



PMP procedure: Regenerative Braking

Initial proposal on next steps for TF4

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15.07.2021



Overview

- TF 4 to be established in GRPE PMP group (kick-off at next PMP meeting).
- Goal: Generalize PMP procedure to electrified vehicles with regenerative braking.

- When to be finalized?
 - PMP deadline March 2022 :”Adaptation of the proposed methodology to include regenerative braking and – to the possible extent – future technologies” (T.Grigoratos, Webconf, 24th MAR 2021)
 - This is a very ambitious target
- How many active members?
 - > Suggesting to have a small, manageable group contributing actively
 - > the results of the TF 4 will be shared in a timely manner within the PMP group
- TF needs expertise from...
 - OEM's (Brakes with support of powertrain department)
 - Dyno manufacturers
 - EC representative (alignment with whole PMP approach,...(legal issues))
 - ...



Content

- Based on PMP particle emission test procedure - Same cycle and sampling approach
- Run on brake dynos with enhanced capabilities for simulation of brake regeneration
- Applicable for all types of electrified vehicles with different levels of regen capability
- Reflecting main influencing factors /boundary conditions
 - Climatic conditions
 - Battery state of charge
 - Braking systems (parallel vs. series brakes)
 - One pedal/two pedal driving
 - Etc.
- In a first version the method should be reflecting typical drive train conditions. Second step expand the method to reflect additional influencing factors
- Different regen strategies for each OEM/carline. Regen strategy proprietary
 - How to enable testing by third parties?
- Proposal must be open and ensure replication of the vehicle regen strategy



Enabler

- Proposed approach:
 - Brake community proposes simplified methodology for regen testing
 - Rely on literature/norms for the method definition whenever possible
 - Discussion of approach with Powertrain development.
Agreement on realistic boundary conditions
 - Estimate to which degree this approach represents real vehicle behavior:
target tbd. xx%
 - Team decision (UNECE PMP Group) if this is a feasible/reasonable approach
 - Conduct measurement campaign to test robustness of the procedure