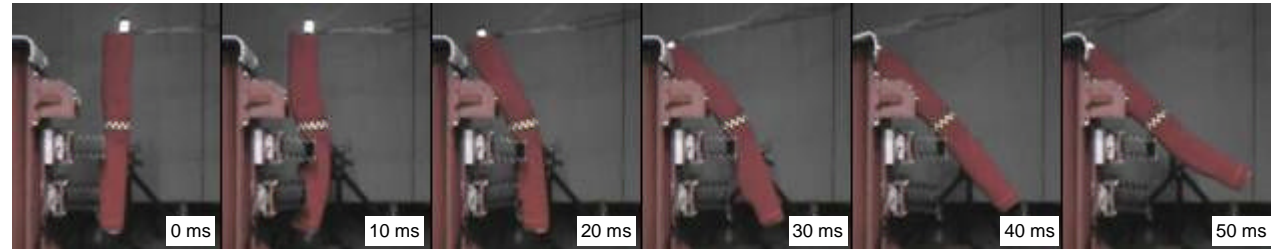
	unit	Max.
Femur-3	(Nm)	148.4
Femur-2	(Nm)	218.6
Femur-1	(Nm)	235.7
Tibia-1	(Nm)	333.7
Tibia-2	(Nm)	266.2
Tibia-3	(Nm)	209.2
Tibia-4	(Nm)	131.3
Knee-ACL	(mm)	8.4
Knee-PCL	(mm)	3.5
Knee-MCL	(mm)	16.3



Test Results

Simplified Car Model (T05) \Leftarrow Flex-GT, $H_1 = \text{base} + 50 \text{ mm}$

