Minutes of 2nd Meeting of Technical Working Subgroup on Amendment 3 to GTR9	
Title	2nd Meeting of Technical Working Subgroup on Amendment 3 to GTR9
Place	Teams
Status	FINAL
Meeting Date	02 November 2021, 7am-10am EDT / 12pm-3pm CET / 8pm-11pm JST
Prepared By	Benjamin Buenger (Audi), Oliver Zander (BASt)
Purpose of Meeting / Agenda	Discussion on Markup Methods and Test Point Methods for Headform Test Procedure in GTR9 Amendment 3
Issue date	03 December 2021
Next meeting	03 December 2021, 6am-9am EDT / 12pm-3pm CET / 8pm-11pm JST
Invited	Interested Experts from Contracting Parties to the 58 and the 98 Agreements, OEMs and Suppliers

Attendees
Benjamin Buenger (BB) Sophie Choteau (SoS) Irina Dausse (ID) Anders Fredriksson (AF) Dirk-Uwe Gehring (DG) Shashi Kuppa (SK) Peter Martin (PM) Gerhard Maurer (GM) Kenneth McCabe (KM) Louis Molino (LM) Kevin Moorhouse (KM) Stefan Schinke (StS) Scott Schmidt (ScS) Paul Scullion (PS) Antje Sipido (AS) Jason Stammen (JS) Yoshinori Tanaka (YT) Mary Versailles (MV) Kazumi Watanabe (KW) Toshiyuki Yanaoka (TY) Oliver Zander (OZ)

Meeting Minutes

1. Welcome and Overview

OZ welcomed the participants. He explained the general purpose of the activities in the Working Group to align on the amendment or at least create a common understanding of the points of discussion with respect to the headform test procedure and positions in this discussion. As main topics for this meeting he recalled from the conclusions of the last meeting:

1) Markup sequence
2) Main contributing factors to the actual headform acceleration (measuring point, target/aiming point, CoG, first contact point).
3) The permission of tests in the offset zone.

He added that the results of the group will be fed back to the Task Force on Amendment 3.

All meeting documents were made available on the ftp server:
(https://files.bast.de/index.php/s/pk4WdyfgyRk5A9H)

2. Adoption of the Agenda (TWSG-02-01)

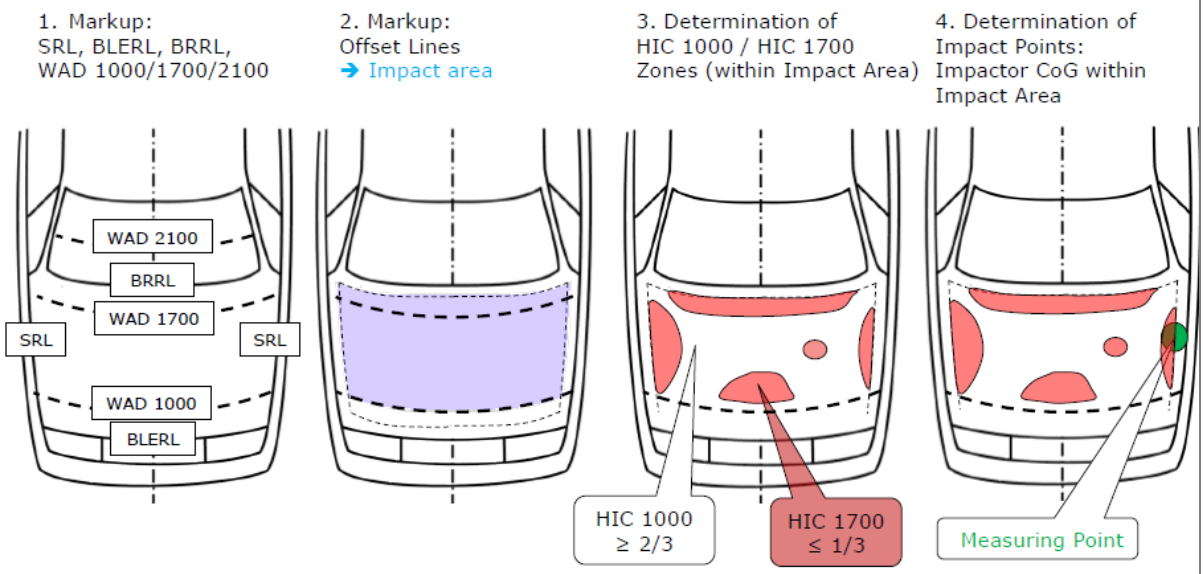
The agenda was adopted with one added topic under agenda item 5 upon request of PM (Porsche Demo by NHTSA).

