

STATUS OF THE GRPE INFORMAL WORKING GROUP ON HEAVY DUTY HYBRIDS (HDH)

The Informal Working Group on Heavy Duty Hybrids (HDH) held two meetings since the 64th GRPE session. The 11th meeting took place from 10 to 12 October 2012 in Ottawa and focused on the technical discussion of the research program and the validation test program 1. The 12th meeting took place on 15 January 2013 in Geneva with major emphasis on validation test program 1 and the HDH road map.

Japan raised concerns on the WHDHC approach proposed by the research institutes. The negative work, which is essential for energy recuperation, is considered being underestimated when only taking the engine cycle as basis. Therefore, it should be vehicle based. Only the post-transmission approach is considered to be applicable for the HILS method, but in order to match with the WHVC approach, it is necessary to set gradients on the WHVC approach. The ToR state that "As a starting point, the vehicle speed pattern of the WHVC vehicle cycle will be used". As a consequence, any alternative such as the WHDHC approach would need to be validated against the WHVC approach during the validation test program.

Validation test program 1 is a collaborative work program of TU Vienna, TU Graz and Chalmers University. The budget for task 1 (serial hybrid simulation - 181,570 €) is provided by OICA, the budget for task 2 (parallel hybrid simulation - 89,170 €) and task 3 (report, interface & user manual - 44,960 €) is provided by the EU Commission.

The basis for the development of the serial hybrid simulator is the Japanese open source model for a serial hybrid provided by JARI. As a first step, an ECU control strategy with different ICE operation points was added to the model. Further, driver models for the WHVC and WHDHC approach were developed. In order to develop the software ECU in a manner as realistic as possible, input of the OEMs is needed. An interface list and a component list were submitted to the OEMs for review. Meetings with OEMs took place during November and December 2012, further meetings are planned for the near future.

Since the WHDC test procedures include a cold start test, it is necessary to integrate thermal models into the simulator. Development of thermal models for the aftertreatment system (ATS) has been completed, validated and implemented into Matlab/Simulink. The thermal models for coolant and lube oil are nearly completed. Development and validation of the thermal models for battery and electric motor will be completed by the end of January 2013.

Drive cycle investigations of a serial hybrid with the different options have started and will be discussed at the 13th HDH meeting. Task 2 (adaptation of the HILS simulator for parallel hybrids) started in October 2012 on the basis of the Japanese simulator for parallel hybrids. Establishment of a component library, as favored by the HDH IWG in earlier meetings, does not fit into the current HILS model. It is therefore necessary to set up a data bus system in the model that allows various combinations of engines, gear boxes and energy storage systems.

Sweden announced the availability of budget for Chalmers University to start working on this re-structuring of the model in parallel to validation test program 1.

In order to start drafting the gtr, it was agreed to establish a drafting group. The chairman volunteered to chair this group, but to cope with the expected high workload a technical secretary needs to be installed. The EU Commission was asked to provide the necessary budget. Nomination of experts to the drafting group should be communicated to the secretary by the end of January 2013. Basis for the drafting of the gtr is the Japanese procedure in Kokujikan n° 281, but the draft should also include the identified needs for amendments based on the work in the HDH IWG.

Environment Canada in cooperation with US EPA presented the results of their test program on Post-TM powerpack testing. Several months of trials and high hybrid manufacturer involvement were needed for being able to run the tests. The complete set-up basically represents a chassis dyno test operated as powerpack test. It was only used for a relative comparison between hybrid and non-hybrid vehicles. It was concluded and confirmed by EPA that chassis dyno testing and powerpack testing compare pretty well for CO₂, but differences were observed for criteria pollutants, especially NO_x.

According to the original timing, HDH IWG should submit the final report incl. the assessment of chassis dyno and powerpack testing at the 65th GRPE in January 2013. Taking the current timetable into account, it will not be possible to meet this deadline. It was agreed to submit the final report including the assessment of chassis dyno testing and powerpack testing and the informal document of the gtr at the 67th GRPE in January 2014. The official document will be submitted at the 68th GRPE, which consequently will delay GRPE adoption from January to June 2014 and WP.29 adoption from June to November 2014. The updated road map, as agreed by the HDH IWG, is shown on page 7 of informal document n° GRPE-65-26.

Next steps:

- Validation test program 1 will continue with data bus system being developed in parallel
- Validation step 2 with real HD Hybrid Vehicles will start around March 2013
- Discussion on chassis dyno and powerpack testing will continue on the basis of input from Contracting Parties, with input required by October 2013
- Establishment of the drafting group

The next meetings are scheduled as follows:

- 1st drafting group meeting: : 19 and 20 March 2013, Borlänge
- 13th HDH meeting: 21 and 22 March 2013, Borlänge
- 14th HDH meeting: 04 June 2013, Geneva (date to be confirmed)
- 15th HDH meeting: 23 to 25 October 2013, San Francisco

GRPE is asked to reserve a half day for the 14th HDH meeting during the 66th GRPE session.

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