Determination of Powertrain Performance of Hybrid Electric Vehicles

Presented by: Germany, Korea

EVE-15 meeting

June 8, 2015

Outline

1. Activities and current state-of-play since EVE-14 Webcon April 20, 2015

2. Planned activities until EVE-16, Ottawa, October 19/20, 2015

Activities and current state-of-play

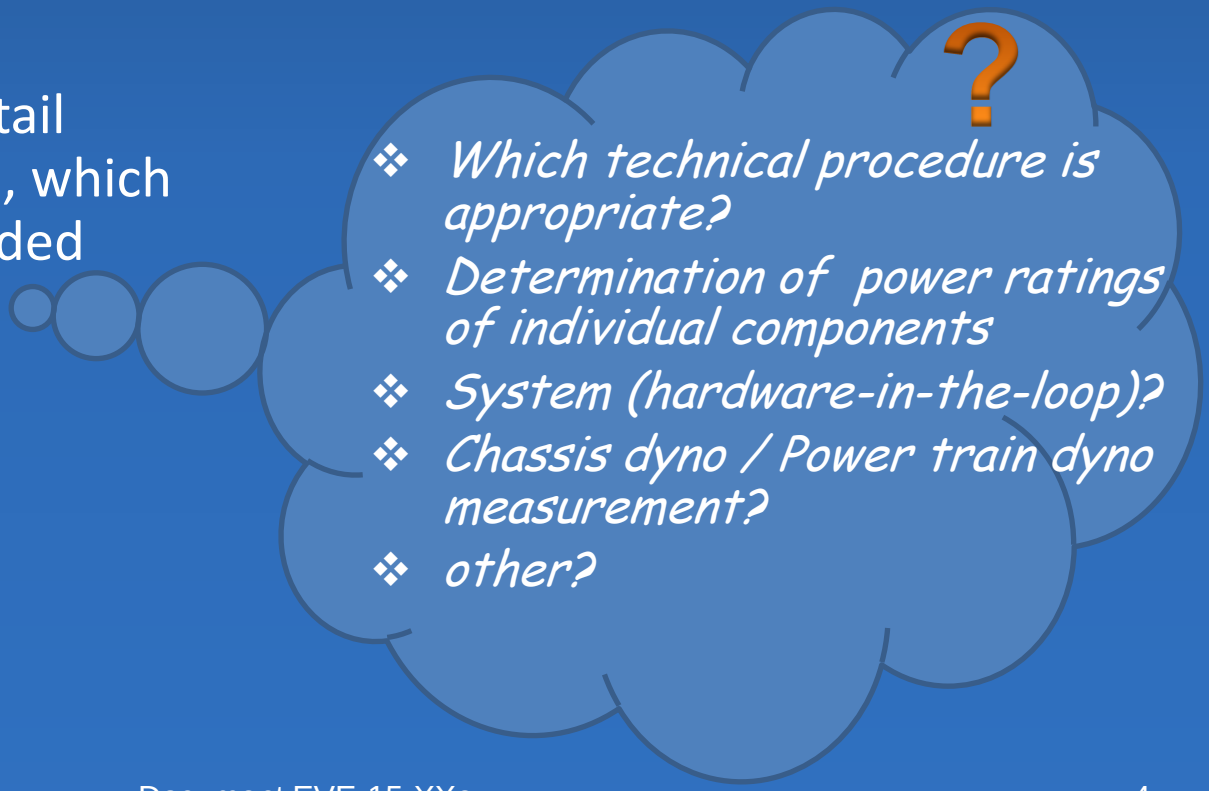
Progress in information gathering

- ✓ SAE-J2908
  "Hybrid System Power Rating" (EVE-14-10e)
- ✓ ISO/TC22/C37/WG2
  "Determination of power for propulsion of hybrid electric vehicle" (EVE-15-tbd e)
- ✓ KATRI
  "Introduction to System Power Concept and its Application" (EVE-07-06e)
- ✓ First Cross-Section of Opinions from Survey
  "Questionnaire to support the development of electrified vehicle's system power determination" (EVE-14-07-Ref1e)

