KATRI Round Robin Tests Using the Flex-GTR-Prototype (SN03)

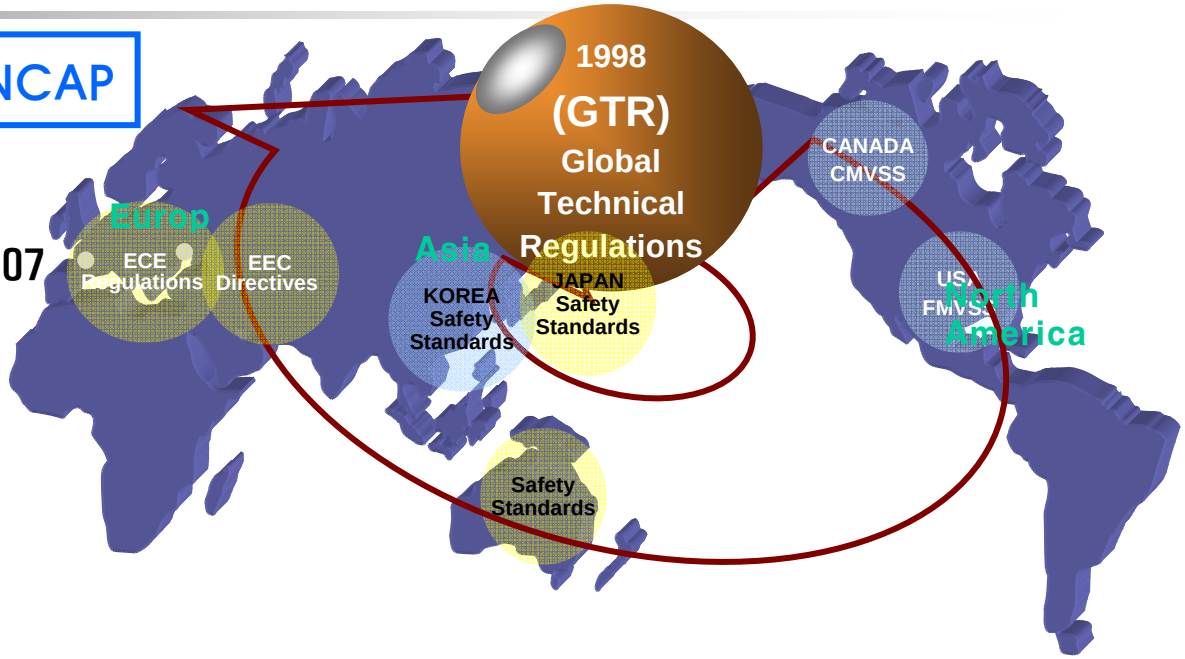
Dec. 1-2, 2009

Ministry of Land, Transport and Maritime Affairs (MLTM)
Korea Automobile Testing and Research Institute (KATRI)

Background

Introduction of Regulation & K-NCAP

- Pedestrian protection (K-NCAP)
  - ✓ Headform test had been Started since 2007
  - ✓ Legform test was added since 2008
- Pedestrian protection (Regulation)
  - ✓ Published Year : 2008. 12
  - ✓ Application : New vehicle (2013)
    Old vehicle (2018)



KATRI Round Robin Test Using the Flex-GTR-Prototype

- Tests were part of the round robin testing with Flex-GTR-Prototype no3
- Tests were conducted by KATRI from late September to early October
- The purpose of test is check for repeatability, usability and durability of Flex-PLi by real vehicle impact

