10th TEG FlexPLI Meeting
01 – 02 December 2009
BASt offices, Bergisch Gladbach / Germany

ACEA Comments
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1. Results of ACEA Round Robin Tests (1/4)

Conditions for ACEA manufacturers’ round robin tests

- FlexPLI version GTR significantly differs from the preceding version GT / GTα

- 3 prototypes of version GTR were initially available in January 2009 for ACEA/BASt: SN01 with wiring, SN02 & SN03 with on-board DAS
  - SN01 was sent back in May 2009
  - (SN02 is still available for ACEA members)
  - SN03 was sent back in February 2009 after initial testing to serve JAMA
  - Different electronics (different components and/or different manufacturers)

- In addition, SN04 with on-board DAS was available only in summer 2009

- ACEA members’ in-house testing
  - Started in March 2009
  - Needed to be stopped in November 2009
  - Most tests were performed with the prototypes SN02 and SN04

- These tests were the first chance for European manufacturers to assess the prototypes of the FlexPLI version GTR
1. Results of ACEA Round Robin Tests (2/4)

Remarks based on observations and experiences during the test and their results

- Repeatability seems appropriate
- Reproducibility could not be assessed adequately (limited number of impactors)
- Usability is promising
- Technical feasibility appears promising
- Test results as well as first experiences indicate that FlexPLI version GTR has potential to be successfully used in vehicle design processes

Nevertheless:

- Numerous open issues were identified
- Some new observations need to be pursued urgently
- Detailed design studies have not been possible within 2009 due to limited time and due to a missing FE-model of version GTR
1. Results of ACEA Round Robin Tests (3/4)

Open issues

- Reasons of increased test results (10% to 15%) of version GTR compared to version GT / GTα have not been studied in detail so far
- Some asymmetric behaviour of knee section was still observed in vehicle tests (reference: TEG/089 - ACEA tests at BASt/BGS)
- The effect on bumper designs of SUV-like vehicles is still not fully understood
- Time for collecting sufficient experiences with version GTR prototypes was very limited (around 6 months all together, just around 2 weeks per ACEA member)
- Reproducibility needs to be assessed
- A validated FE-model of version GTR is urgently needed
1. Results of ACEA Round Robin Tests (4/4)

Observations during ACEA members’ in-house tests

- New problems were observed which could help to improve version GTR in the pre-test phase, during and after testing related to the impactor hardware and software, e.g.
  - more user friendly software desired
  - rubber sheets, cable problems
  - uncontrolled rebound influences operational safety – this behaviour jeopardizes test equipment and staff
  - mechanical stops of measuring devices are close to the compliance criteria – for MCL stop at 28 mm elongation, for tibia from 350 Nm the stopper cables are loaded

- Further observations will be provided depending on the progress of further testing

- However, ACEA believes that solutions for these new issues can be found by all TEG partners in due time to improve the handling of FlexPLI version GTR
2. Bumper Relaxation Zone (1/2)

- The request of a relaxation zone with a relaxed criterion within the bumper test zone reflects technical aspects of feasible bumper designs
  (references: preamble of the gtr 9, paragraph 115
gtr document INF GR/PS/127
gtr document INF GR/PS/089 (EC feasibility study)
gtr document INF GR/PS/091)

- During the gtr discussion, all experts agreed on this request and consequently a criterion of 250 g in a bumper area of 264 mm was proposed considering Industry’s usual safety margin of 20 % which results in a design target of 80% = 200 g that is accepted as indication of tibia fracture

Extract from INF GR/PS/089, Section 8.1.1.

As discussed in Section 7, it is proposed to have a relaxation zone, a maximum total of 264 mm of the legform test width; for this the acceleration limit will be increased to 250 g which will give a manufacturers’ target of 200 g.
2. Bumper Relaxation Zone (2/2)

- Technical constraints recognized by the gtr experts are not only related to towing hooks etc. but are also related to areas where a higher stiffness is necessary due to other legal requirements or due to individual requirements of e.g. special purpose vehicles
- The gtr experts stated that the request for relaxation is based on a mix of research and expert opinions
- The request for relaxation is linked directly to the legform to bumper test procedure
- The request for relaxation does not depend on the measuring tool to assess pedestrian friendliness of future bumper designs
- This relaxation request should be kept independent of the fact that gtr 9 will be amended to include a new test tools

ACEA proposes the definition of a relaxation criterion for tibia bending that is based on the same pragmatic approach as explained above
3. Transition Period for FlexPLI and TRL-LFI

