

Finalized Minutes

The 6th Flex-PLI Technical Evaluation Group (Flex-TEG) Meeting

Date: 31st March 2008 (11:15 – 17:30)

Place: BAST (<http://www.bast.de/>) – Bergisch Gladbach, Germany

Attendance list

A. Konosu (Flex-TEG chairperson/J-MLIT/JARI) , B. Been (Flex-TEG secretariat/FTSS-Europe) ,
O. Zander (BAST), D.U. Gehring (BGS), D. Cesari (INRETS), S. Ronel (INRETS/Lyon Univ.),
S. Meyerson (NHTSA), A. Mallory (TRC/VRTC), O. Ries and S. Siems (ACEA/VW),
R. Fleischhacker and J. Walldorf (ACEA/Porsche), F. Matsuoka (JAMA/Toyota),
D. Longhitano (Honda R&D Americas), F. Minne (UTAC), K. Wolff (Continental),
G. Zenz (SABIC), J.C. Kolb (Bertrandt), M. Winkler and D. Arp (MESSRING),
S. Pruitt (DTS), T. Inoue (JASTI), M. Burleigh (FTSS-UK)

Total: 23 persons

1. Opening and Welcome

- The chairperson expressed his appreciation to the participants as well as to BAST, which provided the conference room.
- Self introduction was conducted by each member.

2. Finalization: Draft Agenda of the 6th Flex-TEG Meeting

- The draft agenda for the 6th Flex-TEG meeting (TEG-060) was discussed.
- Several items are added, and then finalized the agenda (TEG-060-Rev. 1 (added items are described in blue)).

3. Finalization: Draft Minutes of the 5th Flex-TEG Meeting

- The draft minutes of the 5th Flex-TEG meeting (TEG-053) were modified by Mr. Zander and Mr. Gehring comments, and then finalized'. (TEG-053-Rev.1 (modified parts are described in blue, see Agenda 9 and Agenda 11)

4. Confirmation: Status of the Action Items

- The Status Report of the Action Items (TEG-061) was reported by chairperson.
- Except from Action 24 to Action 26, action items were conducted.
- Action items from Action 24 to Action 26 will be conducted by the next Flex-TEG meeting.

5. Reports and Discussions: Flex-GT Technical Evaluation Results

5.1. NHTSA Flex-GT Test Summary

- Ms. Mallory gave a report on the Flex-GT test results for the US vehicles (TEG-063) that was performed at the National Highway Traffic Safety Administration (NHTSA) Vehicle Research and Test Center (VRTC).
- According to the report, two test vehicles (Mazda Miata 2002 and Honda CR-V 2005) were investigated with Flex-GT.
- The results implied that:
 - A) repeatability in the real vehicle test of Flex-GT was excellent;
 - B) collision behavior for vehicles with Flex-GT was very different from those with the TRL legform impactor;
 - C) with the two vehicles that were used in the test, the vehicle with high output value of the rigid impactor also showed high output value of Flex-GT;
 - D) all the measurement values that were obtained with the TRL legform impactor were lower than the injury criteria values of the current draft Pedestrian Safety-Global Technical Regulation (PS-GTR), whereas many of measurement values that were obtained with the Flex-GT were higher than current tentative Flex-GT injury criteria values;
 - E) test results of the Flex-GT were mostly more severe when the impact height of Flex-GT against the vehicle was above 25 mm from the ground than when the height was 75 mm;
 - F) some minor damage in the Flex-GT was reported in the real car test.
- The chairperson stated, “The structure of the vehicle (or the bumper) in the test was applied a major impact force to near knee area of the impactors; so there may not have been much difference between the TRL legform impactor (which has the measuring instrument near the knee area) and the Flex-GT (which has the measuring instruments in the whole part of the leg). The difference between the rigid impactor and the Flex-GT will be clearer if tests against the vehicles are performed with more complicated impactor forces are applied to the legs.”
- Mr. Zander pointed out, “The presentation mentioned that the measurement values of the TRL legform impactor were lower than the injury threshold values that are proposed by the draft PS-GTR. However, base of those values are defined by the European Enhanced Vehicle-safety Committee Working Group 17 (EEVC/WG17 (upper part of tibia acceleration: 150 G, knee bending angle: 15 degrees, shear displacement: 6 mm)); therefore, please do not forget these original threshold values.”
- Mr. Gehring asked about the free-flight distance and the launching method at VRTC.
- Ms. Mallory answered, “The free-flight distance was about 300 mm, and horizontal launching was used. With this method, the distance between the impactor and the launching device is very short; so the collision between the launching device and the Flex-GT become severe due to the rebound of the Flex-GT comparing with the other methods, such as ballistic launching method.”
- Mr. Gehring asked about the selection procedure of the vehicles and the impact position.
- Ms. Mallory answered, “In general, the PS-GTR with a Flex-impactor is thought as a revised version of the current draft PS-GTR which use a TRL/Rigid legform impactor. Therefore, the vehicles (and the impact positions) which can pass the injury threshold values of the current draft PS-GTR for a TRL/Rigid impactor were selected.”
- The chairperson stated, “In particular, there are few Flex-GT impactors for rent; so, in order to prevent damage of the Flex-GT and minimize any trouble with lending, I would like to recommend the use of Flex-GT against the vehicle (and impact position) that at least pass the injury threshold values of the current draft PS-GTR for a TRL/Rigid impactor.”