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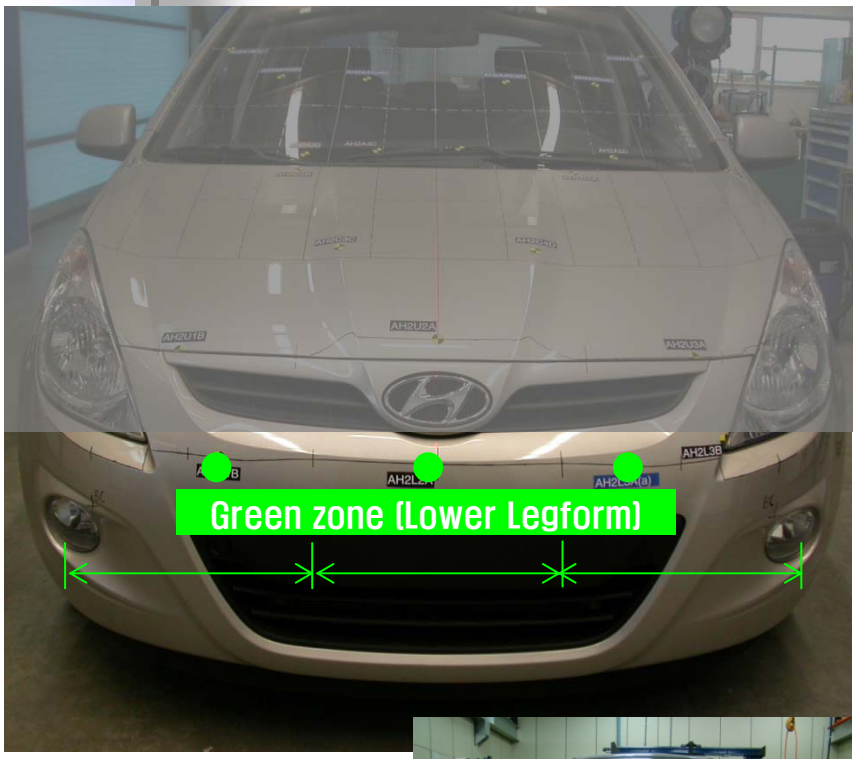
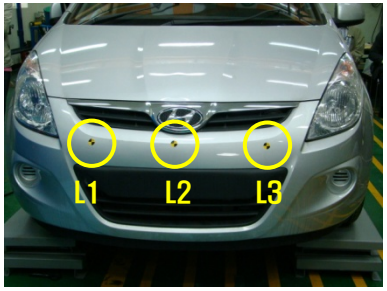
Introduction of Test Vehicle and Test Method





Test Vehicle

- Vehicle meets the criteria of the TRL-LFI to test according to existing legislation
- Vehicle was rated completely green in the TRL-LFI to tests of Euro-NCAP
- Vehicle is considered to be pedestrian friendly in this area

Test Method

Impactor type	Flex-PLi-GTR Prototype
Impact velocity	11.1±0.2m/s
Impact zone	EEVC WG17 LFI by EURO NCAP (Green zone)
Impact point	Same point 2 Same vehicles
Impact times	3 Impact per 1 Vehicle
Impact Height	75mm (From ground level)

