



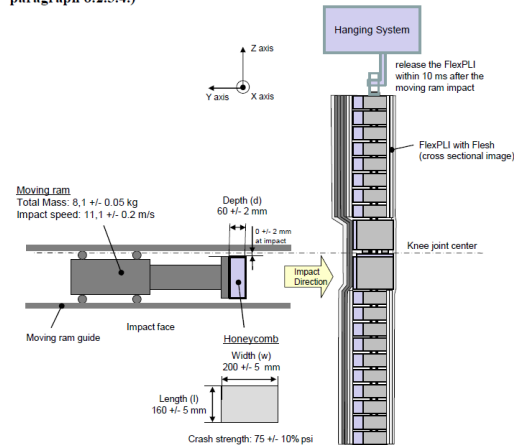
Concept Tech GmbH: Investigation of the Influences of Friction within the Inverse Certification Test Setup of the FlexPLI - Lower Legform Impactor

Initial Information – Boundary Conditions of the Inverse Certification Test Procedure:

from ECE/TRAN/WP.29/GRSP/2011/13

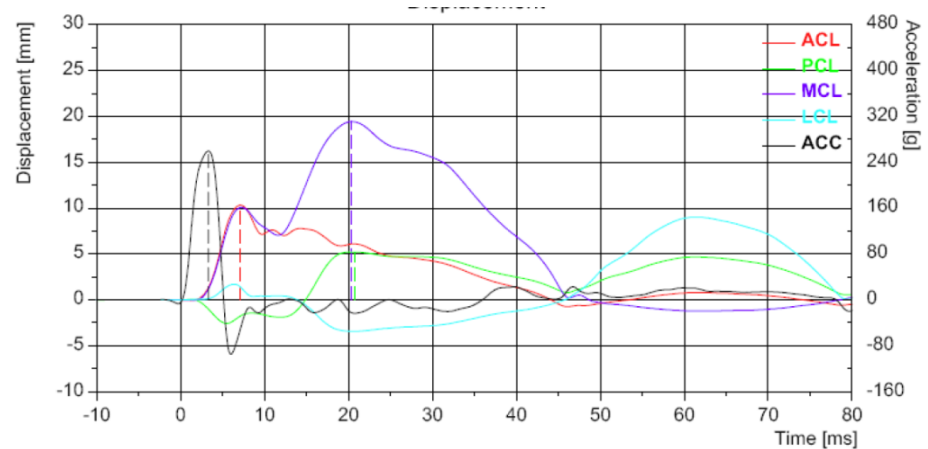
Figure 37

Lower legform II test set-up for dynamic lower legform impactor certification test, inverse type (see paragraph 8.2.3.4.)



Initial Information – Acceleration and Displacement values at Inverse Certification:

from D.-U. Gehring, *Current News About Pedestrian Protection Testing*, presentation at 7.Praxiskonferenz FGS, 2012



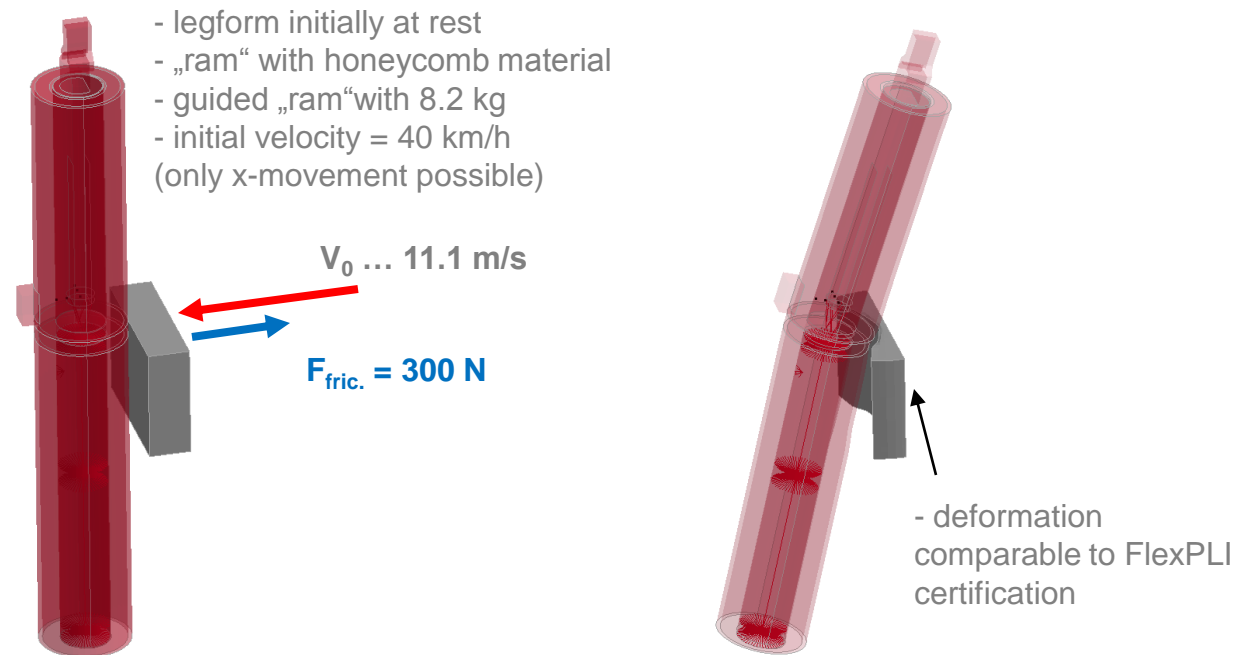
Estimation of acting frictional forces in „moving ram“:

→ based on Concept experiences with development and construction of test-equipment for automotive safety tests (e.g. several guided impactors, such as in an ejection mitigation EMI test system – requirements < 289N)

⇒ $F_{\text{fric.}} \sim 300[\text{N}]$

Simulation-setup to approximate the FlexPLI inverse certification:

→ the EEVC legform has been used as approximation of the FlexPLI!

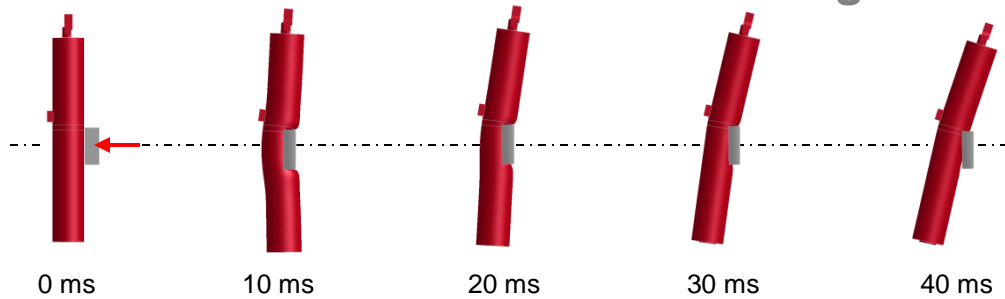


Simulations:

(A) Impact with guided honeycomb impactor without friction

(B) with constant friction force on guided „ram“: $F_{\text{fric}} = 300 \text{ [N]}$
 in opposite direction of v_0

Results of Simulations with the EEVC-Lower-Legform



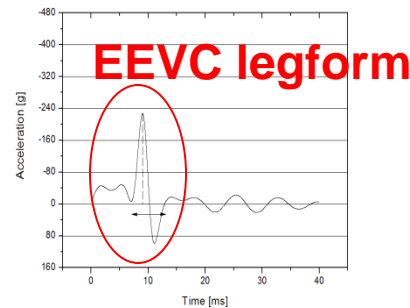
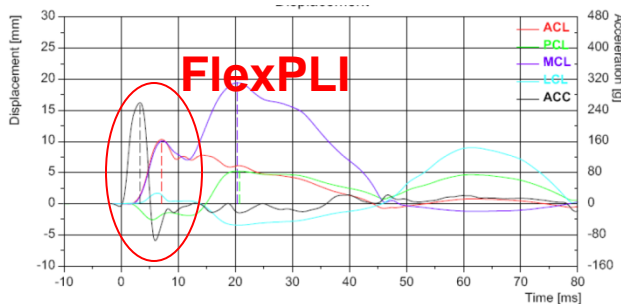
comparable kinematics !