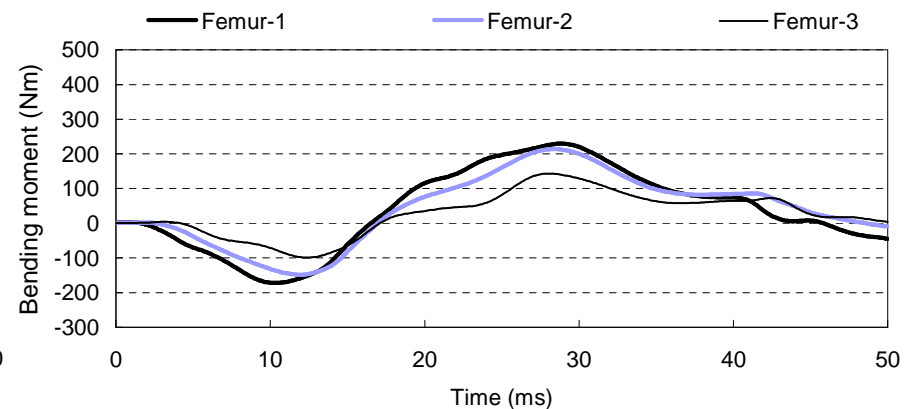
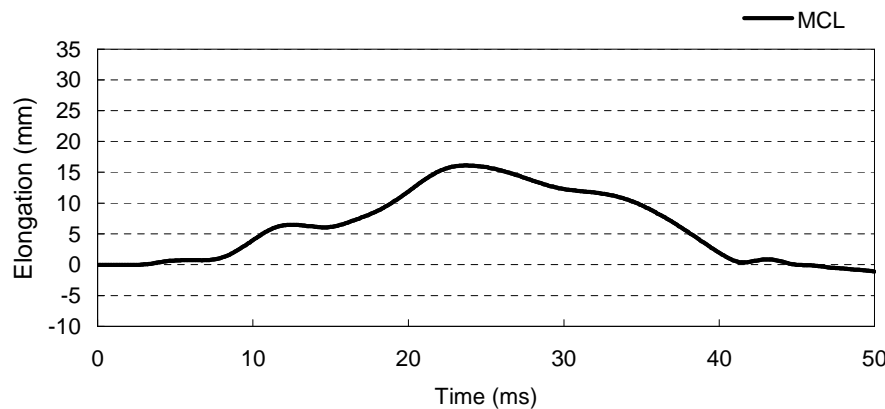
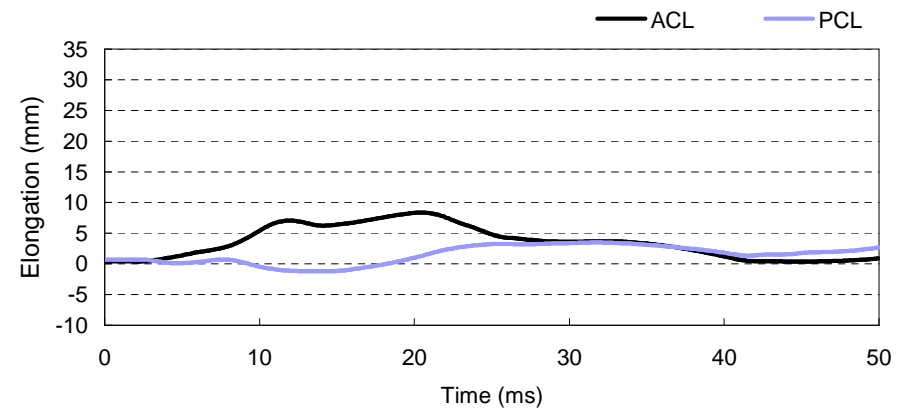
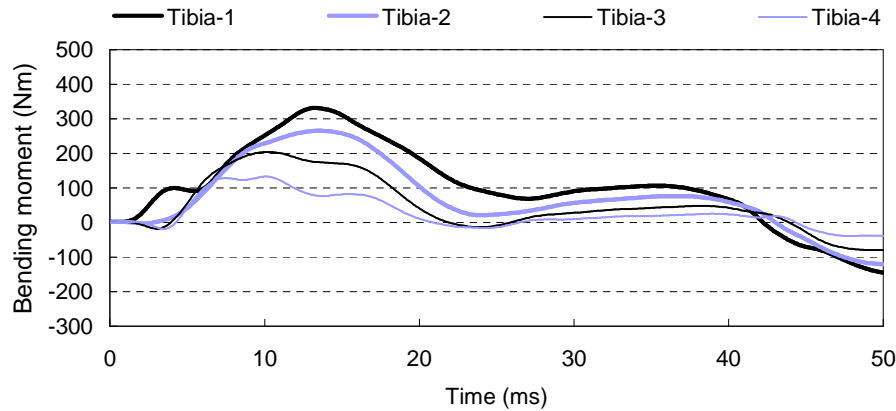
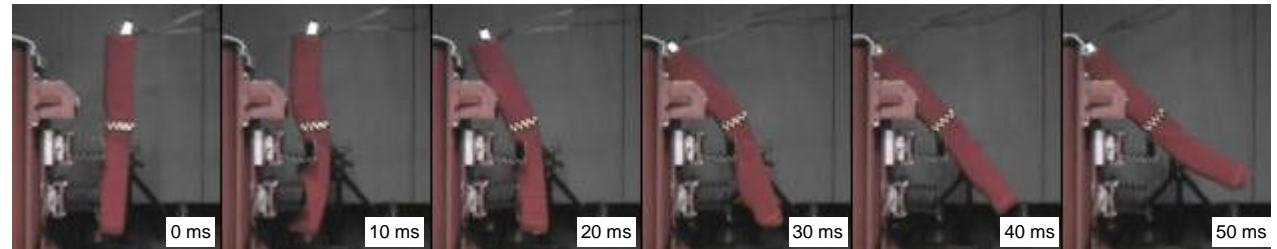
	unit	Max.
Femur-3	(Nm)	147.5
Femur-2	(Nm)	218.7
Femur-1	(Nm)	236.3
Tibia-1	(Nm)	339.2
Tibia-2	(Nm)	268.9
Tibia-3	(Nm)	204.9
Tibia-4	(Nm)	129.5
Knee-ACL	(mm)	8.3
Knee-PCL	(mm)	3.4
Knee-MCL	(mm)	15.9



Test Results

Simplified Car Model (T06) \Leftarrow Flex-GT, $H_1 = \text{base} + 50 \text{ mm}$