5.2. NHTSA Flex-GT Certification Tests

- Ms. Mallory gave a report on the results of the dynamic assembly certification test with Flex-GT (TEG-064) that was performed at the VRTC of NHTSA.
- The report said, “The conditions for the dynamic assembly certification test at VRTC are somewhat different from the ones for normal calibration tests (for example, plate thickness of the calibration test rig is 4.5 mm for normal calibration, whereas it is 6.25 mm for this test; and the calibration test rig is normally fixed to the ground with a bolt, but it is fixed to the ground by a sandbag in this test). Therefore, the results cannot simply be compared to the ones from a normal calibration test. However, good repeatability of Flex-GT and its slight vibration (+/- 2 Nm level) during the fall were confirmed. The slight vibration of Flex-GT is probably due to the friction in the region of its suspension (revolution joint) parts against the calibration test rig.”
- Mr. Pruitt pointed out, “The vibration seems to occur because of the Flex-GT is suspended at the tibia bottom part only and then released suddenly. Probably not because of the friction in its suspension, because if it is due to the friction, there would not be observed a vibration with regular frequency in the measured wave forms.”
- The chairperson suggested, “Reducing this vibration will be considered when the Flex-GTR dynamic assembly certification test is discussed. However, it is a slight vibration, +/- 2Nm level, so it does not seem to affect calibration test results significantly.”
- The chairperson also pointed out, “There seem to be some results that do not satisfy the requirement corridors of the Flex-GT calibration test. However, the test setup/conditions are different from the normal one, so just used the test data for checking the equality before and after a car test is recommendable.”
- Mr. Cesari asked, “This is not directly related to this calibration test results, however isn’t the load against the Flex-GT in the dynamic assembly certification test lower than in the real vehicle test?”
- The chairperson answered, “The same opinion was raised in the last Flex-TEG meeting. Therefore, in the Flex-GTR dynamic assembly certification test, the loading level against the Flex-GTR will be raised to the similar level as in the real vehicle test.”

6. Finalization: Flex-GTR Designs

6.1. Mechanical Design

6.1.1. Flex-GTR Mechanical Design

- Mr. Been gave a report on the draft mechanical design of the Flex-GTR that is the final version of the Flex-PLI (TEG-054-Rev.1).
- It was reported that the mechanical design of the Flex-GTR was discussed with Japanese development members, and then addressed the Flex-GT issues.
- Mr. Gehring asked whether the thickness of the rubber which is added to the bottom of the impactor was regarded as the length of the impactor.

- Mr. Been replied, “The rubber is just supposed to protect the impactor, so it is not added to the length. The test condition will be set without taking the rubber thickness into account.”
- Mr. Gehring asked, “An accelerometer is added to the inside of the cover at the impact side of the knees. Would the sensor not be damaged if the cover slid?”
- Mr. Been answered, “It is indeed possible that the accelerometer will be damaged if the cover slides significantly. However, its measurement data is used for the calibration test only, so severe slide should occur during the test. It is difficult to put the sensor inside the knees because there is no enough space.”
- The chairperson proposed that the Flex-GTR design should be frozen by the contents of TEG-054-Rev.1, and then the Flex-TEG member agreed to the proposal.

ACTION-028

- Flex-GTR developer will develop actual Flex-GTR, based on the agreed Mechanical design.