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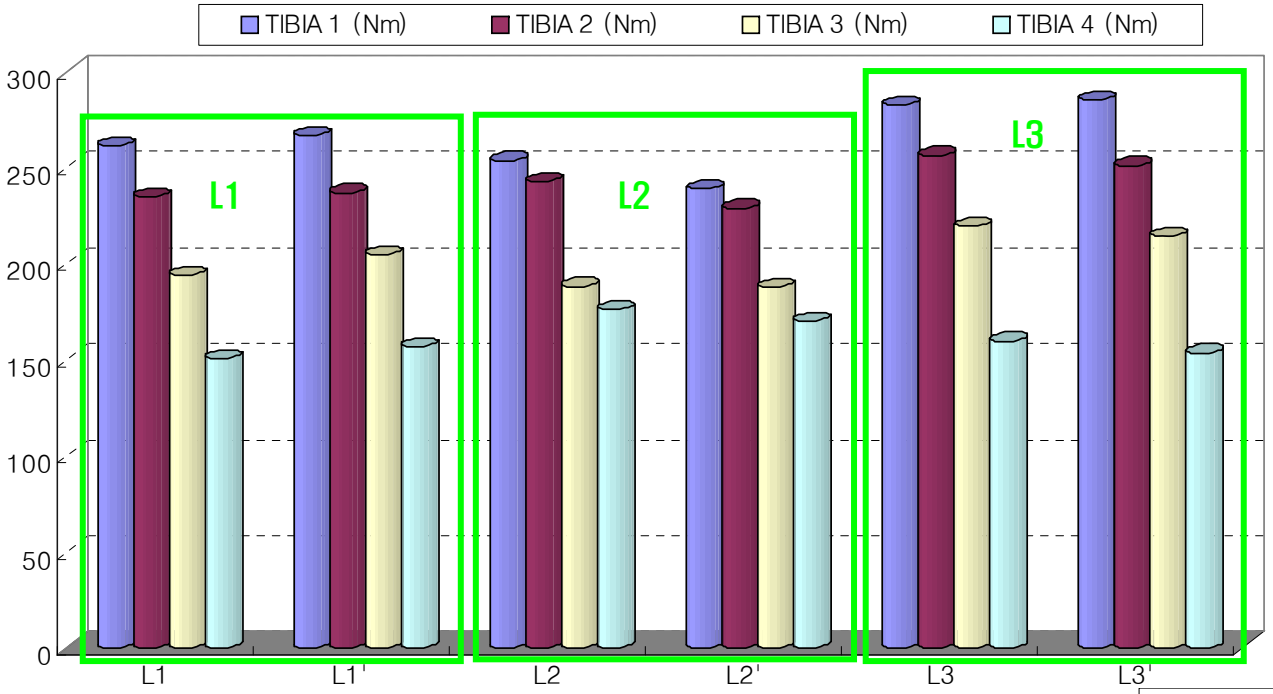
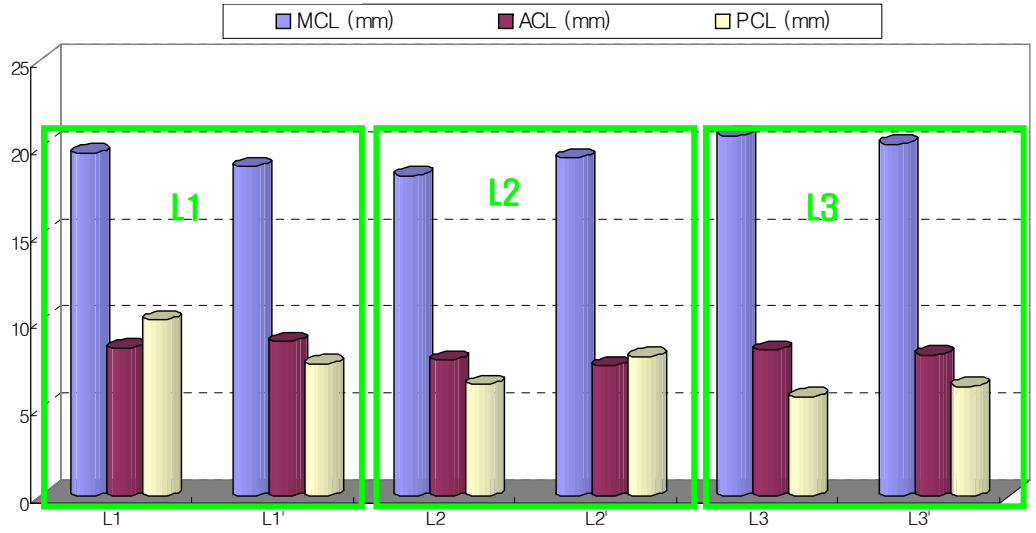
Test Result of Flex-PLi Prototype for the vehicle