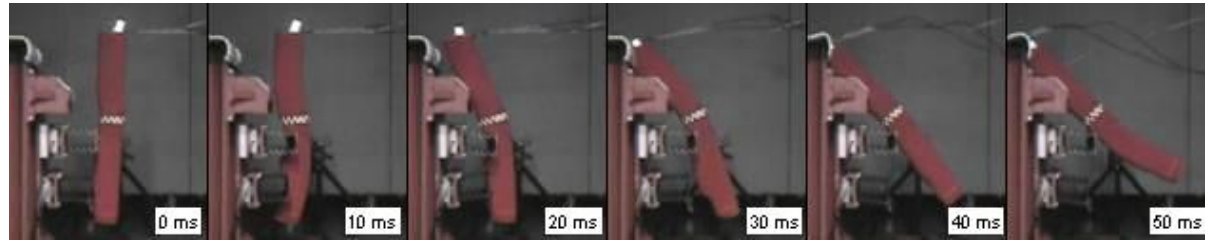
	unit	Max.
Femur-3	(Nm)	143.1
Femur-2	(Nm)	213.7
Femur-1	(Nm)	229.5
Tibia-1	(Nm)	331.5
Tibia-2	(Nm)	266.1
Tibia-3	(Nm)	204.3
Tibia-4	(Nm)	133.0
Knee-ACL	(mm)	8.4
Knee-PCL	(mm)	3.5
Knee-MCL	(mm)	16.1



Comparison of Test Results

Comparisons Kinematics

T01



T02



T03



T04



T05

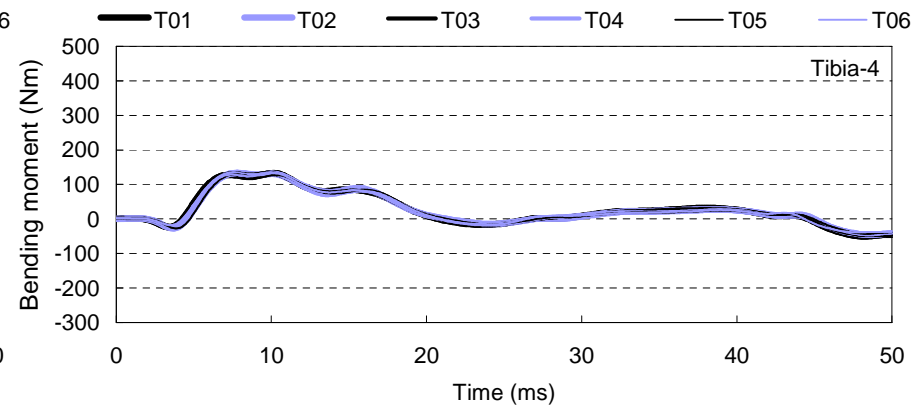
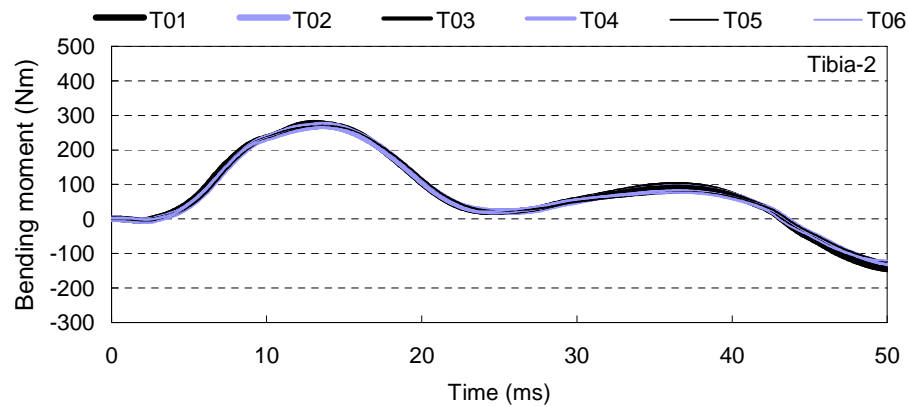
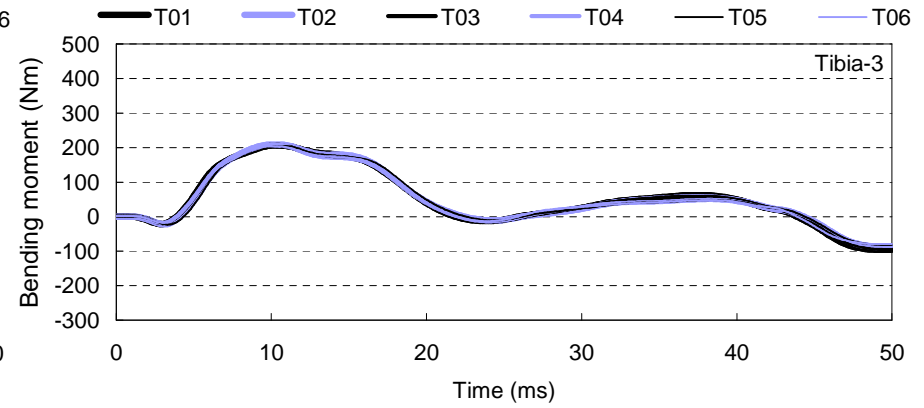
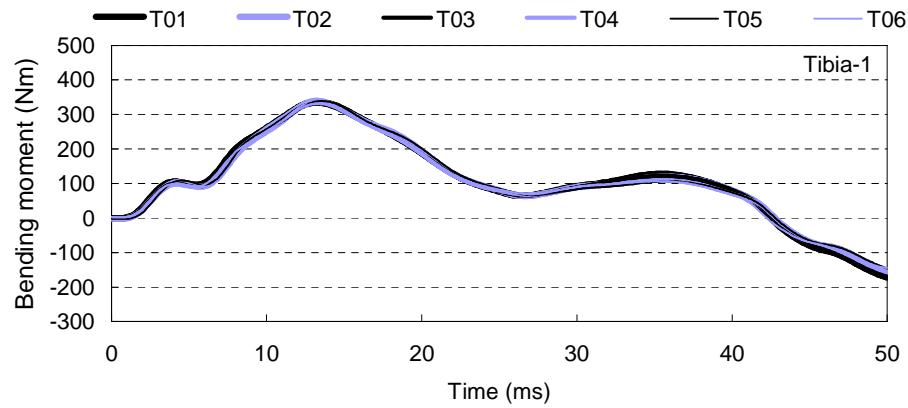