3. Review and Approval of the Meeting Minutes (TWSG-01-08)

OZ presented the minutes as summary of the last meeting. No further comments were made, the draft minutes were approved as final version.

4. Markup Sequence and Test Point Selection (TWSG-02-02)

OZ presented a summary on markup sequence and test point selection under applicants of the UN 1958 agreement. Outer boundaries and WADs are marked on vehicles first. 2nd step is offsetting the lines where applicable to generate the test area. Within this test area, the 2/3 and 1/3 zones are marked. Based on this area division, tests are carried out per the procedure described for adult and child headform tests. Positioning of the impactor was acknowledged to lead to its center of gravity being inside of or on the offset line. This way, the “shadow” of the impactor covered the offset area for safety performance determination.



PM stated that the issue with language was based on "test allowed or not allowed". He added that tests can be done even outside the reference lines. But then, no performance targets would be needed to be met. (i.e., it was not forbidden, to test in other areas). OZ reiterated his former statement that testing outside the test area where no performance requirements were settled would not make sense and thus is not done during vehicle type approvals.

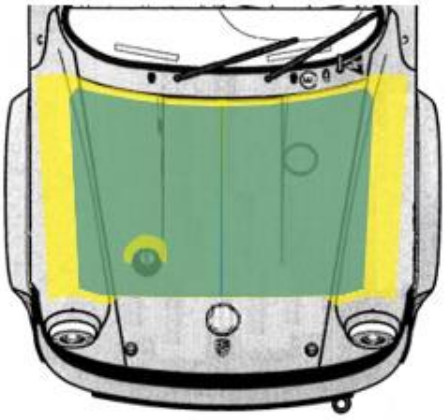
5. <u>Markup Methods and Test Point Methods – Pros & Cons (TWSG-02-03)</u>

OZ introduced the comparison tables of the two interpretations including the advantages and challenges as a working file for documentation of the discussions. Items discussed included the Test Area, the Testable Area, Markup and Test Point. BB asked how a small surface was treated that led to an impact area smaller than 2/3 of the total area. MV stated this would need to be addressed in additional provisions in GTR No.9. PM explained that there are more contingencies that should be addressed by changing GTR No.9. OZ answered that this was not in the spirit of Draft Amendment 3, which was intended for clarification only and not for changing any of the requirements. BB asked if NHTSA also understood the zones as a collection of test results from impact points. PM answered the confirmation tests would assess only points in the zones, so the zones themselves were seen as the requirements instead of a zone based on test results.

6. <u>Discussion</u>

[Remark: The technical arguments described under this agenda item do not entirely reflect the opinion of the US, reason why a separate document (TWSG-02-05) was handed in by NHTSA subsequently.]

PM demonstrated how to test the self-certification of a manufacturer on the example of a Porsche 934 race car. The information showed the vehicle outline and a 2/3 and 1/3 marking illustration.



Then the demonstration changed to a 1:12 scale vehicle model. There, when compared to the method as used within UN-R 127 as presented under TWSG-02-02, the order of drawing lines was changed to first mark the 2/3 area and then the SRL, WAD1000, WAD1700, and BRRL. Afterwards, the ratio of areas was compared and HIC 1000 was required to cover at least 2/3 of the marked area. Finally, the offsets were drawn for preparation of tests, only. OZ commented that for the marking of performance zones, only one method could be applied, either based on the reference lines or the offset lines as outer limits.

PM explained there were three different zones: HIC1000, HIC1700 and “no requirements zone” (with “no requirement zone” being a completely new concept in GTR No. 9). The “no requirement zone” would be a “no test zone”, where a test would be invalid in case of the impactor touching this zone. Then tests in the first two zones were stated to be conducted based on judgment of worst case. Also, the 2D (”slice”) was used for differentiation of 2/3 and 1/3. BB asked, how 1/3 and “no requirement zones” were separated from each other. PM stated that his interpretation couldn’t be proven wrong on the scale model vehicle used.

The pros and cons of the 2D and 3D method were further discussed, also using the example of the intake hole in the bonnet of the Porsche model.