6.2. Instrumentation and Electrical Design

6.2.1. Flex-GTR Instrumentation and Electrical Design

- Mr. Been gave a report on the draft design for the measuring instrument of Flex-GTR (TEG-055-Rev.1).
- It was reported that the design of the draft measuring instruments of Flex-GTR was discussed with Japanese development members, and then addressed the Flex-GT issues.
- Mr. Zander asked, “In the presentation, the purpose of using the measured values on the ACL (Anterior Cruciate Ligament) and the PCL (Posterior Cruciate Ligament) elongations, which are measured items at the knee region, is stated as ‘for calibration purpose.’ Wasn’t it for the injury evaluation purpose?”
- The chairperson answered, “It became clear in the last Flex-TEG meeting that in real accidents (car crash accidents against a pedestrian (pedestrian’s lateral side impact)), there were very few examples in which only a ACL or PCL in the knee region was injured, and usually the MCL (Medial Collateral Ligament), lateral side the knee region, was also injured. In the Flex-GTR, therefore, the elongation of the MCL is adopted for injury evaluation, whereas the elongations of the ACL and the PCL are used as the measuring items for the calibration test in order to investigate whether any damage occurred in the impactor or not.”
- Mr. Zander stated, “In the WG17/Rigid legform impactor, ‘shear displacement’ in the knee region is used for the ACL and the PCL injury evaluation items. Therefore, even if there are few examples of only ACL and/or PCL injury in real accidents, I cannot agree to drop the ACL and the PCL injury evaluation items from the Flex-GTR injury evaluation items.”
- Mr. Cesari stated, “There may be few of only injured the ACL or the PCL cases in real accidents, but we cannot say that only the ACL or the PCL cases will never increase in the future. Therefore, we need to be careful how we decide the injury evaluation items of the Flex-GTR.”
- The chairperson proposed, “The purpose of the use of the ACL and the PCL measuring items, ‘for the injury evaluation’ or ‘for the calibration test only,’ will be discussed continuously using

detailed analytic data on this topic. There seems to be no objections in other items, so I would like to freeze the design of the measuring instruments of Flex-GTR as reported, except the purpose of the ACL and PCL measurement values use.”

- The Flex-TEG member agreed to the chairperson proposal.

ACTION-029

- Flex-GTR developer will develop actual Flex-GTR, based on the agreed Instrumentation and Electrical Design.

ACTION-030

- Flex-TEG member will continue to discuss the purpose of the ACL and PCL measurement values as ‘for the injury evaluation’ or ‘for the calibration test only’.

6.3. Full Calibration Test Procedure

6.3.1. Flex-GTR Full Calibration Test Procedure

- Mr. Been gave a report on the draft full quasi-static and dynamic calibration test procedure of Flex-GTR (TEG-056).
- In the report, the full calibration test procedure of Flex-GTR was discussed with Japanese development members, and then addressed the Flex-GT issues.
- Mr. Gehring asked if it would be better to reduce the frictional force in the horizontal direction at the supporting point in the three-point bending test for Femur and Tibia as well as these bone core calibration test.
- Mr. Been answered that a roller-slider could be set under the supporting point in order to deal with it (TEG-056-Rev.1).
- The chairperson gave a report on the good repeatability of the stopper material which is used in the assembly dynamic calibration test for the Flex-GT (TEG-067) as an informative document.
- The chairperson proposed, “There is a new suggestion from the BAST on the dynamic assembly calibration test procedure. Therefore, except the assembly dynamic calibration test procedure, I propose to freeze the other calibration test procedures as we discussed.”
- The Flex-TEG member agreed to the chairperson proposal.

ACTION-031

- Flex-GTR developer will conduct actual Flex-GTR calibration tests, based on the agreed Full Calibration Test Procedure of the Flex-GTR, except the dynamic assembly calibration test procedure.

6.3.2. BAST Proposal for a Dynamic Assembly Certification Test

- Mr. Zander gave a report on a new proposal for the dynamic assembly certification test method of the Flex impactor (TEG-062)
- The report insists, an “inverse style” dynamic assembly certification test is recommended over the current “pendulum style” one. In the “inverse style,” the Flex impactor is hung in midair (and would freefall after the impact), and a ram with a honeycomb is made to collide at a speed of 40 km/h. The main purpose of changing to the “inverse style” is to make the load condition against the Flex impactor at the time of the dynamic assembly certification test closer to the condition of the actual real vehicle test.
- The chairperson stated, “The proposed “inverse style” does not seem appropriate as a calibration test for a Flex impactor because (1) impact conditions (impact speed, impact positions, etc.) of the ram with a honeycomb against the Flex impactor is more changeable than the current “pendulum style”; (2) the force-deformation characteristics of the honeycomb which is used in the “inverse style” are expected as not constant; (3) in order to impact the ram with a honeycomb to a Flex impactor at 40 km/h, a propelling machine would be necessary and the test scale would be large comparing to the current “pendulum style”, besides the “inverse style” possibly will create large deviation in the test results due to the difference of the test equipment at each laboratory; (4) the frequency, one calibration test in every 20 real vehicle tests, may be too low, because if the calibration test result is failed after 20 vehicle tests, the 20 sets of real vehicle test data would be wasted.”
- Mr. Been also expressed difficulty in understanding the merit of using the “inverse method”.
- Mr. Zander replied, “I prefer to make the load condition of the dynamic assembly certification test as similar as possible to the condition of the real vehicle test, so, I recommend the ‘inverse style.’”
- Mr. Ries commented, “There has been an attempt to make the load condition against the legform impactor in the calibration test closer to the condition of the real vehicle tests in the EEVC/WG17 discussion.”
- The chairperson replied, “I know about the discussion however the EEVC/WG17 had not adopted the load condition of the real vehicle test for their calibration test finally.”
- Mr. Zander commented, “We have proposed the inverse certification test, but up to now it has not been adopted by EEVC/WG17. However, at the last meetings, EEVC WG 17 drafted a work plan and the inverse legform impactor certification is on the agenda
- The chairperson replied, “I rather doubt if there is any merit/need to use a large-scale calibration test with a honeycomb. I think that the current “pendulum style” without honeycomb is much easier and more stable as a calibration test procedure.”
- Mr. Cesari suggested, “It is difficult to decide which style is better in this meeting. How about continuing the discussion between the ‘pendulum style’ and the ‘inverse style’ while making each one’s merit clearer?”
- The chairperson proposed, “As Mr. Cesari said, the merits of the ‘pendulum style’ and the ‘inverse style’ need to be made clear, and we shall continue to compare and discuss which style is more suitable.”
- The Flex-TEG members agreed to the chairperson proposal.