T06



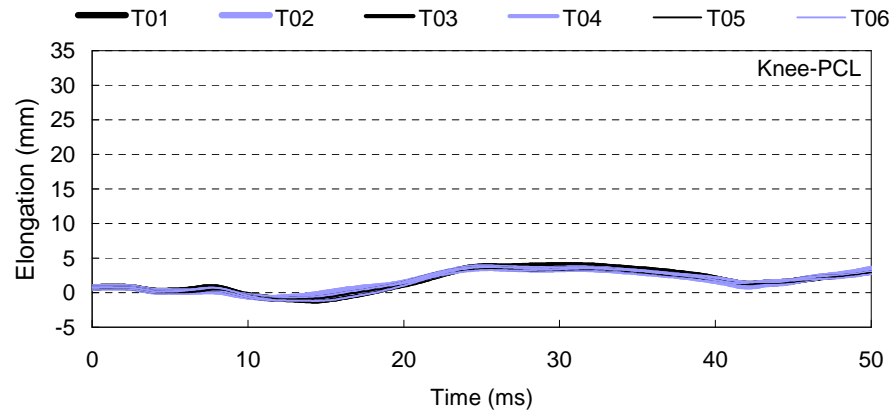
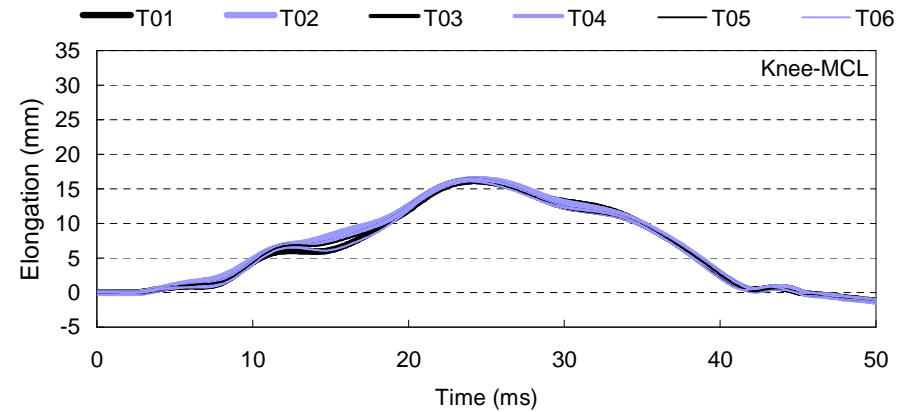
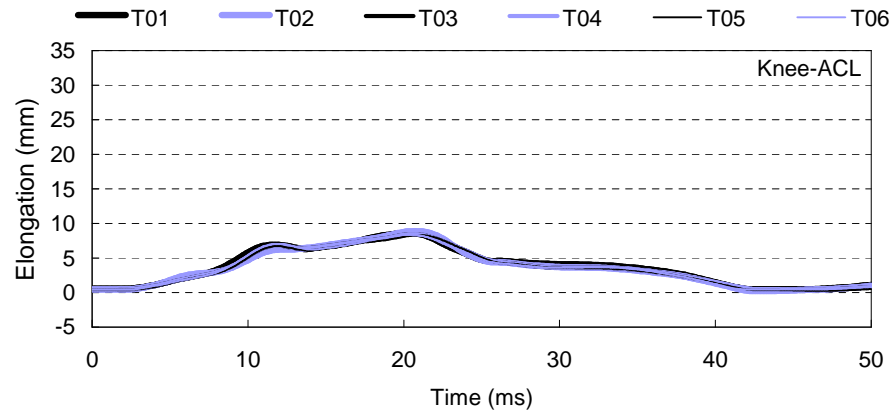
Comparisons

