**Notes of PMP-46**

**Session held during UN-ECE GRPE**

**10 Jan 2018 – Palais Des Nations, Geneva**

Giorgio Martini (chairperson) opened the meeting with the welcome and description of the purpose to brief the GRPE delegates on the status of the PMP work and progress during the last year.

The presentation is shared as PMP-46-02 on the IWG website.

**Exhaust particles:**

**Sub-23nm:**

Todays method measures 50% of particles at 23nm, we are losing some particles below 23nm, about 5% on diesels, but on GDI equivalent 50-100% increase. Current PMP method can identify high emitters so no urgent need. But we need to develop a method in order to properly monitor new technology. Therefore there is a modified methodology proposed within PMP and we are running a round robin to assess the methodology and uncertainties. The main issue is potential artefacts due to nucleation of volatile material – either need very high dilution ratio, or need a catalytic stripper in sampling lines.

The round robin has a golden system, the vehicle is an Opel Astra GDI without GPF – but one was not available in the timeframe of the round robin, this technology will be tested during the later part of the RR. Other equipment setups and vehicles can be tested during the RR.

**Raw Exhaust**

Prelim results from JRC show 20% differences, it is too early to include in legislation. Additional investigations will require significant additional resources – engines and time on test benches

**Gas Engine Testing : investigating if current PMP methodology . Summary of SWRI report**

CNG engine 2-8 times higher PN and 5-10 times higher sub-25nm particles and ash.

Need also to include CNG light duty in the sub-23nm RR. For HD engines it is difficult to circulate the engines so OICA is looking into how to set up an HD program and will advise end Jan 2018 – most likely to request the golden equipment comes to labs where engines already installed.

**Low Temperature**

So far no issues for sampling via CVS and PMP is ready to support the WLTP low temp test

**Discussions**

UK representative Duncan Kay asked whether PMP has the intention to look into fuel quality on particulates ? Giorgio Martini explained this is not included in the current PMP mandate. In the lab we use reference fuels but understand that on road the wider fuel quality can have an impact.

India : noted mandates on blending biofuels – different feedstocks – eg biodiesel may also have an impact.

**Non Exhaust particles:**

**Brake wear particles :**

Need for a common test methodology to get consistent answers and ensure studies are comparable

Noting that the braking cycles already existing are typically established to stress test the brake system for braking ability performance. Therefore looked at WLTP database for looking at typical driving and derived typical activity. Then compared to existing industrial cycles. Created a dedicated task force – TF1 to accelerate the work.

Two cycles – WLTP based (developed by Ford/Heinz Steven) and backup LACT based (developed for H2020 LowBraSys). WLTP based cycle is currently under validation in Ford (dyno and real world) and then next steps for an RR based validation. Planned to conclude initial validation March – April 2018 but probably will run a few months late so RR should conclude mid 2018, prelim results possible for May F2F but expect full report Nov 2018 PMP / Jan 2019 GRPE.

**Sampling:** Selected a rig based system to focus on brake system – looking at whole vehicle system is a lot more complicated. There are different configurations which are being analysed. TF2 is established to accelerate this work. Timetable is to define the rig configuration Jan 2018, testing parameters march 2018 and then validation of rig and methodologies – completion timing TBD.

Focus of PMP is on both mass and number for brakes. There are both smaller and larger particles coming from brakes.

Methodology should simulate real-world conditions – i.e. how the test rig represents real world is important. Optimal layout might differ for PN and PM, therefore may need a compromise in order not to need two separate test methodologies / setups.

The PMP group has many highly active contributors including industry and is progressing very well, more or less in line with the GRPE schedule. It is quite complex, the more we learn, the more challenges we are finding – challenges are completely different to exhaust particles.

**Tyre – Road Wear Particles (TRWP)**

In previous GRPE sessions, PMP reported that it is too complicated to develop a methodology for TRWP – eg distinguishing source particles from those already on the road. Particles might be a mix of tyre and road – and the effort to address at the time was beyond ability of PMP group at the time, so PMP mandate agreed to continue to monitor. No specific discussions in last 3 PMP meetings, but the intention is to have a dedicated session on latest studies available in the PMP May or Nov sessions. We will circulate information far in advance on this topic.

**Discussions**

**UK:** Duncan Kay Highlighted the importance of the Non-Exhaust Particle topics – a lot of interest in UK, and 70% of road transport particles from NEPE. Lots of conflicting evidence perhaps because of no common methodology. Requested PMP to consider need to develop a whole vehicle methodology in future re electrification – regen braking, vehicle mass etc.

Giorgio Martini responded about the complexity of whole vehicle testing – may need to look into modelling for the electrification once we understand about the particles generated by braking events.

PMP leading team will add this important consideration to the next PMP agenda.

**ETRMA :** Mariana Fabriano highlighted the tyre industry has been contributing to building the knowledge from TIP (tyre industry project) within WBDSDC.