ACTION-032

- Flex-TEG member will continue to discuss that which is better the ‘pendulum style’ or the ‘inverse style’ as for the Flex-GTR dynamic assembly calibration test procedure.

6.4. Optional Instrumentation

6.4.1. Flex-GTR Optional Instrumentation

- Mr. Been gave a report on the draft Flex-GTR optional instrumentation (TEG-057-Rev.1).
- In the report, the draft Flex-GTR optional instrumentation was presented. However, these instruments are optional, and will be prepared to the user only who required and can support the development costs (all of the optional instrumentation will not be included in the standard Flex-GTR). Furthermore, realistically it will be difficult to put all the optional instruments onboard, and the weight difference from the standard model in order to add the optional instruments will not be guaranteed. However, the weight difference from the standard model due to the onboard DAS instrument is expected to be set within the allowed limits (+/- 2% level).
- Mr. Been announced that he is planning to develop a finite-element model of Flex-GTR in a consortium style, so anyone who is interested in the consortium, please contact him. The fee will depend on the number of participants.
- The chairperson proposed, “There seems to be no objections, so I propose to freeze the design of the optional instrument as reported.”
- The Flex-TEG members agreed to the chairperson proposal.

ACTION-033

- Flex-GTR developer will prepare optional instrumentations of Flex-GTR to who required and can support the development costs.

6.4.2. M=BUS Onboard DAS Information

- Mr. Winkler and Mr. Arp introduced M=BUS onboard DAS in detail (TEG-058-Rev.1), which will be used as an optional instrumentation of the Flex-GTR.
- If Flex-TEG members need more information on the M=BUS onboard DAS, please contact to Mr. Winkler and Mr. Arp directly.

6.4.3. Slice Onboard DAS Information

- Mr. Pruitt introduced Slice onboard DAS in detail (TEG-059), which also will be used as an optional instrumentation of the Flex-GTR.
- If Flex-TEG members need more information on the Slice onboard DAS, please contact to Mr. Pruitt directly.

6.5. Others

6.5.1. Information: NHTSA Design of a Proposed Upper Body Mass

- As information, Ms. Mallory gave a report on the effect analysis of a pedestrian's upper body mass on the leg injury evaluation, which was performed at VRTC of NHTSA.
- According to the report, VRTC used a pedestrian dummy computer model (rigid body for the bone part and concentrated mass for the flesh) to analyze the extent of the effect of a pedestrian's upper body mass (upper body) on the leg injury evaluation. The results showed that the effect could not be neglected in some cases. However, the analysis is at early stage and more research analysis will be necessary.
- The chairperson pointed out, "(1) The pedestrian dummy computer model which is used in the VRTC analysis has a rigid bone, and the flesh part is treated as concentrated mass; so its analytic result cannot be applied directly to the Flex impactor; (2) there is no problem with the appropriateness of the leg injury evaluation results against a normal sedan type vehicle with a Flex impactor, because the evaluation is performed by a comparison to the human body model with the upper body part; (3) injury evaluation by legform impactor against high bumper vehicles may have some issues, however, the current draft PS-GTR test method already addressed the issues (there is a choice between the 'horizontal impact test with a upper legform impactor' or 'legform impactor test' for the vehicle which has lower bumper reference line(LBRL) height between 425 mm and 500 mm, and the 'horizontal impact test with upper legform impactor' for the vehicle which has LBRL height above 500 mm), so we can use the same method with the Flex legform impactor; (4) To discuss the pedestrian's upper body mass effect to the high bumper vehicles is not involved in the Flex-TEG tasks, therefore, if the US needs to develop a new high bumper vehicles test procedure, I suggest that a different meeting body should be established to discuss the matter."
- Mr. Cesari stated, "At INRETS, an upper body mass effect analysis is done using a human body model showed that the occurrence of leg injury is not affected by the existence of the upper body mass. Of course, more research analysis is necessary, but basically I think the analysis should be treated as a future subject."
- The chairperson concluded, "This matter is outside the scope of the Flex-TEG activities, and also the research is in the initial stage, so we will not treat the topic in the Flex-TEG meeting. However, we believe the research itself is very important, so we encourage continuing the research at the VRTC."
- The Flex-TEG members agreed to the chairperson opinion.

