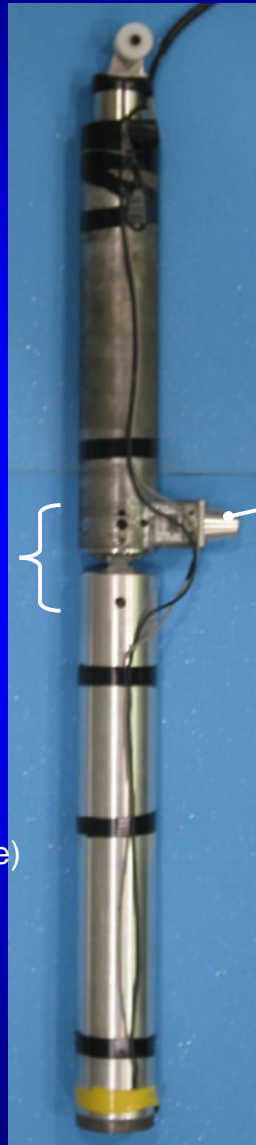


**Information on the Flexible Pedestrian
Legform Impactor (Flex-PLI)
from J-MLIT Research**

**Ministry of Land, Infrastructure and Transport
Government of Japan
(J-MLIT)**

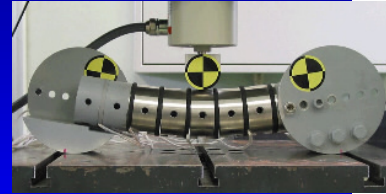
Construction

TRL-LFI

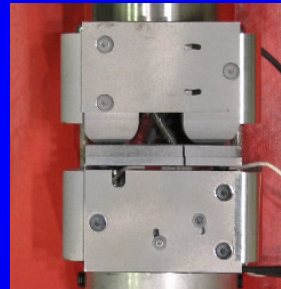


Knee Joint
(Steel Knee Bending Plate)

Flex-PLI 2003



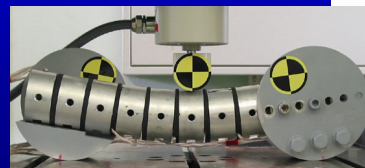
Thigh (RIGID)



Damper

Knee Joint*
(ligament restraint system)

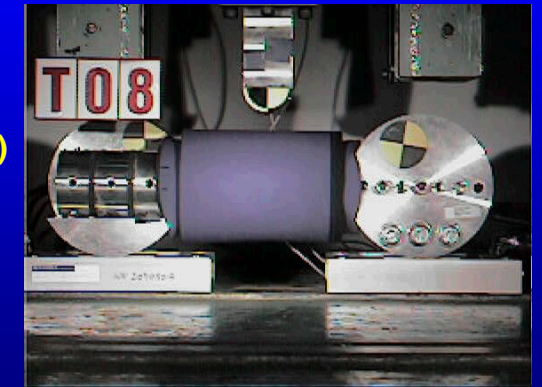
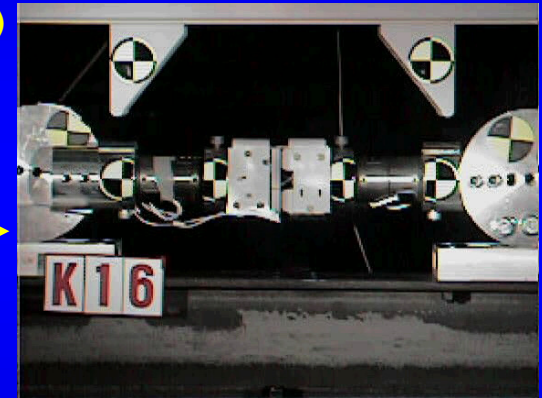
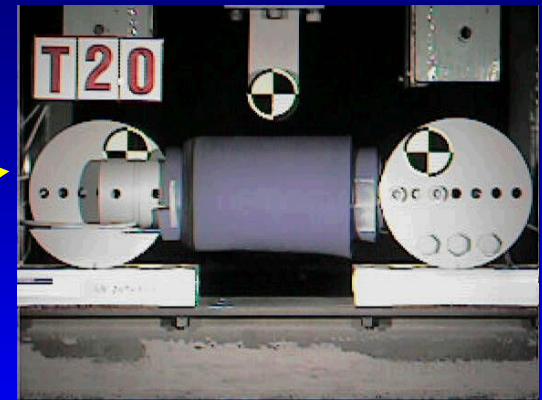
Leg (RIGID)



Thigh (FLEXIBLE)

Leg (FLEXIBLE)

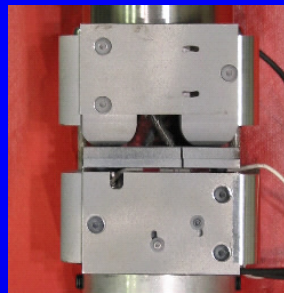
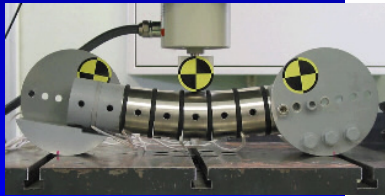
Validation of biofidelity



