

# Meeting Minutes PMP Webconference

13<sup>rd</sup> Dec 2022, 12:00-15:00 CET

## DRAFT

### 0. Introduction & Welcome

ca. 91 participants were welcomed by Barouch Giechaskiel (BG, JRC, PMP Chairman) and Rainer Vogt (RV, OICA/Ford/Technical Secretary PMP).

### 1. Review Meeting Minutes last PMP meeting 23.11.2022

RV reviewed the meeting minutes of the last PMP Meeting on 23.11.2022 which are available on the UNECE website. Comments may be sent to RV/BG within the next two weeks.

### 2. OICA presentation update on Energy Share and statement

Jürgen von Wild (OICA/BMW, JvW) presented on behalf of the OICA team. Friction energy was much lower as compared to JRC, for example PEV had 2% median and 0-3 % range on WLTP Brake. Mild-Hybrid showed a widespread. OICA concluded that individual vehicle specific Energy Shares are needed. Data showed that individual correlation (WLTC exhaust / WLTC Brake) for P/T concepts exists.

For the interim, OICA requested a statement to be included in the GTR:

“At the request of the manufacturer, and with approval of the responsible authority, individual values of energy share may be determined as described ... The friction brakes energy  $E(\text{neg, frict.brakes})$  is determined by the equation ... “

see OICA presentation.

Philip Eichler (UBA, PE): Would 60V be the cut between “Full-Hybrids” and “Mild Hybrids”? Theo Grigoratos (JRC, TG): yes - also see JRC presentation / proposal.

Raquel Cordeiro (RC): What could be the cause of difference for OICA and JRC data? TG said OICA data might not be worst-case. Also added that this can be due to technical reasons e.g. PEV battery capacity that might result in different regen capacity, blending, etc.

JvW stated that OICA used 55 vehicles from 6 OEMs. No OICA data was omitted. TG replied that OICA has more than 6 members and nobody can ensure that the worst-case vehicles were used in this analysis or that the rest of the OEMs might not have worse performing vehicles in terms of friction energy shares. JvW questioned, why to follow the worst-case approach - relevant are the average emission.

TG commented that the next PMP ToR would deal with vehicle individual factors and GTR would be amended by a sentence indicating so. However, he dismissed the OICA proposed sentence due to the lack of a commonly accepted and detailed documented method to perform the calculation at this stage.

Andrew Stephenson (JLR/OICA, AS): Could a one-line correlation be used?

JvW; Yes, but one line would have a worse fit.

Xueyuan Nie (XN): How would a potential corrosion effect be considered in the PEV case?

Sebastian Gramstat (Audi/OICA, SG): Research activities are ongoing to prevent corrosion. TG: this cannot be addressed in the current version of GTR and is doubtful if it would be addressed in the future.

Staffan Johansson (VCC): How would the translation between regeneration and brake dyno work, for example one-paddle drive? TG: The JRC proposed test procedure does not need it and no specific measures are taken.

TG: The updated GTR could define a dedicated test on the Chassis Dyno but needs to be discussed and agreed upon in PMP.

### 3a. JRC presentation on Family Building

TG presented a proposal for OEM (type-approval) family definition. Aftermarket brakes will be elaborated in the Euro-7 implementing regulation with the aim of including the definition of the families in the next amendment to the GTR. It is not possible to adopt in January 23.

In JRC's view, the GTR should not define vehicle emission levels for the members of a family. This would be part of the implementing regulation.

Typical family parameters would be type of caliper, type of brake, type of friction material, and more ... see JRC presentation.

Only vehicles that feature an identical brake assembly may be part of the same brake family.

The "worst performing brake" is identified by the product of WL x Friction braking share coefficient

JvW: which load will be tested? Eq 8.1.a x Factor? TG clarified that the test shall be carried out using the vehicle parameters of the parent of the family (i.e. the vehicle with the highest product of WL x Friction braking share coefficient). This will not necessarily be the heaviest vehicle – see added example in JRC's presentation.

RV: Non-Friction Braking Coefficient should read Friction Braking Coefficient.

TG: will check and potentially revise - DONE.

HB: It is not clear why in the GTR the friction coefficients are fixed for all types of vehicle but the rest of the family building is left to local legislators. If the coefficients are the same for all regions, one has to assume that the technological setup of the vehicles is the same in these regions as well. Therefore, no regional differences in family building should exist.

If the rest of the family building is left open due to regional/local differences in legislation, one has to assume that the vehicle technology will be different as well. If the vehicle technology is different, one has to assume that the coefficients will vary too. Therefore, we do not agree with the proposal to fix "one-fits-all" coefficients and not address the proposal on family building from OICA.