7. Future Action Plans

- The chairperson proposed following future action plans;

By the end of September 2008

- Flex-GTR developer group will product Flex-GTR, and conduct Flex-GTR evaluations by them.
- Flex-TEG members will discuss and decide the ACL and PCL measurement purpose, Injury assessment and/or Calibration.
- Flex-TEG members will discuss and decide the type of assembly level calibration test method for Flex-GTR, pendulum type or impact type.
- 7th Flex-TEG meeting will be held to discuss above issues.

From October 2008 to the end of April 2009

- Initial technical evaluation of the Flex-GTR will be conducted by main Flex-TEG members.

- 8th Flex-TEG meeting will be held to check above evaluation results.
- The Flex-TEG members agreed to the chairperson proposal.

ACTION-034

- Flex-TEG members will act based on the future action plans which are proposed by the chairperson.

8. Discussion: Contents of a Flex-TEG Status report for the 43rd GRSP Meeting

- The chairperson proposed that he will make a draft Flex-TEG status report for the 43rd GRSP meeting before the GRSP meeting and then finalized the report with Flex-TEG member's comments.
- The Flex-TEG members agreed to the chairperson proposal.

ACTION-034

- The chairperson will make a draft Flex-TEG status report for the 43rd GRSP meeting containing a summary of this meeting before the GRSP meeting and then finalized the report with Flex-TEG member's comments.

9. AOB

- Nothing special.

10. Closing

- The chairperson again expressed his appreciation to Flex-TEG members for participating in this meeting as well as to BASt for providing the conference room.
- Members were invited to meet again at the next (7th) Flex-TEG meeting.

Annex 1: Flex-TEG Working Schedule (After April 2008)

By the end of September 2008

- Flex-GTR developer group will product Flex-GTR, and conduct Flex-GTR evaluations by them.

- Flex-TEG members will discuss and decide the ACL and PCL measurement purpose, Injury assessment and/or Calibration.

- Flex-TEG members will discuss and decide the type of assembly level calibration test method for Flex-GTR, pendulum type or impact type

☆ 7th Flex-TEG meeting

From October 2008 to the end of April 2009

- Initial technical evaluation of the Flex-GTR will be conducted by main Flex-TEG members.

☆ 8th Flex-TEG meeting

* 1) Review of Injury Risk Functions, 2) Evaluations of Technical Feasibilities, 3) Evaluation of Lower Limb Protection Level of Flex-GTR, and 4) Documentation Activities, will be conducted in parallel on above activities.

Flex-GTR



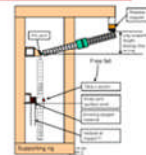
Measurement Items (Standard)

Channel	Purpose
Femur moment 1, 2 and 3	Calibration
Tibia moment 1, 2, 3 and 4	Injury
Tibia top acceln ax	Calibration
MCL elongation	Injury
ACL elongation	Calibration
PCL elongation	Calibration
LCL elongation	Calibration

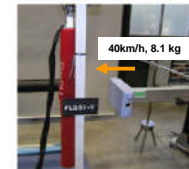
Assembly Level

Pendulum type

- Calibration rig with support arm and release magnet
- Control input pulse with tibia x-acceleration
- Control parameters
 - Release magnet
 - Release magnet
 - Release magnet
 - Release magnet
 - Release magnet
 - Release magnet
 - Release magnet
 - Release magnet



