

Flex-GT:

Repeatability and reproducibility
of assembly certification and inverse test results

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Overview test programme Flex-GT

Certification tests

Inverse tests

Summary and next steps

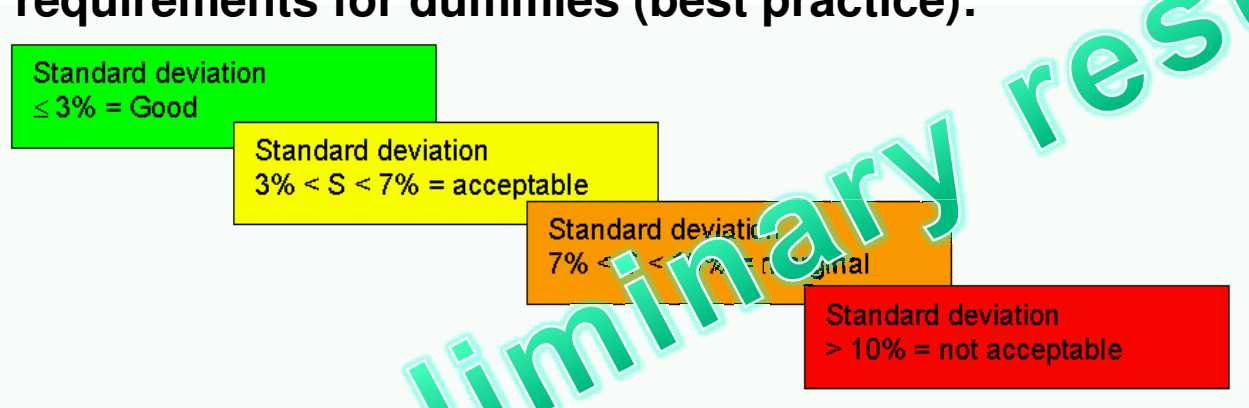
Preliminary results

- **Purpose of joint project between ACEA and BAST:
Assessment of repeatability (r) and reproducibility (R)
of certification as well as of inverse test results**
- **Impactor built level: GT**
- **Three different legform impactors (SN02, SN03, SN04)**
- **Nine certification tests – impactor variation**
- **Nine certification tests – test setup variation**
- **Nine inverse tests – impactor variation**

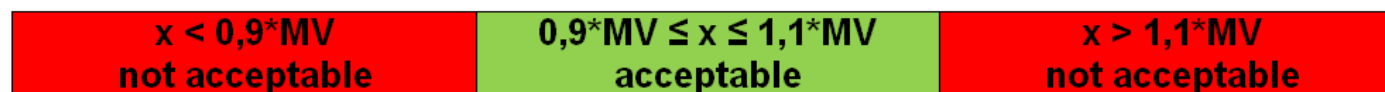
Preliminary results



- Test results of all three impactors within certification and inverse tests were assessed
- Assessment of the *repeatability* (r) of test results for all four tibia strain gauges and the ACL, PCL and MCL elongations
- Assessment of the standard deviation [CV] according to the requirements for dummies (best practice):



- Calculation and assessment of the *reproducibility* (R):
- Calculation of the pooled means of all segments with repeatable test results according to *ISO/TC22/SC12/WG5 Doc N751* [$CV < 5\%$]
- Acceptable reproducibility corridor: pooled mean $\pm 10\%$



Overview test programme Flex-GT

Certification tests

- Impactor variation
- Test setup variation

Inverse tests

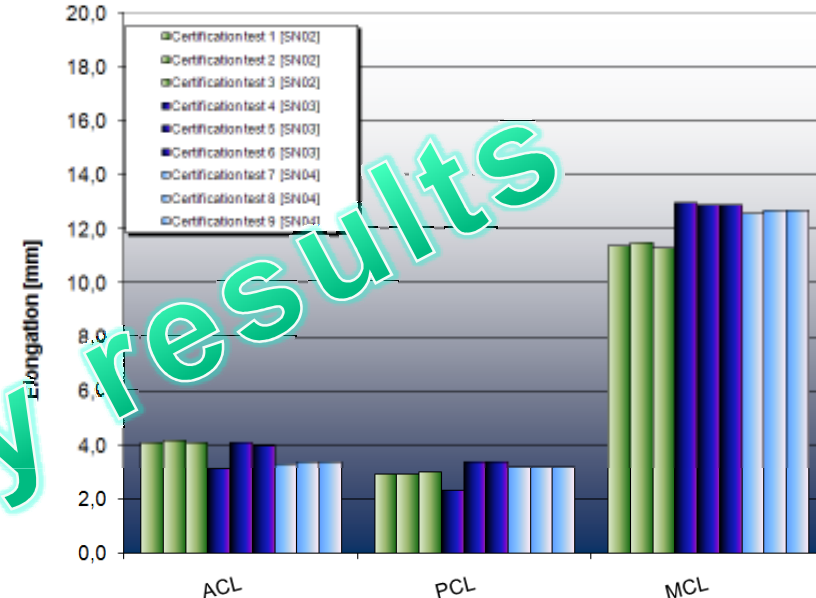
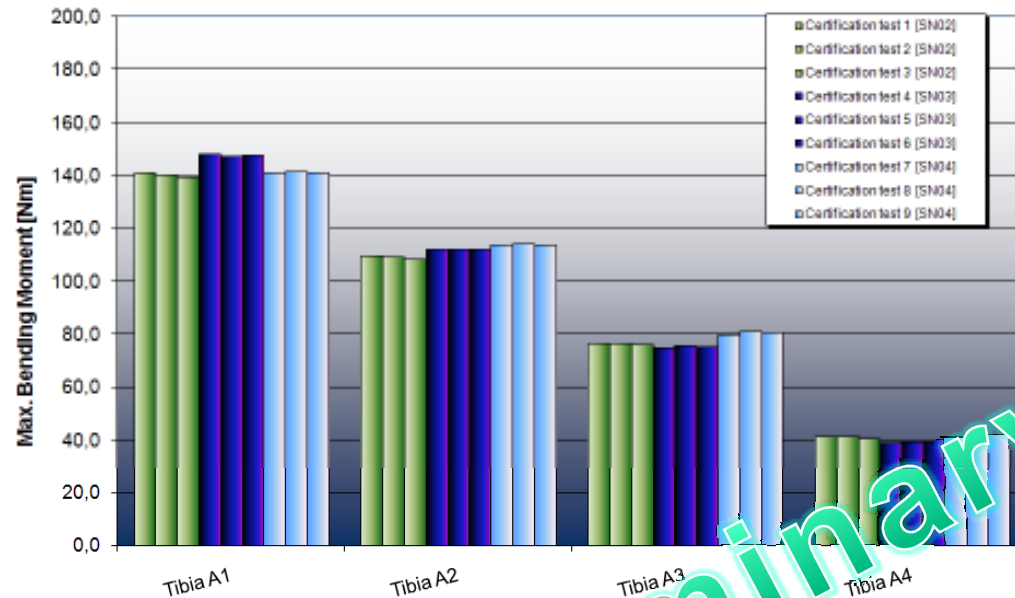
Summary and next steps