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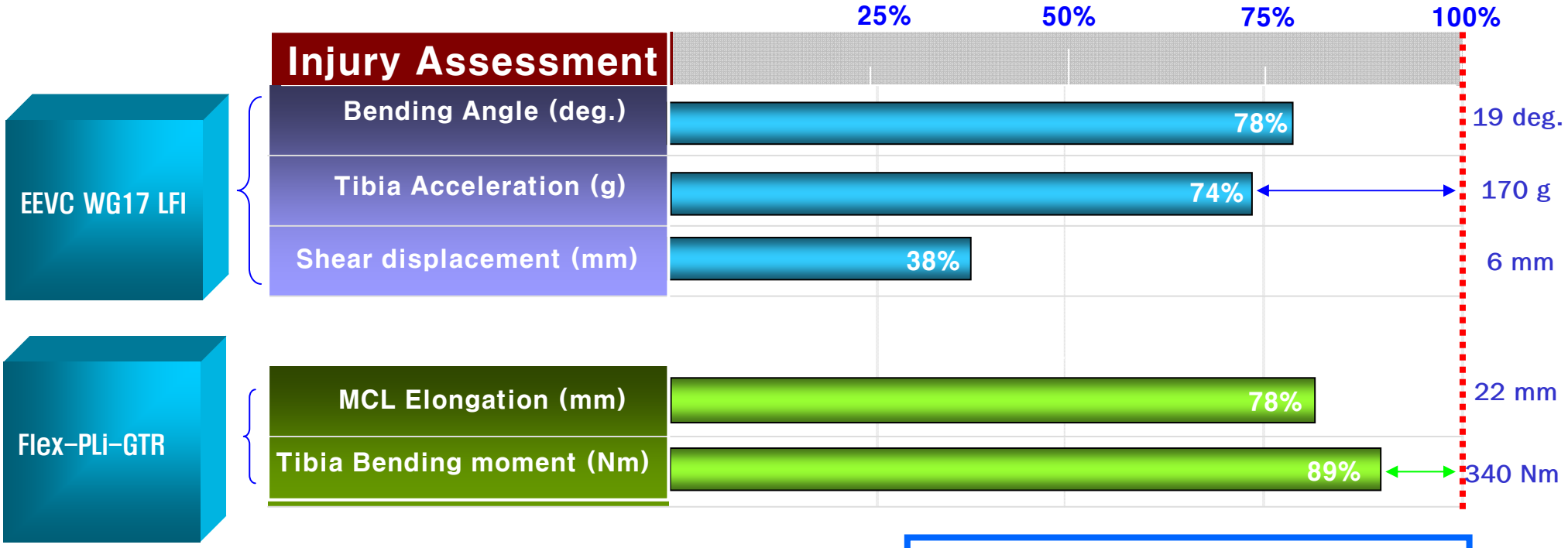
Comparison between EEVC WG17 LFI and Flex-PLi-GTR



- Bending limitation of 19 deg.
  -> MCL Elongation : 22mm
- Tibia Acceleration limitation of 170g
  -> Tibia Bending moment : 340Nm

- Shear displacement limitation of 6mm
  -> ACL/PCL Elongation : 13mm

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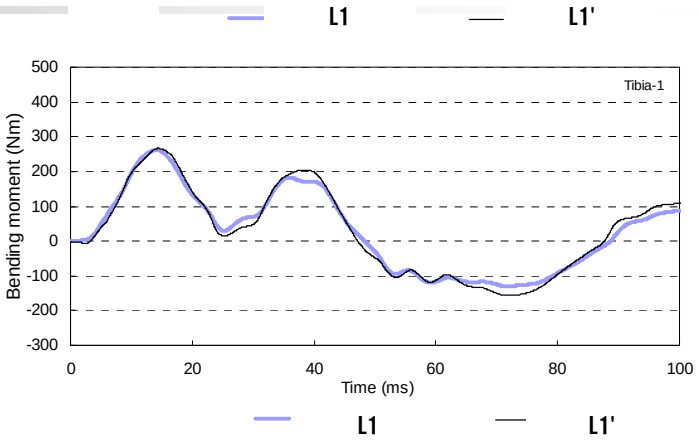
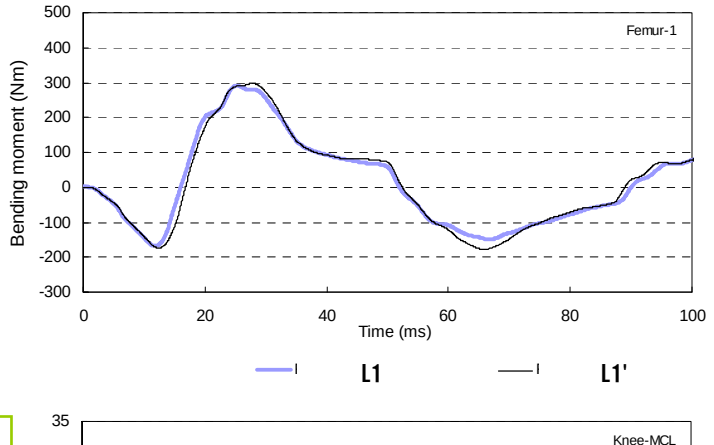
Repeatability for Flex-PLi Prototype