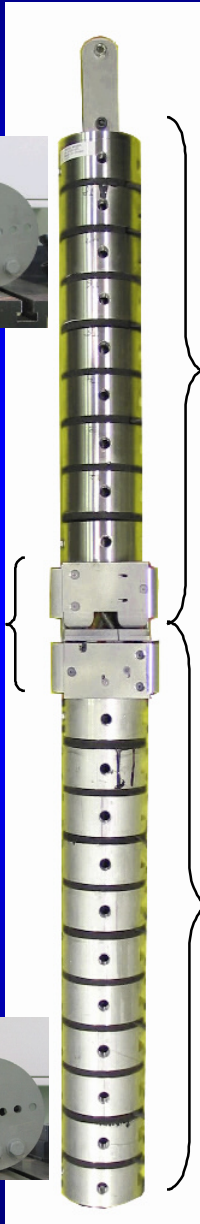
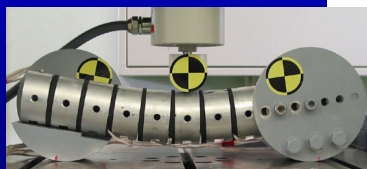
Flex-PLI has higher biofidelic construction than the TRL-LFI

Biofidelity

Flex-PLI 2003



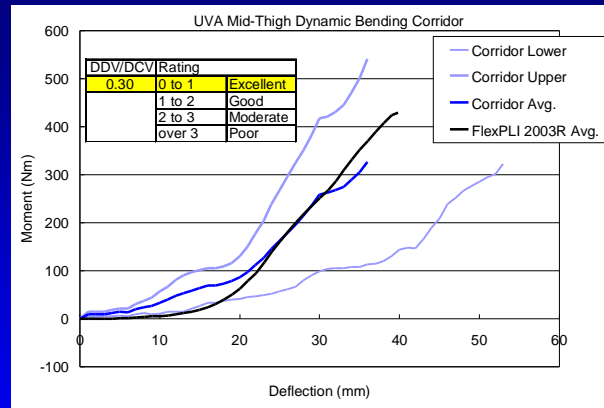
Knee Joint*
(ligament restraint system)



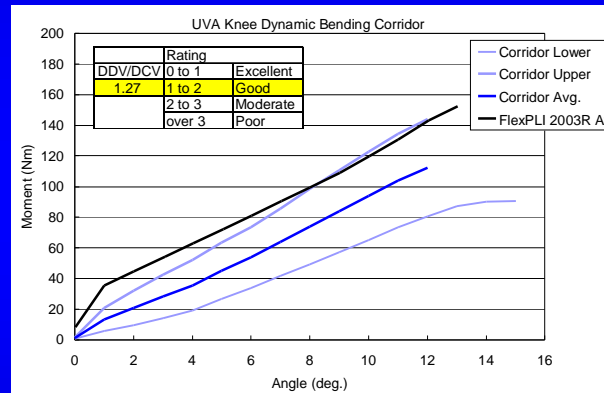
Thigh
(FLEXIBLE)

Leg
(FLEXIBLE)

