

**FOURTEENTH MEETING OF THE GRPE INFORMAL WORKING GROUP
ON HEAVY DUTY HYBRIDS (HDH)**

Geneva, 04 June 2013

MINUTES OF THE MEETING

Venue: Palais des Nations, Geneva

Chairman: Petter Åsman (Sweden)

1.- WELCOME AND INTRODUCTION

The Chairman welcomed the participants.

2.- ADOPTION OF THE DRAFT AGENDA

(Working paper HDH-14-02e)

The draft agenda was adopted.

3.- DRAFT MINUTES OF THE THIRTEENTH MEETING

(Working paper HDH-13-11e)

The draft minutes of the 13th meeting were approved.

4.- HDH VALIDATION TEST PROGRAMS

4.1 Presentation by research institutes on validation test program 1

(Working paper HDH-14-03e)

Working paper HDH-14-03e is a joint presentation of the three institutes tasked with conducting validation test program 1.

Prof Fredriksson started with an overview of the new model structure (pages 4 to 12). Rationale for the new model structure was a greater flexibility of the modeling approach that allows various combinations of engines, gear boxes and energy storage systems. The new model structure for serial and parallel hybrids was made available for testing at the end of April. It includes a comprehensive component model library, a new signal naming convention based on AUTOSAR and the restructuring of the vehicle models. Relevant powerpack components were included in the library toolbox, while previously developed models were transferred into the model library. The models will be further developed until the end of June 2013 based on feedback from OICA members and other stakeholders.

Mr. Silberholz reported on positive feedback from OEMs on the new model structure. Open issues from the discussions are the actuation of different brake systems in the driver model and time vs. distance based slope pattern. He continued with a detailed analysis of the road

slope calculation methods (30 sec moving average method vs. minicycle approach, pages 15 - 19). The two options are considered not directly comparable due to big deviations in resulting reference power pattern. Reason is that the WHTC denormalization method leads to operation points at lower loads and speeds for hybrid powertrains. Therefore, the WHDHC calculation tool may be not suitable any longer. Further investigations on this item will continue.

As a conclusion of validation test program 1, extensive changes on models and model structure were made, the next model release (including stakeholder remarks) will be available shortly, the comprehensive model and work program documentation will start, and drive cycle modifications need further investigation.

4.2 Status of validation test program 2

(Working paper HDH-14-04e)

Dr. Perujo presented working paper HDH-14-04. Test program and timetable were set up between the participating OEMs and JRC before the start of the test program. The input parameters rolling resistance coefficient, air resistance coefficient and total weight were determined and selected in accordance with Kokujikan No. 281, paragraph 10-5. It was decided to carry out the tests with as many auxiliaries as possible shut down and to measure/estimate the power consumption of the auxiliaries required for the proper operation of the vehicle. In order to get repeatable results, a daily test sequence was agreed.

Validation test program 2 at JRC started with the Volvo parallel hybrid bus in May. Preliminary results are shown on pages 9 and 10. The Iveco vehicle is about to start, the MAN bus will follow by the end of June. Data processing will be done during July, August and September. The final report is planned to be released by mid September 2013.

4.3 Discussion

The Chairman asked about the selected naming convention. Prof. Fredriksson responded that AUTOSAR is widely used within the automotive industry.

Mr. Olechiw (USA) asked if the 30 sec moving average method for slope determination, as proposed by Japan, was no longer considered. Mr. Silberholz expressed a strong preference for the minicycle approach. Mr. Dekker (NL) emphasized that a representative negative work is absolutely essential and efforts would need to be made for an appropriate solution. The secretary reminded that fixed slopes should also be considered, but Mr. Silberholz expressed reservation. Mr. Narusawa (JP) indicated that Japan will investigate the minicycle approach favored by the institutes and come back with a response at the next HDH meeting. The secretary asked the institutes and Japan to closely cooperate in the development of the final method.

Mr. Olechiw (USA) requested to include powertrain verification as an option to whole vehicle verification in the gtr, and to validate the HILS method with emission results. He asked for further discussion on how to maintain and update the models and the required level of validation in the gtr. EPA also confirmed to take part in validation test program 2.

5.- CONTRIBUTIONS FROM STAKEHOLDERS

5.1 Hybrid and GHG activities

None.

5.2 General comments on HDH work program

OICA requested to consider plug-in hybrids in the gtr, and will present a proposal to the HDH IWG for discussion. The Chairman asked that the proposal should be circulated by the end of September in order to allow proper consideration at the next HDH meeting.