Wave form: Tibia-1, Tibia-2, Tibia-3, Tibia-4



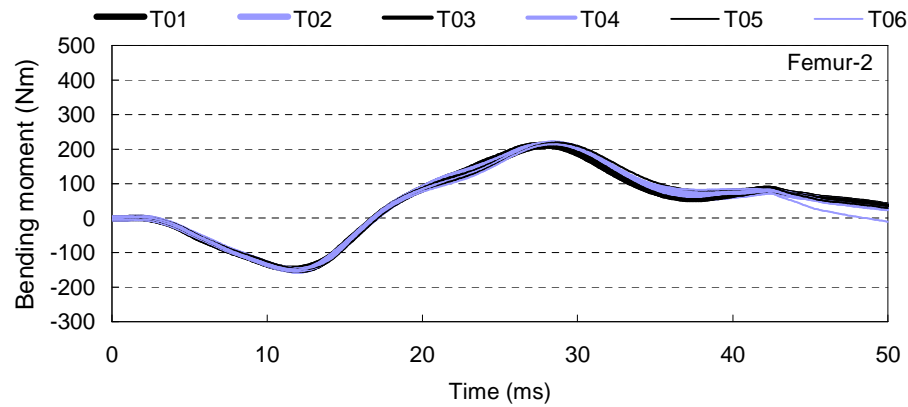
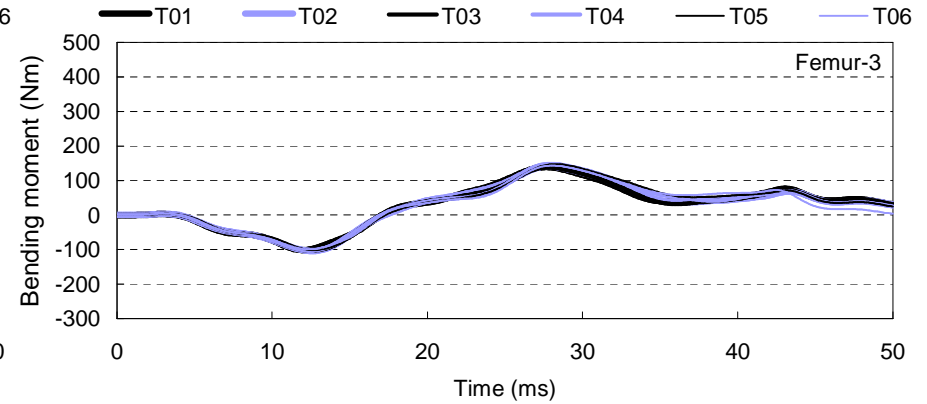
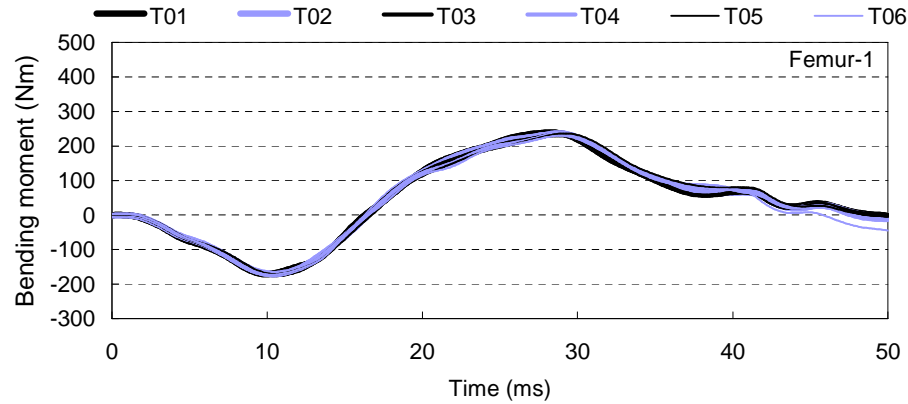
Comparisons