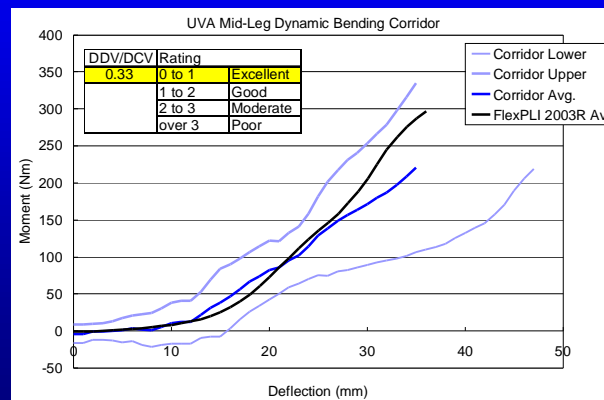
IHRA/PS/290



TRL-LFI
cannot bend



TRL-LFI
stiffer knee joint



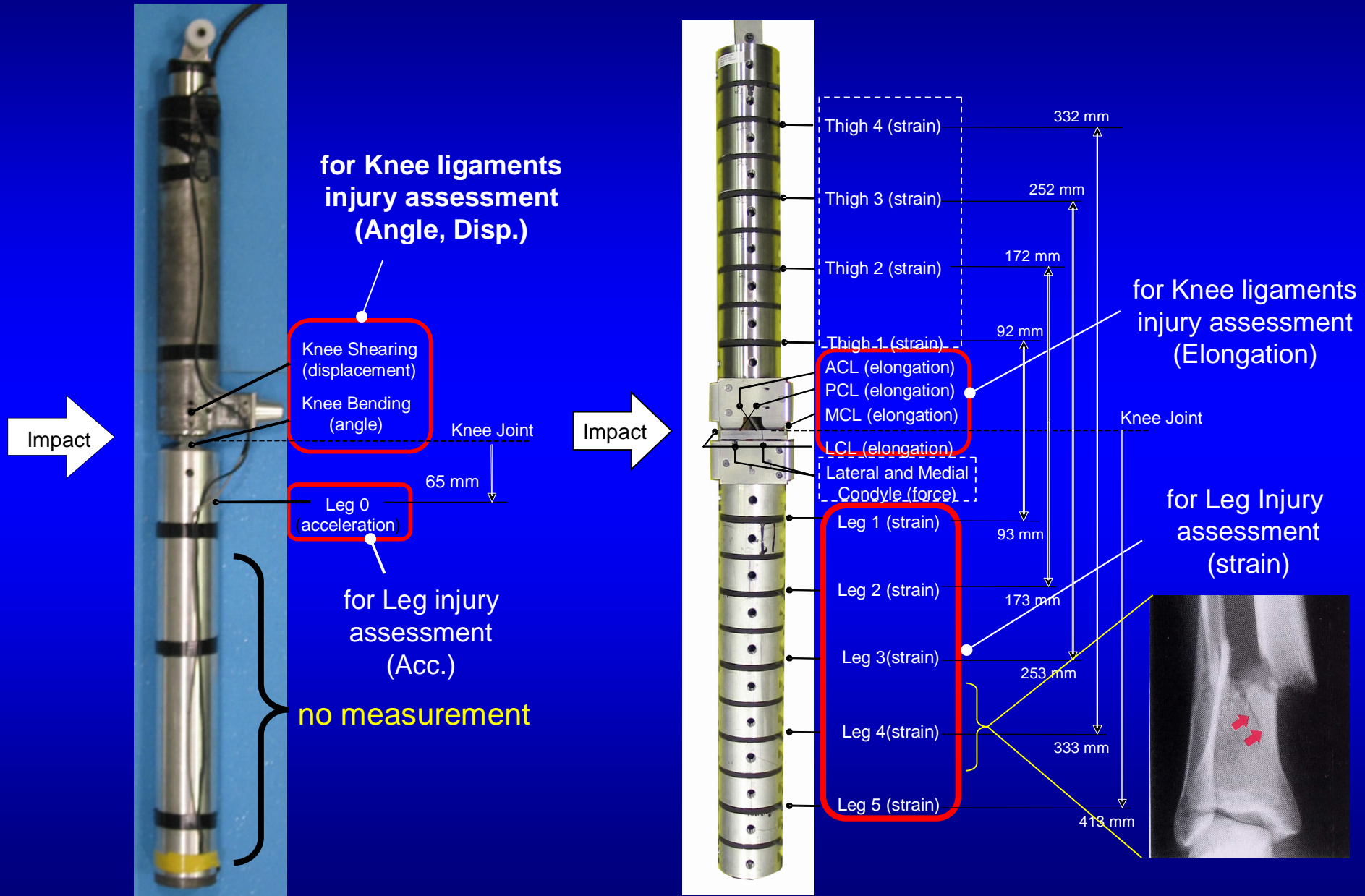
TRL-LFI
cannot bend

Flex-PLI has high biofidelity

Measurement System

TRL-LFI

Flex-PLI 2003



Flex-PLI has higher injury assessment ability than the TRL-LFI

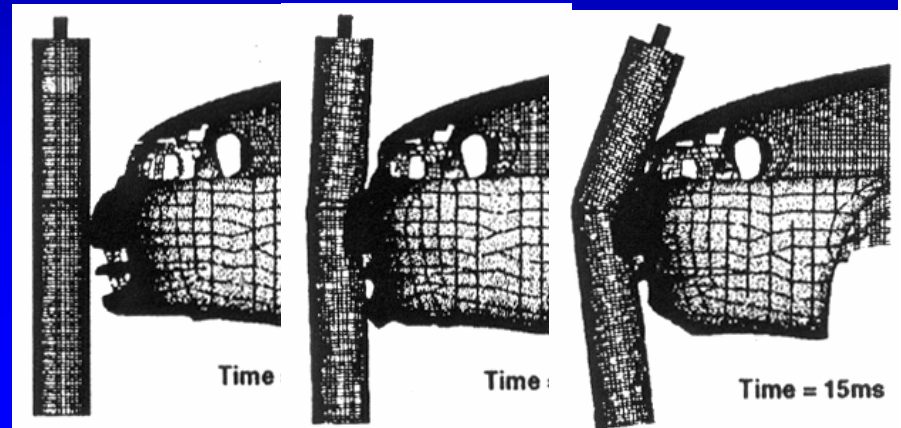
Kinematics

Flex-PLI can simulate human lower extremity bending motion properly.
(TRL-LFI can bend the knee joint portion only)

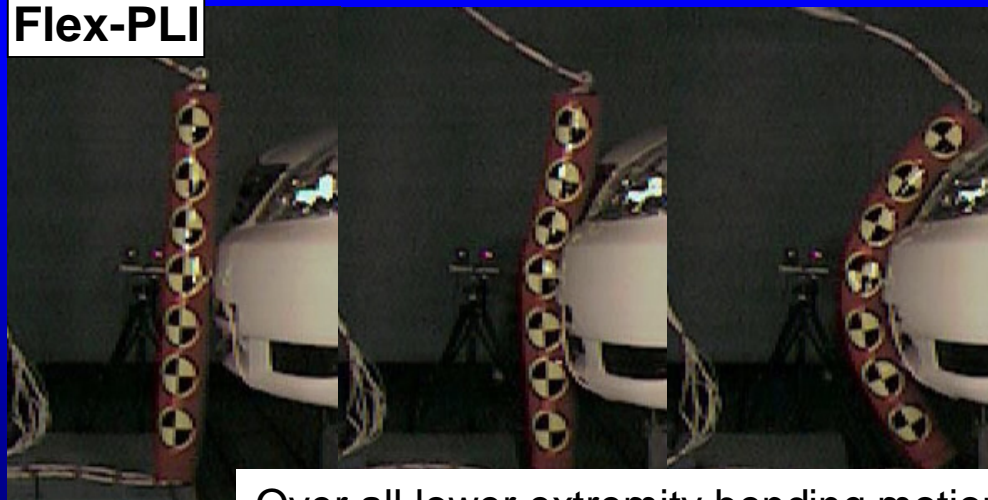
TRL-LFI



FE-Model of TRL-LFI

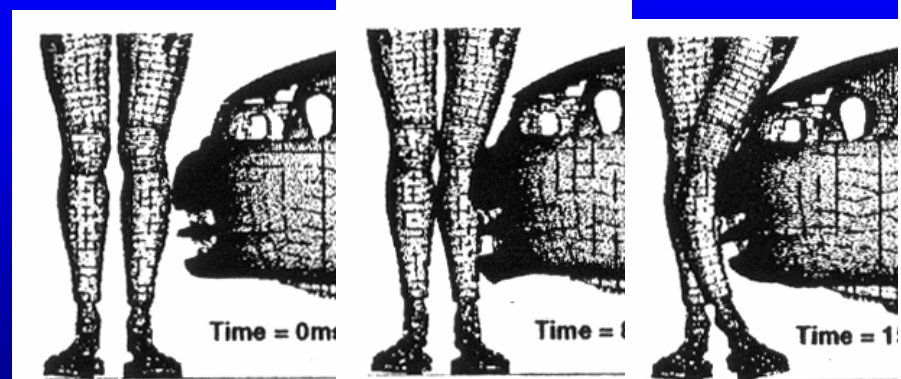


Flex-PLI



Over all lower extremity bending motion is observed.