OR Impact type



Annex 2: List of documents

Document number	Document name	Dated [dd/mm/y]
TEG-001	Agenda for 1st Meeting of Flex PLI Technical Evaluation Group.doc	1/Sep./2005
TEG-002	Flex-G_General_Information_050904.pdf	5/Sep./2005
TEG-003	Flex-G_Preparation_Manual_050904.pdf	5/Sep./2005
TEG-004	2005.09.02 - BAST Flex-G Test Programme.pdf	2/Sep./2005
TEG-005	Revised Agenda for 1st Flex-G_MT.pdf	6/Sep./2005
TEG-006	2005_06_ESV_JAMA-Flex.pdf	21/April/2005
TEG-007	2005_06_ESV_JMLIT-Flex.pdf	21/April/2005
TEG-008	2005_06_ESV_NHTSA_TRL-Flex.pdf	10/Mar./2005
TEG-009	Attendance list 1 st Flex-PLI Meeting	6/Sep./2005
TEG-010	DRAFT Minutes 1st Flex PLI meeting_051011.pdf	11/Oct./2005
TEG-010-R1	Modified_Minutes 1st Flex PLI meeting_051122.pdf	22/ Nov./2005
TEG-011	Agenda for 2nd Meeting of Flex-TEG.pdf	22/ Nov./2005
TEG-011-R1	Modified_Agenda for 2nd Meeting of Flex-TEG.pdf	22/ Nov./2005
TEG-012	Flex-G_Minor_Modifications_onto_SN01_051122.pdf	22/ Nov./2005
TEG-013	Flex Repeatability and Reproducibility for Thigh Leg Knee.pdf	22/ Nov./2005
TEG-014	Flex_Assembly_Test_Results_and_Tentative_Corridors_051122.pdf	22/ Nov./2005
TEG-015	Report_on_Flex-G_Car_Test_Results_051122_final.pdf	22/ Nov./2005
TEG-016	Flex-TEG_Schedule_051115.pdf	22/ Nov./2005
TEG-016-R1	Flex-TEG_Schedule_051122.pdf	22/ Nov./2005
TEG-017	Attendance list 2nd Flex-PLI .pdf	22/Nov./2005
TEG-018	DRAFT Minutes 2nd Flex-TEG_060228.pdf	28/Feb./2006
TEG-018-R1	FINAL Minutes 2nd Flex-TEG_060424.pdf	24/ April /2006
TEG-019	Draft Agenda for 3rd Meeting of Flex-TEG_060327.pdf	24/ April /2006
TEG-020	Status Report on Action Items_060424.pdf	24/ April /2006
TEG-021	Flex-GT-alpha_General_Information_060424.pdf	24/ April /2006
TEG-022	Flex-GT-alpha_Injury_Assessment_Ability_060424.pdf	24/ April /2006
TEG-023	TRL-LFI_Retry_Test_060424.pdf	24/ April /2006
TEG-024	Flex-GT-alpha_Typical_Dynamic_Assembly_Calibration_Test_Result_060424.xls	24/ April /2006
TEG-025	Attendance list 3rd Flex-TEG_060424.pdf	24/April/2006
TEG-026	DRAFT Minutes 3rd Flex-TEG	24/April/2006
TEG-026-R1	Final_Minutes_3rd_Flex-TEG_MT_070402.pdf	2/April/2007
TEG-027	ACEA_draft_comments_Flex-GT-alpha_060530.pdf	30/May/2006
TEG-028	Chairperson_Answer_on_the_ACEA_draft_comments_Flex-GT-alpha_060606.pdf	6/June/2006
TEG-029	Draft_Agenda_on_4th_Flex-TEG_Meeting_070316.pdf	16/Mar./2007
TEG-029-R1	Final_Agenda_on_4th_Flex-TEG_Meeting_070402.pdf	2/April/2007
TEG-030	Status_Report_on_Action_Items_070402.pdf	2/April/2007
TEG-031	Development of an FE Biofidelic Flexible Pedestrian Legform Impactor Model (FLEX-GT-prototype Model)	16/Mar./2007
TEG-032	Development of a Biofidelic Flexible Pedestrian Legform Impactor Type GT (FLEX-GT)	16/Mar./2007
TEG-033	Information on Flexible Pedestrian Legform Impactor Type GT (FLEX-GT)	29/Mar./2007
TEG-034	Flexible Pedestrian Legform Impactor Type GT (FLEX-GT) Evaluation Test Results	29/Mar./2007
TEG-035	Flexible Pedestrian Legform Impactor Type GT (FLEX-GT)	29/Mar./2007