Wave form: Knee-ACL, Knee-PCL, Knee-MCL



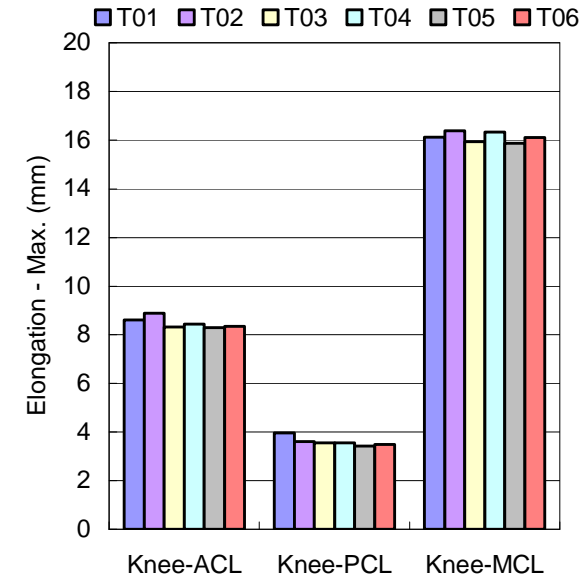
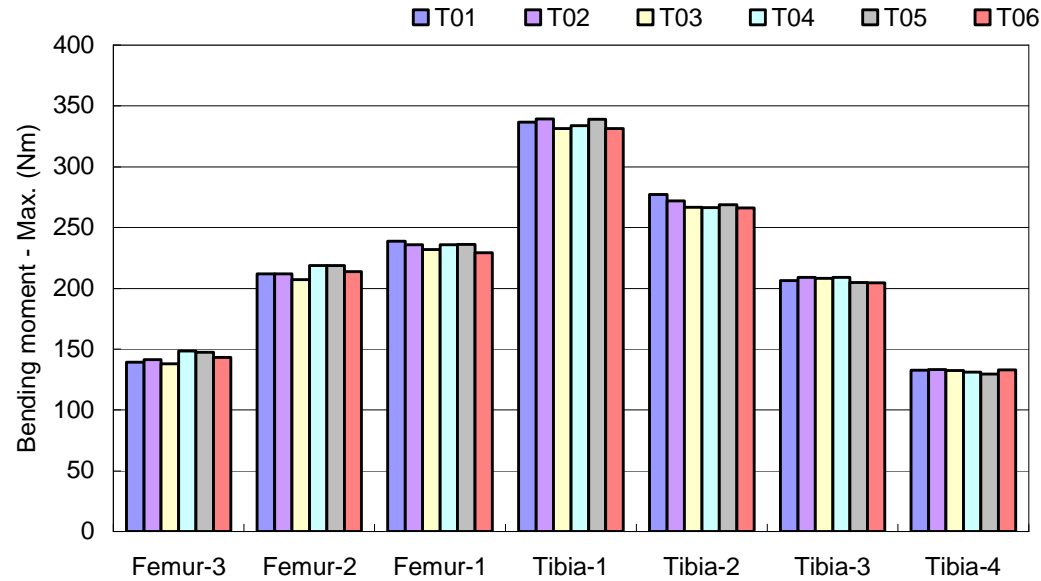
Comparisons

Wave form: Femur-1, Femur-2, Femur-3



Comparisons

Maximum Values



	Femur-3	Femur-2	Femur-1	Tibia-1	Tibia-2	Tibia-3	Tibia-4
Avg. (Nm)	143	214	235	335	269	207	132
SD (Nm)	4.32	4.43	3.39	3.65	4.41	2.10	1.47
CV	3.0%	2.1%	1.4%	1.1%	1.6%	1.0%	1.1%
Assessment	Good	Good	Good	Good	Good	Good	Good