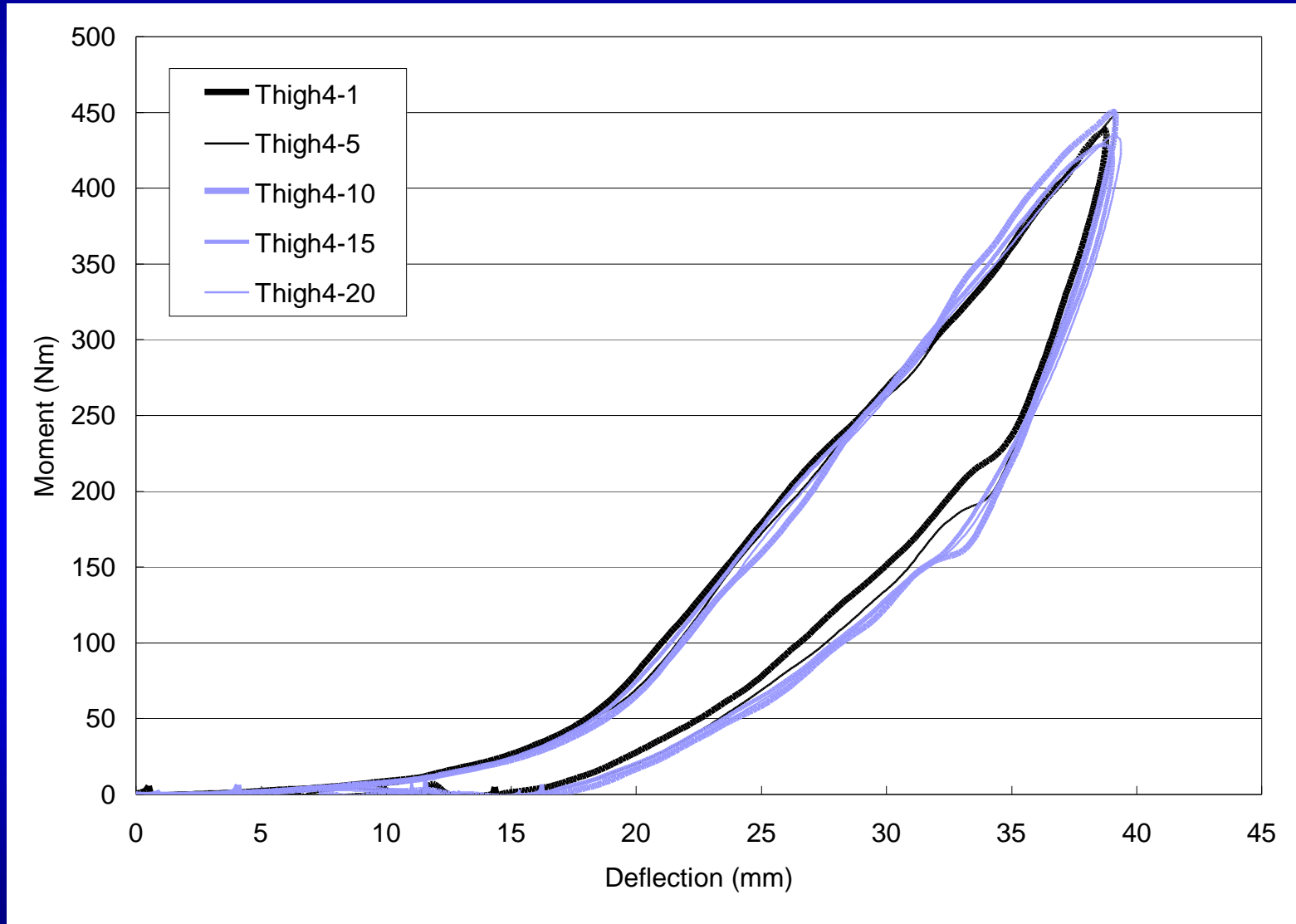
Human FE-Model (THUMS)



