

PMP – Particle Measurement Program Informal Working Group Task Force 2– Brake Dust Sampling and Measurement

Meeting #2 – Thursday 21 September 14:00 – 15:00

Minutes of Meeting – Final Version

1. Tour de table: Participants: AUDI (Sebastian GRAMSTAT), AVL (Christos DARDIOTIS), BMW (Rasmus LEICHT), Brembo (Francesco RICCOBONO), CARB (Sonya COLLIER – John COLLINS), DEKATI (Mikko MOISIO), Ford (Marcel MATHISSEN), General Motors (Matthew ROBERE), JARI (Hiro HAGINO), JRC (Theodoros GRIGORATOS), LINK Engineering (Carlos AGUDELO – Radek MARKIEWICZ – Matt Marschall), TMD Friction (Ilija PLENNE), TSI (Jurgen SPIELVOGEL – Stephan PERCOT).

2. Organization of the following presentations: According to the availability declared from the TF2 partners the schedule regarding the sequence of the presentations is as follows:

October 5: 1st Presenter TU Ostrava; 2nd Presenter HORIBA/AUDI

October 19: 1st Presenter FORD; 2nd Presenter Brembo

November 2: 1st Presenter General Motors; 2nd Presenter JARI (tbc)

Based on the experience of the 1st presentation given by LINK it is possible that the meetings will last somewhat longer than 1h (up to 75 min). In any case it is recommended to try to keep the presentations to 20 min in order to have additional discussion of at least 15 min for each presenter.

3. Presentation of LINK/TSI: After a short introduction, CA highlighted the need to align with the PMP activities on the topic. CA announced that the NA SAE dyno committee has temporarily ceased its activities in order to enhance the PMP's effort.

It was highlighted that the initial approach is to develop a methodology which can be applied to existing configurations with an update/upgrade and not develop a system from the scratch. CA analysed all the challenges and focused specifically to the duct finish of the configuration and the connection to the accompanying instrumentation. An introduction on the topic of losses and the need to be examined in detail was provided. Specific attention was given to the air speed entering the brake enclosure. Different options regarding speed were examined and CA highlighted that usual city duty cycles fall within the range of 200-1000 m³/h. CA also explained why this parameter should be constant and not dependent to the “vehicle's speed” as defined by the cycle (i.e. more sophisticated dyno configuration without the proportional payback, sampling will be compromised with variations in flowrate, etc.).

Explanations were provided after CARB question regarding the possibility to conduct chemical analysis following the sampling. TG (JRC) highlighted that even if it is out of the scope of the current mandate of the PMP it shall be enabled as it is clear that it will be beneficial in terms of future research and understanding of brake wear emissions.

Two different configurations, one with horizontal and one with vertical duct, were presented. Pros and Cons of each configuration were analysed. TSI, AVL and Dekati assured that their instruments could be coupled to both systems without problems. A discussion regarding the one of the most important parameters that should be considered – the residence time of the

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particles in the duct – followed. SP (TSI) recommends to sample as close as possible to the sampling point to minimize losses. MM (Dekati) explained the trade-off between smaller and bigger particles based on the sampling position.

CA also explained in brief the use of different type of fixtures and analysed the most appropriate ones.

SP (TSI) briefly presented the instruments used for the purposes of the current exercise by TSI and analysed the potentials of each instrument. TG (JRC) clarified that it is out of the scope of the TF2 to propose specific instruments but we definitely should define the technical specifications. Also asked SP to prepare for future reference some more detailed analysis of the Pros and Cons of each instrument.

A discussion regarding the preferred diameter of the duct along with a presentation from CA on the losses of big and small particles expected under different scenarios followed.