Flex-GT:
Repeatability and reproducibility
of assembly certification and inverse test results

5th Meeting of the GRSP Flex PL Technical Evaluation Group
Bergisch Gladbach, December 7th, 2007

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Overview test programme Flex-GT

Certification tests
Inverse tests
Summary and next steps
• Purpose of joint project between ACEA and BASf: 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
Overview test programme Flex-GT

- 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):

  - Standard deviation ≤ 3% = Good
  - 3% < S < 7% = acceptable
  - 7% < S < 10% = marginal
  - > 10% = not acceptable

- 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 ± 10%

  - \[ x < 0.9 \times MV \] not acceptable
  - \[ 0.9 \times MV \leq x \leq 1.1 \times MV \] acceptable
  - \[ x > 1.1 \times MV \] not acceptable
Overview test programme Flex-GT

Certification tests

- Impactor variation
- Test setup variation

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
Certification tests – Impactor variation

Test results - repeatability:

- Each legform impactor 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)
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