	Car Test Results	
TEG-036	Flex-GT-alpha BAST/ACEA Tests	30/Mar./2007
TEG-037	Handling and Usage (Flex-GT-alpha)	2/April/2007
TEG-038	Certification Histories (Flex-GT-alpha)	2/April/2007
TEG-039	ACEA Preliminary Test Results with FlexPLI-alpha	March/2007
TEG-040	Attendance list of 4 th Flex-TEG meeting	2/April/2007
TEG-041	Draft minutes of 4 th Flex-TEG meeting	26/July/2007
TEG-041-Rev.1	Finalized_the_4th_Flex-TEG_Meeting_Minutes_071207	7/Dec./2007
TEG-042	FlexPLI Comments ACEA 20070808 TFP approved	12/Sep/2007
TEG-043	ACEA/BAST Joint Project Report on Tests with the Flexible Pedestrian Legform Impactors Flex GT alpha and Flex GT	7/Nov./2007
TEG-044	5th_Flex-TEG_Meeting_DRAFT_Agenda	20/Nov./2007
TEG-044-Rev.1	Revised 5 th Flex-TEG Meeting DRAFT Agenda_071204	4/Dec./2007
TEG-044-Rev.2	Finalized 5 th Flex-TEG Meeting Agenda 071207	7/Dec./2007
TEG-045	J-MLIT Flex-GT Simplified Car Test Results 071129	29/Nov./2007
TEG-045-Rev.1	J-MLIT Flex-GT Simplified Car Test Results 080331	31/Mar./2008
TEG-046	JAMA-JARI Answer for the ACEA Comments Sep 2007 071129	29/Nov./2007
TEG-047	Flex-GT Full Calibration Test Procedures 071129	29/Nov./2007
TEG-048	Review of Injury Criteria and Thresholds for Flex 071129	29/Nov./2007
TEG-049	Evaluation of Protection Level Provided by Flex-PLI 071129	29/Nov./2007
TEG-050	Status of Action Items 071130	30/Nov./2007
TEG-051	BAST/ACEA Joint Project Preliminary Report on Flex-GT Repeatability and Reproducibility of Assembly Certification and inverse test results	7/Dec./2007
TEG-052	FTSS Design Review of Flex-GT and FLEX-GTR Development dec14-07	7/Dec./2007 (14/Dec./2007 updated)
TEG-053	Draft Minutes of the 5th Flex-TEG Meeting, 080124	24/Jan./2008
TEG-053-Rev.1	Final Minutes of the 5 th Flex-TEG Meeting, 080331	31/Mar./2008
TEG-054	Flex-GTR_Mechanical_Design_080229	29/Feb./2008
TEG-054-Rev.1	Flex-GTR_Mechanical_Design_080331	31/Mar./2008
TEG-055	Flex-GTR_Instrumentation_Electrical_Design_080229	29/Feb./2008
TEG-055-Rev.1	Flex-GTR_Instrumentation_Electrical_Design_080331	31/Mar./2008
TEG-056	Flex-GTR_Full_Calibration_Test_Procedure_080229	29/Feb./2008
TEG-056-Rev.1	Flex-GTR_Full_Calibration_Test_Procedure_080331	31/Mar./2008
TEG-057	Flex-GTR_Optional_Instrumentation_080304	4/Mar./2008
TEG-057-Rev.1	Flex-GTR_Optional_Instrumentation_080327	27/Mar./2008
TEG-058	M=BUS_Onboard_DAS_Information_080305	5/Mar./2008
TEG-058-Rev.1	M=BUS_Onboard_DAS_Information_080331	31/Mar./2008
TEG-059	Slice_Onboard_DAS_Information_080331	31/Mar./2008
TEG-060	Draft_Agenda_6th_Flex-TEG_Meeting_080314	14/Mar./2008
TEG-060-Rev.1	Final_Agenda_6th_Flex-TEG_Meeting_080331	31/Mar./2008
TEG-061	Status of the Action Items_080331	31/Mar./2008
TEG-062	BAST Proposal for a Full Assembly Certification Test_080331	31/Mar./2008
TEG-063	NHTSA_Flex-GT_Test_summary_080331	31/Mar./2008
TEG-064	NHTSA_Flex-GT_Certification_Tests_080331	31/Mar./2008
TEG-065	NHTSA_Design_Upper_Body_Mass_080331	31/Mar./2008
TEG-066	TIPS_for_Measurement_Cable_Repairment_080331	31/Mar./2008
TEG-067	Repeatability_of_Dynamic_Assembly_Test_Stopper_Material_080331	31/Mar./2008

TEG-068	Draft Minutes of the 6th Flex-TEG Meeting	17/Jun./2008

http://www.unece.org/trans/main/wp29/wp29wgs/wp29grsp/pedestrian_FlexPLI.html

Annex 3: List of Actions

Action number	Action	Dated [dd/mm/y]
ACTION-001	The chairman will verify the representatives of the organizations that did not attend this Flex-TEG Meeting.	06/ Sep./2005 (Reported. 2 nd TEG) Closed.
ACTION-002	The chairman will obtain approval for the added tasks at the next GRSP meeting.	06/ Sep./2005 (Reported. 2 nd and 3 rd TEG) Closed.
ACTION-003	The chairman would check with Autoliv (Sweden) and Korea on their experiment contents and schedules.	06/ Sep./2005 (Reported. 2 nd and 3 rd TEG)
ACTION-004	Mr. Tanahashi to inform the group if manufacture will allow disclosure of detailed model information per test shown in ESV paper 05-0106.	06/ Sep./2005 (Reported. 2 nd TEG) Closed.
ACTION-005	The chairman would confirm the parental body of the Flex-TEG Meeting at the next GRSP and other meetings.	06/ Sep./2005 (Reported. 2 nd and 3 rd TEG) Closed.
ACTION-006	The chairman would present at the GRSP meeting a proposal for releasing Flex-TEG information material to the public through the GRSP website.	06/Sep./2005 (Reported. 3 rd TEG) Closed.
ACTION-007	The Chairman will send the properties of the materials of the pads used in the assembly dynamic calibration tests to the Flex-TEG members.	22/Nov./2005 (Reported. 3 rd TEG) Closed.
ACTION-008	The Chairman will disclose waveform data of typical assembly calibration tests (digital data) to the Flex-TEG members.	22/ Nov./2005 (Reported. 3 rd TEG) Closed.
ACTION-009	Japan: will make improvements to movable range of knee of Flex-G.	22/ Nov./2005 (Reported. 3 rd TEG) Closed.
ACTION-010	BASt/BGS: will run confirmation tests on repeatability and reproducibility of Flex-G in assembly state.	22/Nov./2005 (Reported. 3 rd TEG) Closed.
ACTION-011	Mr Imaizumi will recheck the position of JAMA members on Mr Kinsky's request to disclose the model names of test vehicles.	24/ April /2006 (Reported. 4 th TEG) Closed.
ACTION-012	Mr Imaizumi agreed to confirm if JAMA members would be willing to use TRL-LFI as well as Flex in future vehicle tests by JAMA.	24/ April /2006 (Reported. 4 th TEG) Closed.
ACTION-013	Each TEG member should review the presentation given at the current (3rd) Flex-TEG Meeting and transmit their comments to other members by the end of May 2006.	24/ April /2006 (Reported. ACEA: 30 May 2006, Chairperson: 6 June 2006) Closed.
ACTION-014	Japan should transmit the results of its future tests to TEG members at least one week prior to the coming Flex-TEG Meeting.	24/ April /2006 (Reported. 4 th TEG) Closed.
ACTION-015	The chairperson should check with HONDA if TEG members can share the human FE model and the Flex-GT FE model using for the finalization of Flex-GT specifications.	24/ April /2006 (Reported. 4 th TEG) Closed.
ACTION-016	Japan should proceed with its development of	24/ April /2006