Test video – FlexPLI Inverse Certification

from D.-U. Gehring, *Current News About Pedestrian Protection Testing*, presentation at 7.Praxiskonferenz FGS, 2012

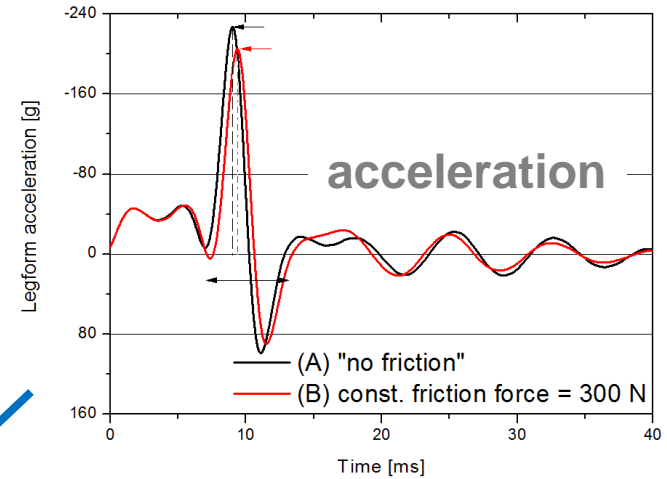
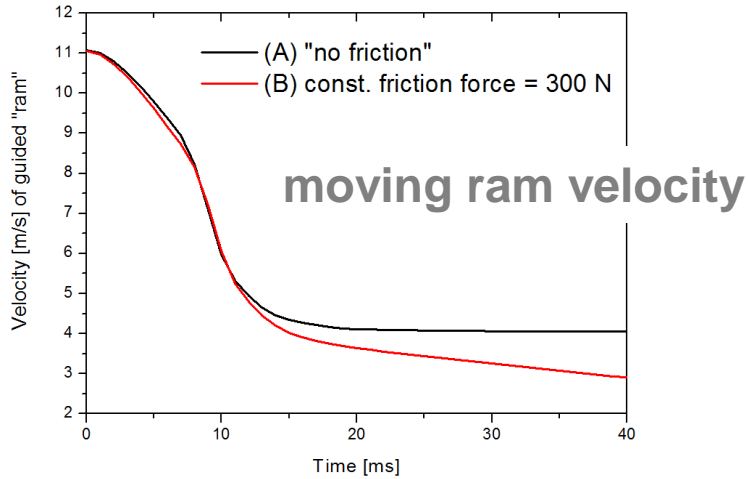


Comparison of legform acceleration

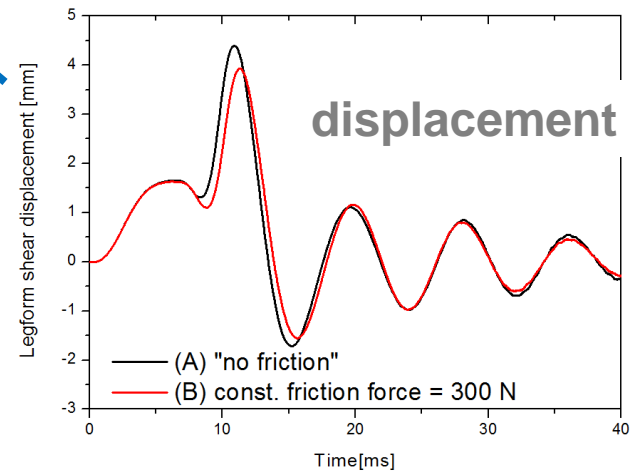
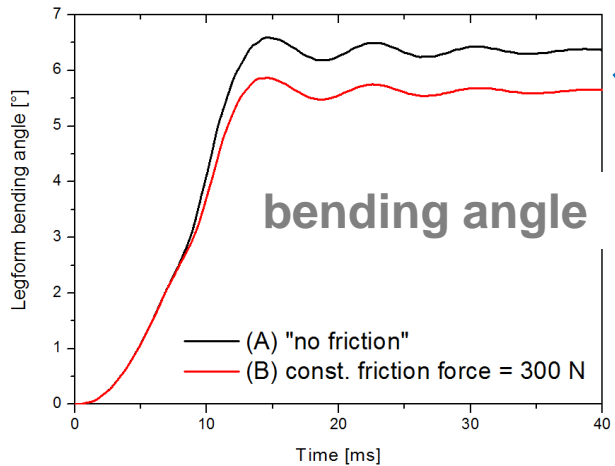


comparable legform acceleration!

Results of Simulations:



Influence of friction force on signal max. values $\geq 10\%$!