5.3 Assessment of powerpack testing

None.

5.4 Assessment of chassis dyno testing

None.

5.5 CO₂ emission

(Working paper HDH-14-05e)

The secretary presented a proposal on how to deal with CO₂ within the HDH framework (working paper HDH-14-05, pages 6 - 10). CO₂ emission is part of the HDH mandate. Currently, Contracting Parties have their own regional HD CO₂ regulations in place or are developing CO₂ regulations for HD vehicles. There is no WP.29 mandate for a CO₂ regulation for conventional heavy duty vehicles. At a meeting between EU-COM (DG-CLIMA) and HDH Chair and Secretary, it was agreed that it was not appropriate to develop a CO₂ regulation by UNECE just for HD hybrid vehicles. HDH IWG should develop the procedure for CO₂ determination, thereby fulfilling their mandate on CO₂ emissions. The HILS CO₂ result may then be used as input for the regional CO₂ regulations, if needed. Chair and Secretary suggested other Contracting Parties to apply a similar approach.

The proposal was agreed.

6.- DEVELOPMENT OF THE GTR

6.1 Report from the drafting group

The Chairman reported that the HDH drafting group had been established and had two meetings, so far. The Technical Secretary has not yet been nominated. It was agreed and confirmed to integrate the hybrid test procedure into gtr n° 4. Starting point for the HILS method is the Japanese regulation. Modifications to the Japanese regulation (e.g. the new model structure) and any additional items (e.g. thermal models) would be included based on the input from the HDH work program. The powertrain test procedure will be based on the EPA regulation.

6.2 Re-structuring of gtr n°4

The secretary reported on the status. The details of the HILS method and of the powertrain test procedure will be incorporated into a new Annex 8 to gtr n°4. On the HDH website, specific folders "HDH DG ..." have been created. The current very preliminary draft is already available on this folder. The draft versions prepared by the drafting group will be uploaded to the drafting group folder for review by the IWG members, whenever a new draft is available. Any editorial comments should be submitted to the technical secretary (to be nominated), any other comments to the IWG for discussion.

6.3 Comments

None.

7.- ROAD MAP AND PROJECT PLANNING

(Working paper HDH-14-05e)

The secretary presented working paper HDH-14-05. The roadmap agreed at the 12th HDH meeting remains unchanged, for the time being. The HDH IWG intends to submit the final report of the work program and the informal document of the gtr at the 68th GRPE in January 2014. The official document will be submitted at the 69th GRPE in June 2014 for adoption. WP.29 adoption is foreseen in November 2014. The road map is shown on page 11 of working paper HDH-14-05. This timing is in jeopardy, if the nomination of Technical Secretary is further delayed due to non-availability of the budget. EU-COM was urged to submit the budget a.s.a.p.

8.- NEXT MEETINGS

The next HDH meetings will take place, as follows

- 15th HDH meeting: 24 and 25 October 2013, San Francisco, USA
- 16th HDH meeting: 07 January 2014, Geneva
- 17th HDH meeting: March 2014, Europe (date and place to be confirmed)
- 18th HDH meeting: June 2014, Geneva (date to be confirmed)

The next meetings of the drafting group (HDH-DG) will take place, as follows

- 3rd HDH-DG meeting: to be decided upon availability of technical secretary
- 4th HDH-DG meeting: 22 and 23 October 2013, San Francisco

9.- SUMMARY AND CONCLUSIONS

Chairman and secretary summarized the meeting as follows:

- The results of validation test program 1 with the new model structure were presented by the institutes; the new model structure includes a comprehensive component model library, a new signal naming convention and restructured vehicle models
- The models will be further developed based on feedback from stakeholders
- The drive cycle investigations resulted in different road gradients from the two calculation methods; application of road gradients to WHVC needs further investigation during validation test program 2 incl. the use of road gradients fixed in the gtr
- Validation test program 2 at JRC has started in May; the details of the test program were defined between JRC and the participating OEMs
- OICA confirmed that individual members will arrange for HILS testing at EPA and will start discussions with EPA on the most suitable approach
- OICA informed that they will provide budget for model verification by the institutes during validation test program 2
- EPA requested to include powertrain verification in the gtr, and to validate the HILS method with emission results, and confirmed to take part in validation test program 2
- The proposal by Chair and Secretary of using the HILS CO₂ result as input to regional CO₂ regulations was agreed

- The HDH drafting group has been established and had two meetings, so far; the Technical Secretary has not yet been appointed, but it is hoped that the budget will be available in June

10.- OTHER BUSINESS

None.