	Flex-GT according to the above schedule.	(Reported, 4 th TEG) Closed.
ACTION-017	Mr Been will provide new sentences for Tasks 3 and 4 by the next Flex-TEG Meeting.	24/April/2006 (Reported, 4 th TEG) Closed.
ACTION-018	BASSt/BGS shall conduct a comparison test on Flex-GT and the Flex-GT prototype and shall report the results to TEG members.	2/April/2007 (Joint Project ACEA/BASSt report (TEG-043) which is related on this topic is submitted to the TEG members on 7 Nov. 2007.) Closed.
ACTION-019	Japan will evaluate and analyze the repeatability and reproducibility of each part of the impactor based on the measurements of the impactor itself and will report the result to TEG members.	2/April/2007 (Japan report (TEG-034-Rev.1) which is related on this topic is submitted to the TEG members on 6 Aug. 2007.) Closed.
ACTION-020	The chairperson will submit a TEG document stating the repair method when multiple measurement cables have been disconnected.	7/December/2007 Closed.
ACTION-021	The chairperson will add photos that show the deformation of the simplified car to the TEG-045.	7/December/2007 Closed.
ACTION-022	Mr. Been will propose improved calibration methods for the Flex-PLI.	7/December/2007 Closed.
ACTION-023	The chairperson will circulate a final draft of the Flex-GTR design two to four weeks before the next (6 th) Flex-TEG meeting.	7/December/2007 Closed.
ACTION-024	Mr.Kinsky will do double check the injury risk curves by their in house experts.	7/December/2007
ACTION-025	Mr.Been will ask EEVC/ WG12 to review the current injury thresholds for FLEX-PLI.	7/December/2007
ACTION-026	Mr.Been will make a draft proposal on EC FP7 project regarding FLEX-PLI, and then Flex-TEG member will evaluate the contents.	7/December/2007
ACTION-027	The chairperson will make a draft Flex-TEG status report for the 42nd GRSP meeting containing a summary of this meeting by this weekend (Dec. 8, 9), and then distribute it to Flex-TEG members.	7/December/2007 Closed.
ACTION-028	Flex-GTR developer will develop actual Flex-GTR, based on the agreed Mechanical design.	6 th Flex-TEG meeting
ACTION-029	Flex-GTR developer will develop actual Flex-GTR, based on the agreed Instrumentation and Electrical Design.	6 th Flex-TEG meeting
ACTION-030	Flex-TEG member will continue to discuss the purpose of the ACL and PCL measurement values as 'for the injury evaluation' or 'for the calibration test only'.	6 th Flex-TEG meeting
ACTION-031	Flex-GTR developer will conduct actual Flex-GTR calibration tests, based on the agreed	6 th Flex-TEG meeting

	Full Calibration Test Procedure of the Flex-GTR, except the dynamic assembly calibration test procedure.	
ACTION-032	Flex-TEG member will continue to discuss that which is better the 'pendulum style' or the 'inverse style' as for the Flex-GTR dynamic assembly calibration test procedure.	6 th Flex-TEG meeting
ACTION-033	Flex-GTR developer will prepare optional instrumentations of Flex-GTR to who required and can support the development costs.	6 th Flex-TEG meeting
ACTION-034	Flex-TEG members will act based on the future action plans which are proposed by the chairperson.	6 th Flex-TEG meeting