JASIC 2003 Report

Repeatability for Thigh in dynamic certification test

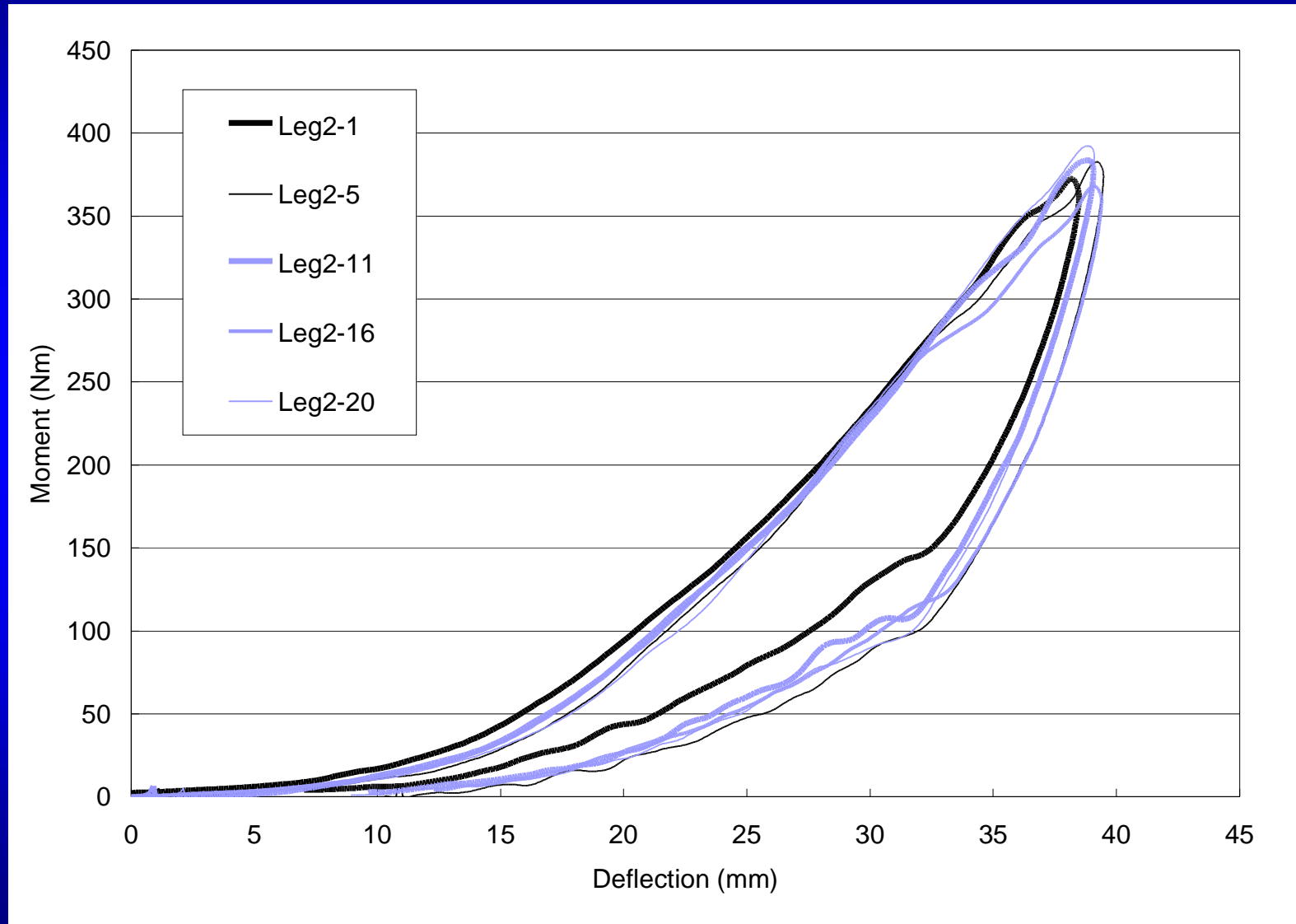
Repeatability test (20 times loading)



Flex-PLI Thigh has high repeatability in dynamic certification test.

Repeatability for Leg in dynamic certification test

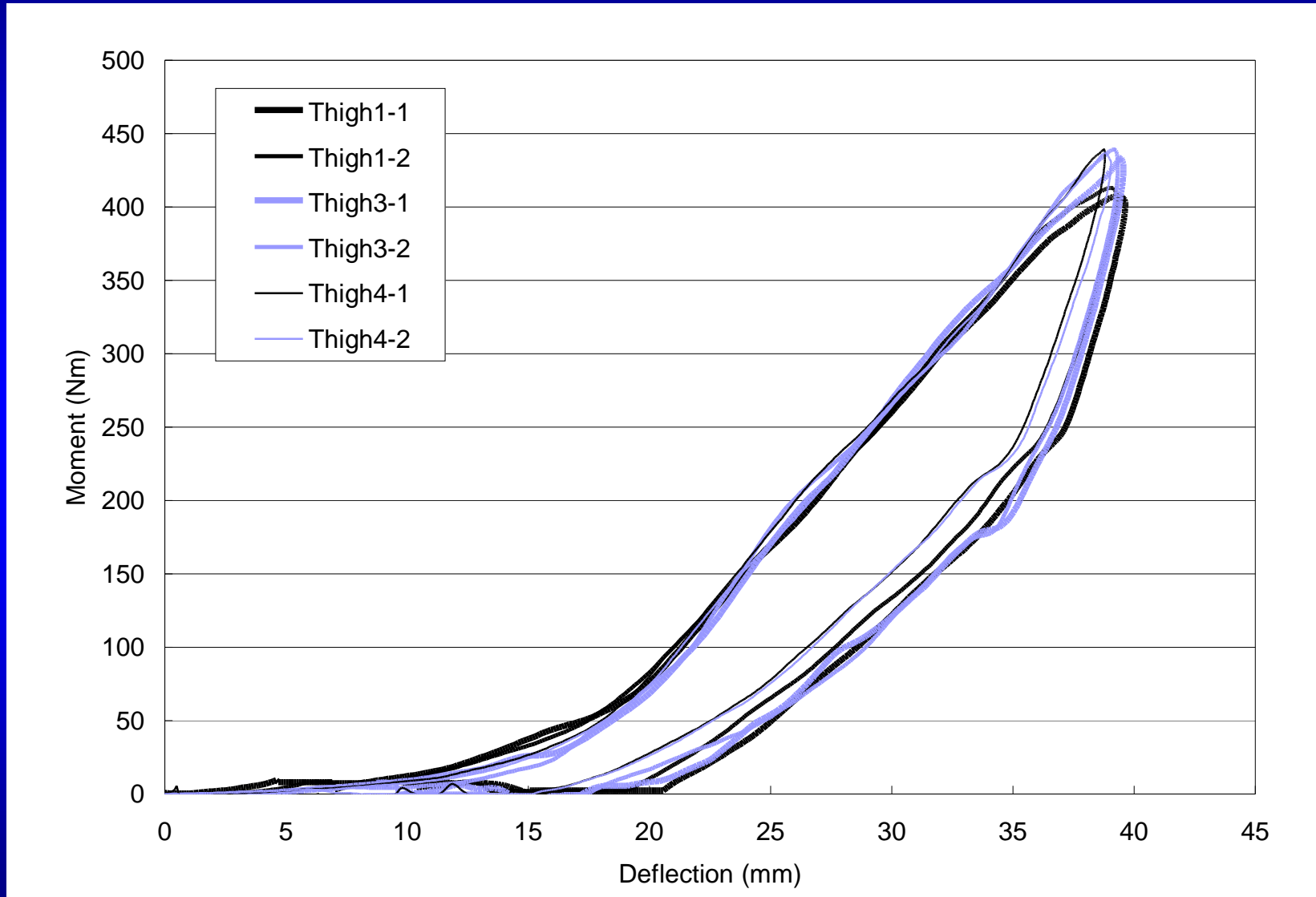
Repeatability test (20 times loading)