TG: regions might, or might not apply the GTR. Currently, there were no concerns.

BG: For example, a region could decide to test only the parent of a family or permit each vehicle category to have separate emissions based on the (fixed) coefficients. Additionally, the main objective for defining the families in the GTR is to let the testing facility know which vehicle parameters shall use to test a brake that is used in more than one vehicle.

### 3b. JRC presentation on Non-friction Braking Method

TG continued with the process to define Friction Brake Coefficients for GTR – proposal (see presentation). TG explained how the worst case is defined. NOVC-HEV are separated in Cat 1 (<60V, Mild-hybrids) and Cat 2 (>60V Full-Hybrids). Full-Hybrid value is based on only one vehicle from a brake dyno. TG mentioned that no third party including OICA submitted any data for this category (Cat. 2). However, JRC would not like to put these vehicles in the same group as Cat.1 due to the higher regenerative potential of full-hybrids. If values for this category cannot be agreed then Cat. 1 and Cat. 2 will share the same coefficient as Cat. 1.

OICA has stated earlier that this energy share is just reflecting what has been programmed into the brake dyno software – not a measurement.

TG: A detailed method for the determination of the coefficients for each case will be included in an amendment to the GTR.

HB noted that the brake energy correlation is only available to PM, but not proven valid for PN. PM / energy data has been published at EuroBrake.

HB: The proposal of a similar correlation factor for PN and PM is not acceptable at this point as there is a significant lack of data concerning correlation of electrification grade and PN emissions. This topic should be postponed to the already announced amendment of the GTR as there is no sound basis for a clear and good correlation between the friction energy share and SPN or TPN.

TG replied that ILS data with Br5 showed an increase of TPN with the load. Since there are only two data points the correlation cannot be declared as linear. However, there is a correlation and the application of the TPN measurement in the GTR will allow to collect more data and make any adjustments if needed at the next amendment.

JvW: For Brake 5 only 4 Labs delivered data. For the Non-friction braking so far only Energy share was discussed.

Ravi Vedula (Brakes India, RVe): The goal of the GTR is for PM and PN, in this context energy share was discussed.

David Hesse (IAV, DH) via chat: I support Heinz's opinion! The proposal to use coefficients assumes that the correlation between friction energy and emission factor is linear - we cannot assume that this is the case for PN + PM. We need more data to adopt the method as robust and reliable (I propose to determine PN/PM emissions on a dyno for e.g. ICE, Mild HEV, PHEV and BEV).

Stefan Carli (VW/OICA, SC) commented it should not be stated as “linearity”. TG will rephrase: “looks like correlation”

Bill Coleman (VW/OICA, BC): A footnote to the GTR does not help at all. Without further note it could be the next next, etc GTR amendment. Need to add a time schedule.

BG: Amendment could be submitted for UNECE Jan 24. TG: The word next will be added to the text to ensure it will be addressed already in the first amendment of the regulation.

BC: But this is not acceptable to Eu7

BC: the entire GTR including the necessary amendments should be adopted in June 23. OEMs need confidence on the timing. TG replied that the GRPE agreed to submit a working document for October 2022 with the aim of being adopted in January 2023. JRC requested an OICA statement on the footnote amended to the GTR. Is it useful, or not? JRC would propose to elaborate a detailed method, maybe it could be based on elements of the WLTP Brake without the need of the entire cycle.

Additional Items (see presentation)

David Antanaitis (GM/OICA, DA): stated the opinion that the term "Non-friction braking" would work, but the name of the coefficient should be changed (it can be re-named as "friction braking coefficient" or similar)

RVe agreed. - DONE

TG: Fixed dimensions of the enclosure were requested by OICA, leading to a single design. PMP members reported to JRC that the new dimensions are working. There would be the wish avoiding an oversized enclosure.

Proposed design recommendations are stated in the presentation. If there are objections until 23.12., the recommendations will be deleted completely.

Rob Gardner (TRL, RG) via chat: Should the updated definition of NOVC-HEV refer to the "nominal voltage of the traction REESS" and not the "traction battery"? The former is the term used in GTR15 and UNR154.

#### 4. Next steps

Circulate consolidated GTR version by 14.12.

Continue any major discussions w/o PMP meeting Dec 20.

Deadline for comments to GTR until 23.12.

Consolidate before end of Year and submit to UNECE to final format in January 2023

Next PMP meeting on Nov 9 in Geneva– as Hybrid meeting. Links will be shared.

Done

#### 5.) AOB

SC announced that this was his last PMP meeting. He thanked the colleagues for the 20+ years of collaboration. BG thanked Stefan for his contributions, starting from the very beginning of the PMP and wished him all the best for his retirement.