While the point of first contact method touched all points around the entire hole during the head impact, this was not the case with the measuring point method. Though not solving this issue entirely, the 2D method minimized the problem to the greatest extent, with two contact points, only.

OZ noted that the philosophies of the 3D method differed from the basic view, homologation, and verification of self-certification. MV stated that no discrete test points were checked but areas and whatever the first contact would be in those tests, the compliance to that particular zone was assessed. OZ emphasized that however these points were the basis for all differentiation of the zones. BB added that the 3D method would raise far more questions than the 2D method, with the impactor creating values for structures that were located outside the zones. StS mentioned that clear result allocation and reproducibility was compromised by 3D first contact as the duplication of test results was a challenge when it came to verification tests. Furthermore, 2D had documentation advantages. PM understood that from the OEM standpoint drawing up the map depended on whether the sphere or the slice was used. Currently the map is drawn using the slice; if the procedure changed to the sphere the OEM would need to go back and redraw and take into account all inconsistencies with the 3D method.

AS asked NHTSA how to choose the impact point on a hard structure as e.g. the wiper spindle and assumed to aim with the headform CoG onto that point. This was confirmed by PM. AS added that using the 3D method would result in testing somewhere and assigning the HIC to a vehicle surface based point of first contact only, not related to a worst case point directly. PM confirmed that there could be an issue but that however, further outboard assigning the Po1C to the result would be the intention. OZ raised the question how a hard point would be generally tested according to NHTSA interpretation. PM stated this was done by aligning the center of gravity of the impactor with the hard point. OZ concluded that based on the confirmation by PM, the measuring point was the more relevant point for worst case HIC results. He added that exactly this circumstance was to be clarified in terms of lateral positioning. PM answered that on the SRL, and only there, the lateral positioning was relevant. OZ emphasized that the 2D “slice” was not to be positioned within the offsets because this would mean the introduction of a new requirement not yet established in GTR9. PM answered that this difference was always the issue in NHTSA interpretation. Upon request he stated that the US could agree upon the 2D test method in case of the centre of gravity of the headform was allowed to be aiming at points in the offset zone (located on the same longitudinal vertical plane as the velocity vector of the headform). MV mentioned that there should be no tests within the offset zones. Only the definition of the “aiming” was to be clarified.

New ideas, adding an additional line in the offset zone as new lateral limitation for the test area were generated by PM and discussed.

NHTSA stated to accept the center of gravity of the impactor being well into the offset zone. It was replied that this was different to what has been done in type approval during the past 16 years. BB stated that there was clear data available showing in case of using the 3D method this would lead to an impactor outside of the reference lines, i.e. with the CoG outside. He added that with Draft Amendment 3 reflecting the current practice, nothing would be skipped and no areas be hidden. Besides, with 3D, reproducibility issues would occur, causing issues in market surveillance.

LM (for US) did not see any benefit using the 2D method and no issue in terms of reproducibility using the 3D method, which however is an issue for all countries with market surveillance, other than US. BB further explained that market surveillance was all about one technical service approving a vehicle and then another one checking it. In this context, the 2D method would provide one lateral location only, while the 3D method had various ones, leaving unnecessary room for interpretation.

7. Conclusions, Next Steps

It was found that good progress was made during this meeting in terms of creating a common understanding and a possible acceptance of the 2D method by the US, but linked to certain conditions. However, some technical questions were still to be answered:

- What is the order during markup procedure? Which zones are baseline for positioning and testing and which zones indicate the performance?
- What is the clarity benefit and worst-case assessment within the NHTSA interpretation and the amendment?
- Are tests in the offset zones allowed in terms of performance assessment?

It was concluded that another technical meeting prior to the next Task Force meeting would be beneficial. The questions listed above resulted in the following two action items to be dealt with at the next meeting:

1) Description of the markup sequence / procedure and zone assignment as interpreted by the US (in comparison to TWSG-02-02)
2) Potential safety benefit, technical feasibility and possible side effects of testing in the offset zones (CoG aiming at points therein)

It was agreed upon action item 1 to be covered by PM / NHTSA and action item 2 to be covered by BB / Industry.

In the meanwhile, MV will inform the Task Force about the work and progress of the Technical Working Subgroup and that due to time restrictions an official meeting of the whole TF could not be held before the next GRSP meeting (06 - 10 December 2021).

8. AOB

The meeting was wrapped up. OZ thanked all attendees for their valuable contributions and closed the meeting.