Certification procedure:

- Three different legform impactors (SN02, SN03, SN04)
- Three certification tests with each impactor
- Assessment of repeatability and reproducibility of certification test results

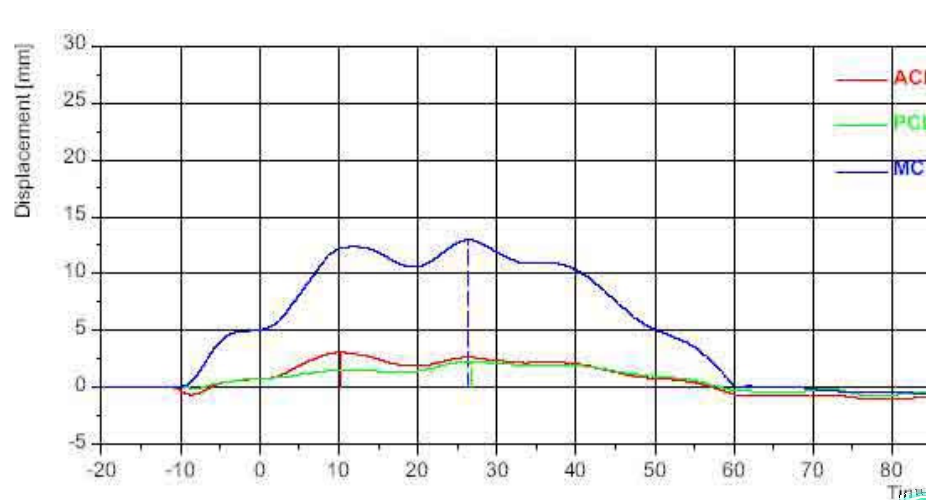


Test results - repeatability:



- Each legform impacted with very similar, almost identical test results
- Slight differences in test results from impactor to impactor
- Very good repeatability except the ACL/PCL results of SN03 due to the first test (Certification test 4)

Ligament test results – Flex-GT SN03, Certification tests 4 & 5:



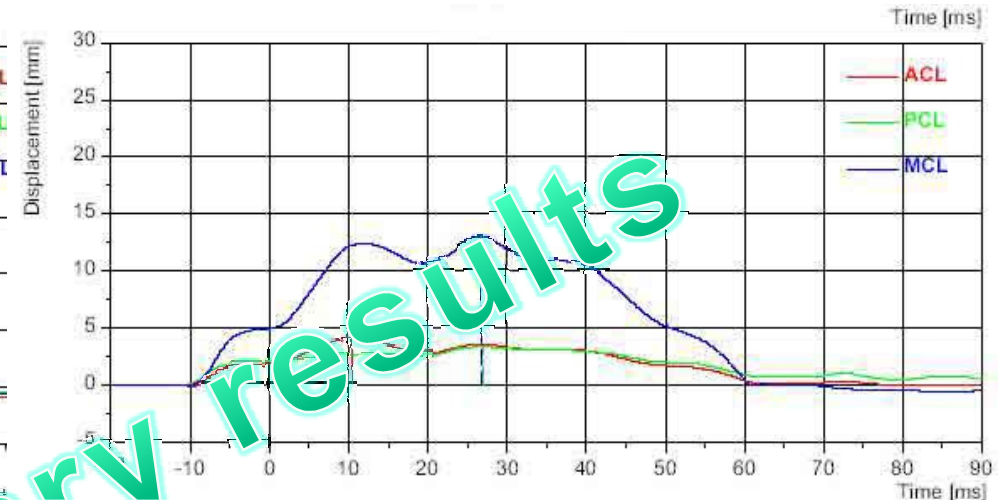
Maximum Displacement

CFC 180

ACL 3.1 mm at 10.2 ms

PCL 2.3 mm at 26.7 ms

MCL 13.0 mm at 26.4 ms



Maximum Displacement

CFC 180

ACL 4.1 mm at 10.5 ms

PCL 3.4 mm at 26.9 ms

MCL 12.9 mm at 26.8 ms

- Despite the different ACL/PCL peak results of the first test, the traces show a quite similar behaviour
- Peaks occur at a similar time
- No indication of a defect potentiometer or other malfunctions