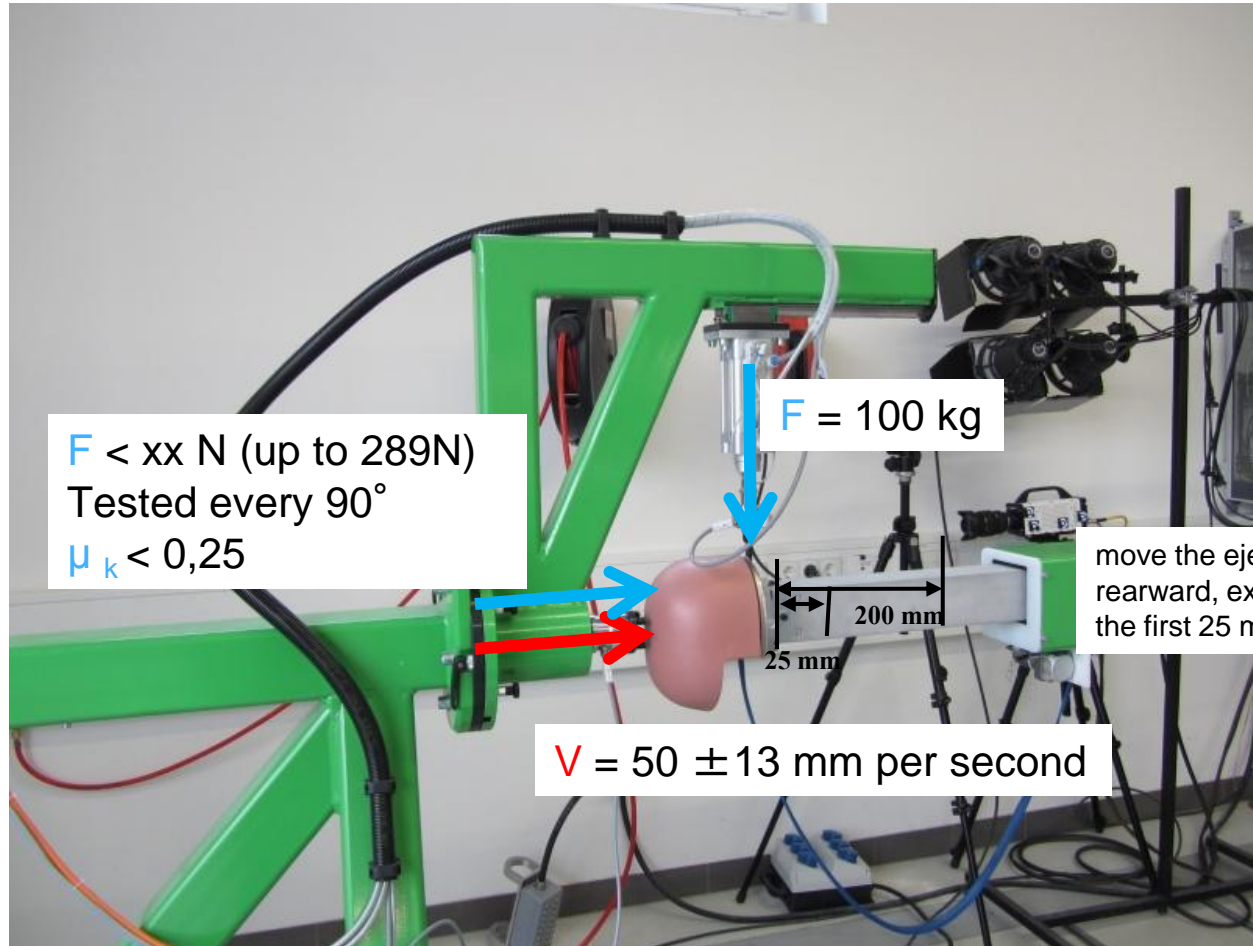
↪ Summary:

The **frictional forces** in the inverse certification test setup will most probably **influence the measured displacements and bending moments** in the legform and **should therefore be specified within the description of the test procedure.**

As first suggestion:

The frictional force should be < 100 N so that the influence on the results is less than about 3%. The calibration of the certification system could be controlled with similar means as used for EMI linear impactor systems (see next slide for explanation).

↳ Example of Ejection Mitigation Testsystem Calibration Test-Setup:





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