- Discussion on the flexible legform impactor started in 2004 within the gtr experts’ group
- Due to lack of experience with the FlexPLI at that time it was agreed to establish a FlexPLI TEG that started working in September 2005
- The gtr experts’ group noted the need of a transition period where either the TRL-LFI or the FlexPLI (once integrated in the gtr) can be chosen for bumper testing and the respective vehicle design
  (references: preamble of the gtr 9, paragraph 115
  gtr document INF GR/PS/109)
- One vehicle life cycle is a suitable timeframe for an alternative impactor choice
- Request for a right of continuance for vehicle variants once approved with TRL-LFI

Consequently, ACEA proposes 8 years as an appropriate transition period and certification validity of models should be granted for vehicles’ complete life cycles once certified with the TRL-LFI
4. Summary

- Vehicle tests indicate a promising status of the FlexPLI version GTR development
- Version GTR shows potential to develop pedestrian friendly vehicles
- Nevertheless, before being used as a legal tool numerous open issues are to be solved:
  - Evaluation of the reproducibility of test results using FlexPLI version GTR
  - Differences to version GT / GTα (higher test results) need to be investigated
  - Effects on SUV-like vehicles needs to be understood
  - A validated FE-model is urgently needed for fundamental design analyses
  - Clarification and next steps regarding new observations during the tests
  - ...
- A relaxation zone with a relaxed criterion should be provided being in line with the gtr 9 concept
- A transition period of one vehicle life cycle appears to be appropriate combined with a right of continuance once vehicle variants are certified with the TRL-LFI
5. Next Steps (1/2)

- TEG is requested to continue its activities in 2010
- Provision of prototype impactors needed in 2010
- Collection and investigation of solutions regarding handling problems observed so far by March 2010
- Clarification of open issues, study of SUVs, further examination of design concepts by May 2010
- A further TEG meeting to be held before the 47th GRSP session in May 2010 in April / May 2010
5. Next Steps (2/2)

- Targets for further TEG activities:
  - Careful review of all open issues
  - Technical update of the FlexPLI version GTR assessment
  - Basis for a modified gtr 9 amendment (i.e. deletion of the [...] )

- Possible consequences for Japanese authorities (to be clarified in 10th TEG):
  (reference: JAMA information provided during the OICA pre-meeting in November 2008)
  - Delayed adoption of the gtr 9 amendment
  - Public comments in Japan from March 2010 (delayed)
  - Interim period of 18 months for administrative issues (reduction of 6 month)
  - New pedestrian legislation could be officially completed by end of 2012
6. ACEA Recommendations

- ACEA generally requests **more time to study the open issues** as detailed as possible – see proposed **next steps**, time schedule

- ACEA needs to have **further access to** prototype(s) of FlexPLI **version GTR** for further in-house tests & studies **in 2010**

- The FlexPLI should **NOT be introduced overhasty** into legislation – the elimination of problems is more difficult and time consuming after acceptance as a legal tool

- Until open issues are treated adequately, **square brackets must be kept** or **limits need to be increased**

- A **relaxation criterion** should be **defined** following the pragmatic approach of the gtr experts’ group

- A **transition period** of **8 years** and the right of continuance for vehicle variants once certified with the TRL-LFI are proposed
7. Test Results, Charts

The following charts contain the results of the ACEA round robin tests

- Red pillars indicate test results produced with impactor no. SN04
- Blue pillars show those produced with impactor no. SN02
- Yellow pillars show results produced with impactor no. SN01
- 16 different vehicles of 8 different manufacturers were tested; overall, the pillars represent results of 87 single tests
  - Each pillar may represent either a single test or an average of several tests
  - Pillars of the same color just indicate the same impactor but NOT the same vehicle, impact location etc. and therefore cannot be used to assess the quality of the impactors
- Charts 1, 3, 5 and 7 show tibia bending moments measured on compact cars, sedans, small family cars and SUV’s as well as sport cars
- Charts 2, 4, 6 and 8 show the measured ligaments elongations respectively

Legend:

- SN04 / sedan / M1 / C2 means vehicle no. 2 of manufacturer no. 1 which is a sedan-type vehicle that was tested with prototype no. 4 of the FlexPLI version GTR
Results may NOT be used to assess the quality of the impactors – please refer to the explanatory notes in section 8.
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chart 3: sedans

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chart 7: SUV’s and sports cars

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chart 8: SUV’s and sports cars

Results may NOT be used to assess the quality of the impactors – please refer to the explanatory notes in section 8
Thank you for your attention!