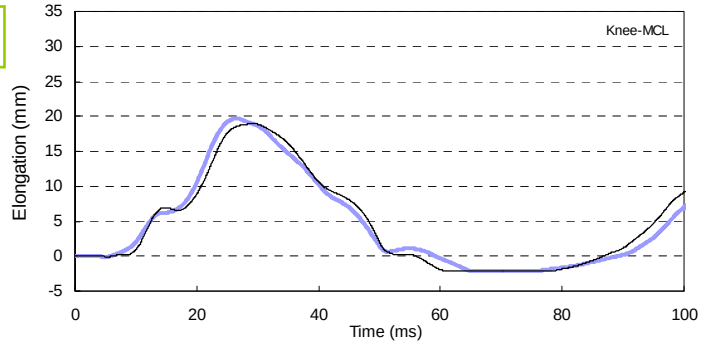
Tibia (Nm)



Femur (Nm)



Knee (mm)



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Repeatability for Flex-PLi Prototype

		TIBIA 1 (Nm)	TIBIA 2 (Nm)	TIBIA 3 (Nm)	TIBIA 4 (Nm)	MCL (mm)	ACL (mm)	PCL (mm)
L1	L1	261.4	234.9	194.1	150.5	19.7	8.5	10.1
	L1'	266.7	237	204.7	156.9	18.9	8.9	7.6
	MEAN	264.05	235.95	199.4	153.7	19.3	8.7	8.85
	ST.DEV	3.7477	1.4849	7.4953	4.5255	0.5657	0.2828	1.7678
	C.V	0.0142	0.0063	0.0376	0.0294	0.0293	0.0325	0.1997
	C.V(%)	1.42	0.63	3.76	2.94	2.93	3.25	19.97
L2		TIBIA 1 (Nm)	TIBIA 2 (Nm)	TIBIA 3 (Nm)	TIBIA 4 (Nm)	MCL (mm)	ACL (mm)	PCL (mm)
	L2	253.6	242.7	188.1	175.9	18.4	7.8	6.4
	L2'	239	228.8	187.9	170.2	19.4	7.5	8
	MEAN	246.3	235.75	188	173.05	18.9	7.65	7.2
	ST.DEV	10.324	9.8288	0.1414	4.0305	0.7071	0.2121	1.1314
	C.V	0.0419	0.0417	0.0008	0.0233	0.0374	0.0277	0.1571
	C.V(%)	4.19	4.17	0.08	2.33	3.74	2.77	15.71
L3		TIBIA 1 (Nm)	TIBIA 2 (Nm)	TIBIA 3 (Nm)	TIBIA 4 (Nm)	MCL (mm)	ACL (mm)	PCL (mm)
	L3	282.6	256.4	219.4	159.7	20.7	8.4	5.7
	L3'	285.4	251.1	214.3	153.4	20.2	8.1	6.3
	MEAN	284	253.75	216.85	156.55	20.45	8.25	6
	ST.DEV	1.9799	3.7477	3.6062	4.4548	0.3536	0.2121	0.4243
	C.V	0.007	0.0148	0.0166	0.0285	0.0173	0.0257	0.0707
	C.V(%)	0.70	1.48	1.66	2.85	1.73	2.57	7.07

CV = 3%	3% < CV = 7%	7% < CV = 10%	CV > 10
good	acceptable	marginal	not acceptable

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Conclusion

KATRI have conducted the round robin test for Flex-PLi-GTR and as the result,

- Comparison between EEVC WG17 LFI and Flex-PLi-GTR for same vehicle
  - ✓ Vehicle meets the criteria of EEVC WG17 LFI is also to meet Flex-PLi-GTR
  - ✓ In spite of meeting regulation, The margin of Flex-PLi is shorter than EEVC WG17 LFI
  - ✓ This result should not apply for every vehicle, it is only applicable to our tested vehicle
- Repeatability
  - ✓ Almost Good(62%) and Acceptable(24%) but some happened not acceptable level(9%)
- Durability and Usability
  - ✓ No serious issues on the durability and usability
- Some improvements are needed
  - ✓ As for Design and Durability : No sharp edges and No fracture especially zipper
  - ✓ As for Usability : More convenient and automatic control program
  - ✓ As for stability : Better data download and electrical ground connection

※ More consideration is necessary to unexpected and without-control rebound phenomenon

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