Flex-PLI Leg has high repeatability in dynamic certification test.

Re-product-ability for Thigh in dynamic certification test

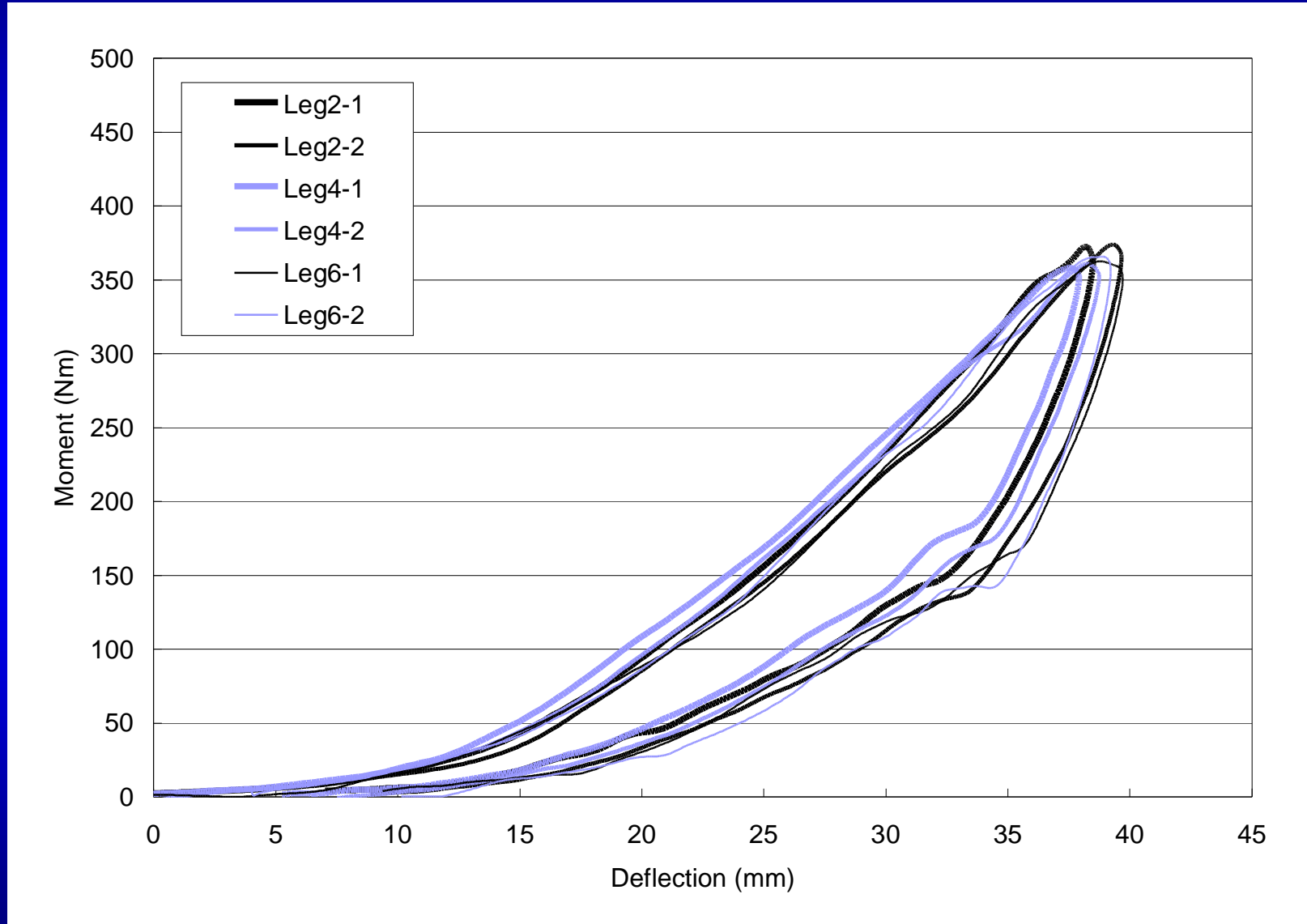
Re-product-ability test (3 products)



Flex-PLI Thigh has high re-product-ability in dynamic certification test.