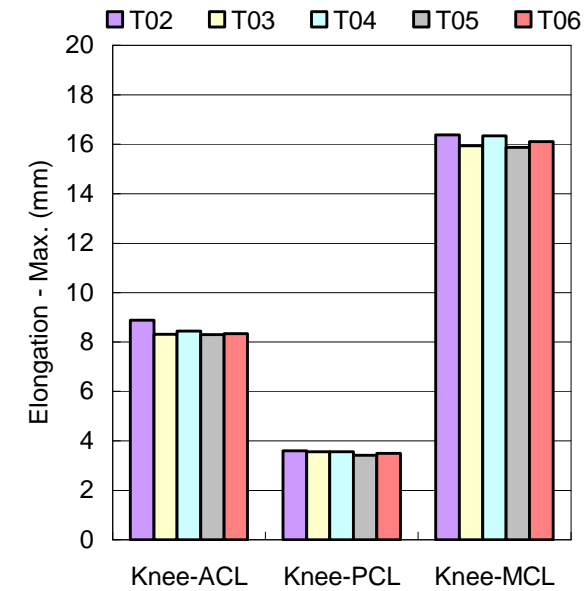
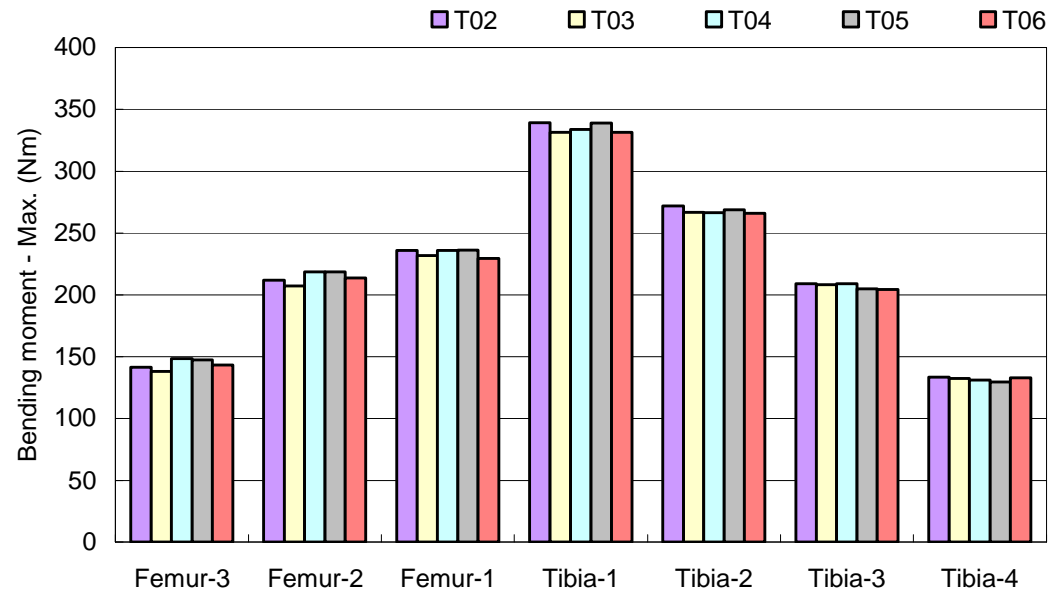
	Knee-ACL	Knee-PCL	Knee-MCL
Avg. (mm)	8.5	3.6	16.1
SD (mm)	0.22	0.18	0.21
CV	2.6%	5.1%	1.3%
Assessment	Good	Acceptable	Good

SD: Standard deviation, CV: SD/Avg.

Good: less than 5%, Acceptable: from 5% to less than 7 %, Marginal: from 7% to less than 10 %, Not Acceptable: over 10 %

Comparisons

Maximum Values (excludes T01 (40.7km/h) test result)



	Femur-3	Femur-2	Femur-1	Tibia-1	Tibia-2	Tibia-3	Tibia-4	Knee-ACL	Knee-PCL	Knee-MCL
Avg. (Nm)	144	214	234	335	268	207	132	8.5	3.5	16.1
SD (Nm)	4.36	4.87	3.04	4.02	2.52	2.33	1.60	0.24	0.07	0.23
CV	3.0%	2.3%	1.3%	1.2%	0.9%	1.1%	1.2%	2.9%	1.9%	1.5%
Assessment	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good

SD: Standard deviation, CV: SD/Avg.

Good: less than 5%, Acceptable: from 5% to less than 7 %, Marginal: from 7% to less than 10 %, Not Acceptable: over 10 %