Re-producta-bility for Leg in dynamic certification test

Re-product-ability test (3 products)



Flex-PLI has high re-product-ability in dynamic certification test.

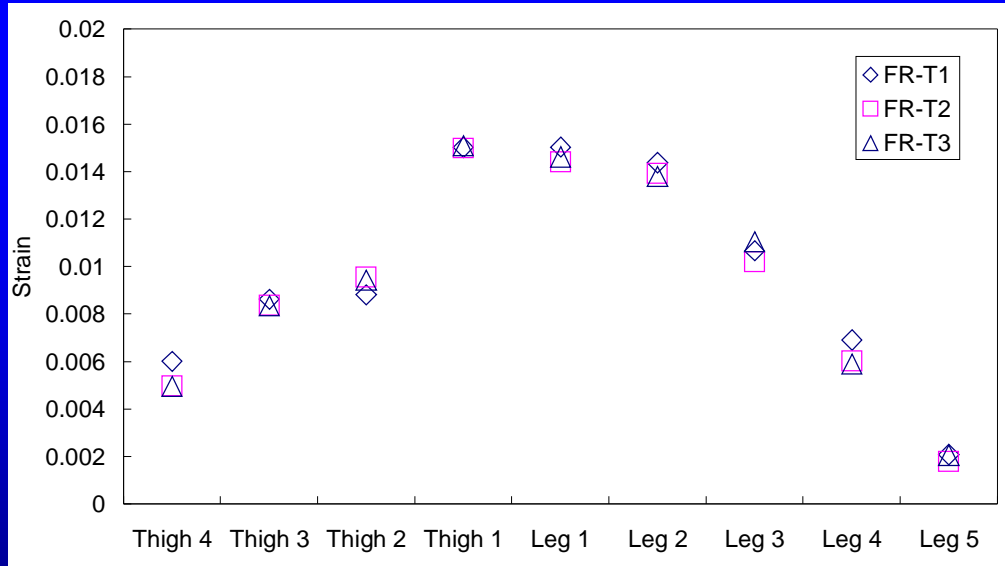
Flex-PLI 2003R Subsystem test



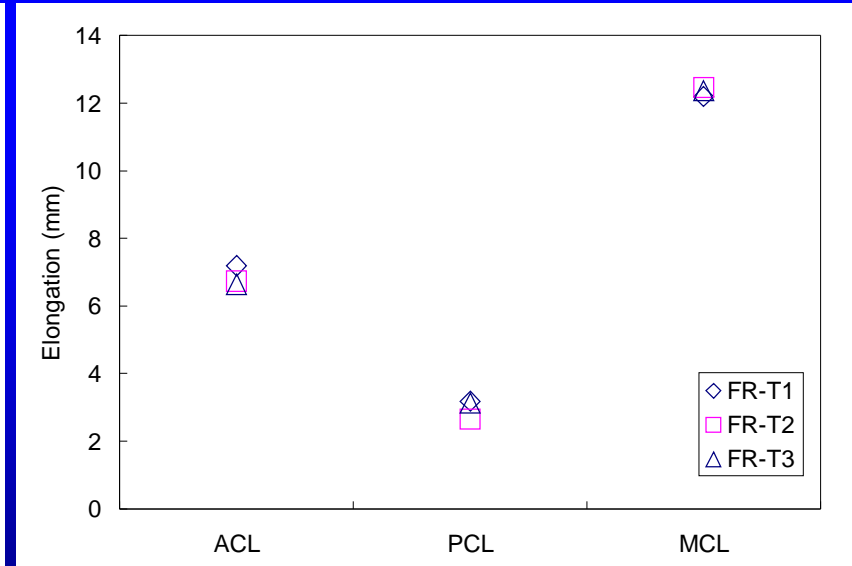
Repeatability in subsystem test



Thigh and Leg (strain)



Knee (ligament elongation)

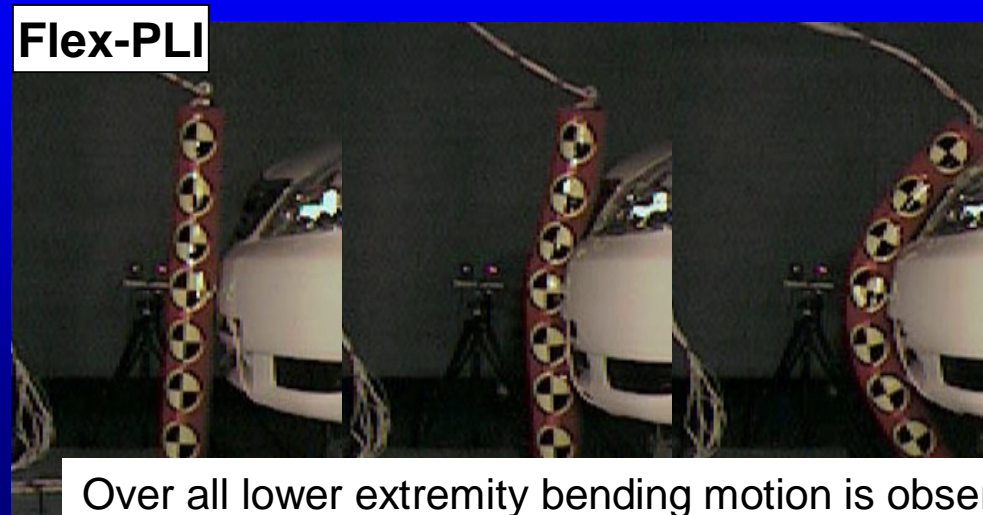
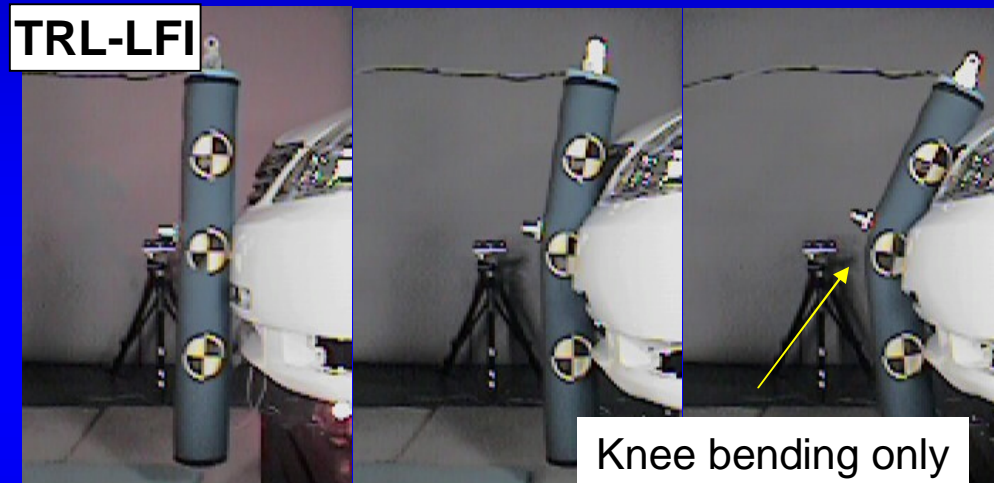


Flex-PLI has high repeatability in subsystem test.

Discussion

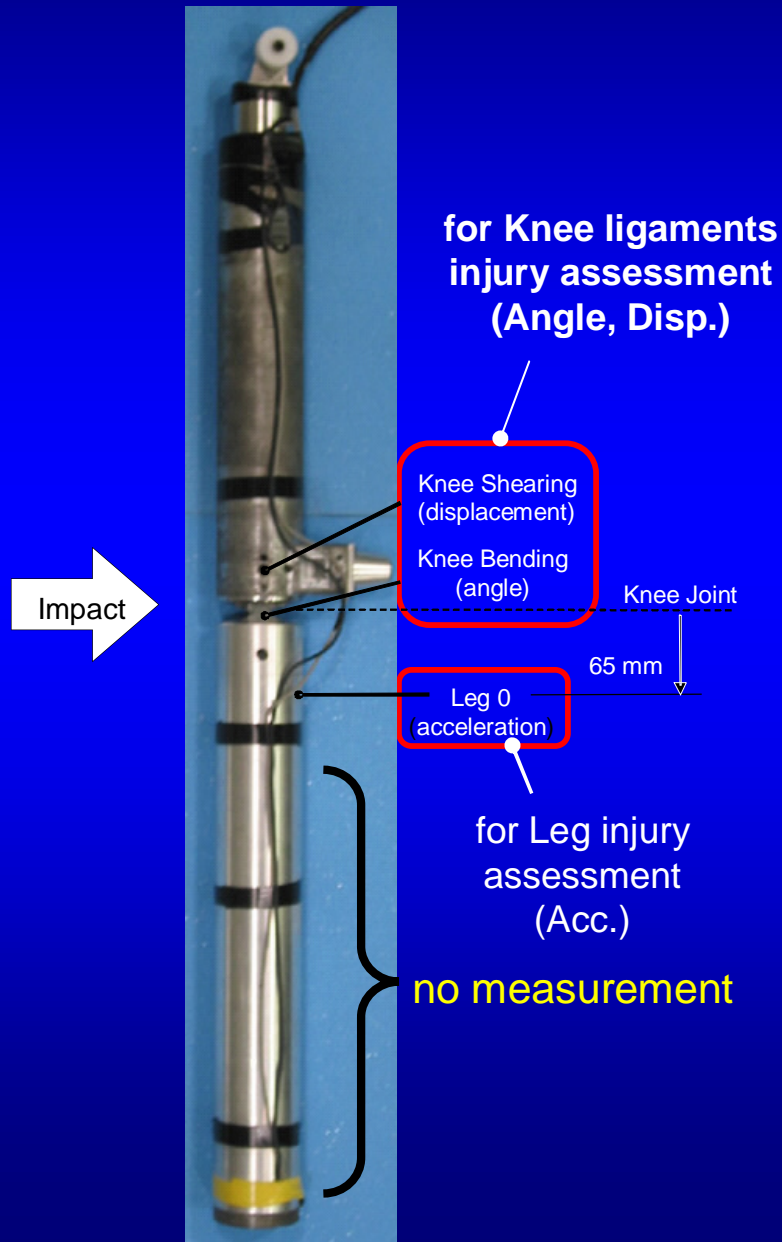
from the Kinematics

TRL-LFI has a possibility to mislead the protection way for the pedestrian lower extremity, since it cannot simulate the human lower extremity motion properly.



from the Measurement

TRL-LFI



TRL-LFI has a possibility to mislead the protection way for the pedestrian lower extremity, since it doesn't have a measurement system for the injury assessment of the lower part of the leg.



TRL-LF cannot detect the lower part of the leg severity

Conclusions

Conclusions

- Flex-PLI has
 - high biofidelity,
 - higher injury assessment ability than the TRL-LFI,
 - high repeatability and re-product-ability in dynamic certification test,
 - and high repeatability in the subsystem test with production car.
- TRL-LFI with the lack of biofidelity and insufficient injury assessment ability may mislead the countermeasure for the pedestrian lower extremity protection.
- J-MLIT recommends to utilize the Flex-PLI as a tool for GTR/PS legform test .

Thank you for your attention!