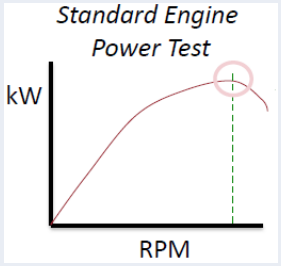
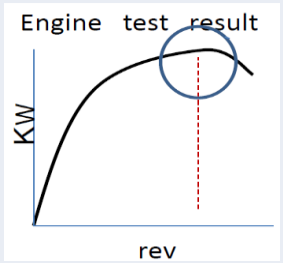
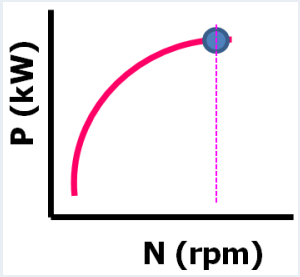
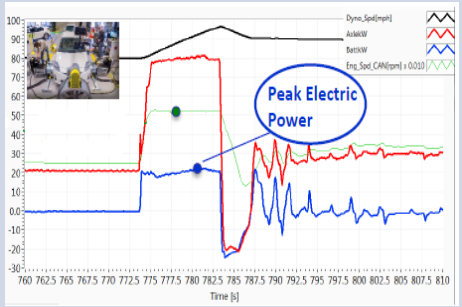
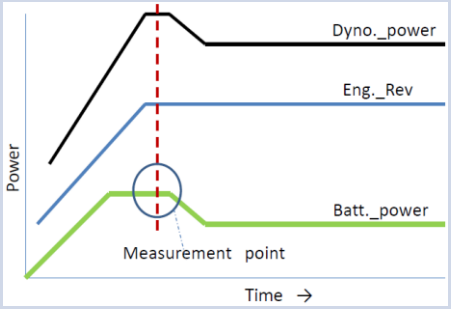
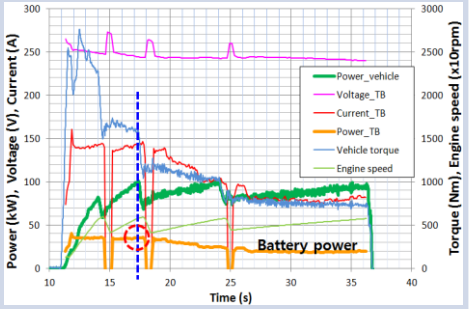
Information needed

- **technical questions:**

  to be answered in detail including information, which resources will be needed therefor



Summary of ongoing projects

Items	SAE J2908 TF (Argonne, U.S.)	ISO TC/22/SC37/WG2 (JARI, Japan)	KATRI updated (KATRI, Korea)
Principle (Hybrid system power)	Nominal rating + System power test	Nominal rating + System power test	Nominal rating + System power test
Nominal Rating (ICE)	SAE J1349 	ISO 1585 	UN R85 
System Power Test (Electric source) *To be discussed*			
Test Equipment (Dynamometer)	Hub dyno or Chassis dyno	Chassis dyno	Power train dyno or Chassis dyno

Summary of ongoing projects

Items	SAE J2908 TF (Argonne, U.S.)	ISO TC/22/SC37/WG2 (JARI, Japan)	KATRI updated (KATRI, Korea)
Vehicle categories	PC, LDC		
Power train concepts	(N)OVC-HEV incl. all types of drive train concepts and manual / automatic /CVD gear boxes		
Information	Nominal system power P_{sys} $P_{Electric\ assist}$ at $P_{sys,max}$ $P_{Electric\ assist}$ at $P_{ICE}=0$ P_{reg} Regenerative power	$P_{sys,max}$	$P_{sys,max}$
Target / comprehension towards existing regulations	Ratings for common data benchmarks, customer information (complements SAE J1349) System Power Test for engineering exercises	$P_{sys,max}$ rating required as level playing field for comparison of HEVs power with ICE- vehicles (complements ISO 1585) and for GTR No. 15 (WLTP),	Vehicle classification, taxation complements UN R85
Time line	Project start 11/2014 finalization scheduled for Q4/ 2015	Waiting for approval votes 19/6/2015 projected time line: 18 months	Research work in progress

Information needed

- **strategic political questions:** need for technical information on best/worst case or representative case?

- *Regulatory approach: amendment or entirely new document?*
- *Regulation? Recommendation? Mutual Resolution?*
- *What kind of power ratings are needed?*
- *which vehicle conditions shall these ratings represent?*
- *For which applications?*
- *Taxation schemes, incentives, insurance classification?*

First Cross Section of Opinions from Questionnaire Survey

EU

- The subject is **important** and **relevant for many other Regulations**
- Forms the basis for proper **vehicle classification**
- Consider expanding the scope beyond PC and LDCV: harmonized procedure for **L-Category** vehicle and **NRMM**
- For all engines, motors and combinations of propulsion units up to a tbd. limit there **should be a single harmonized way** to determine it's continuous max. rated net and peak propulsion unit performance

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Purpose:

- WLTP and others

Way forward:

- Upgrade of UN R85 and development of GTR in parallel

First Cross Section of Opinions from Questionnaire Survey

JP

- JP understands that the demand in WLTP is **limited to the determination** of the **system power of HEV**
- There is **only need to define the combined power of hybrid electric vehicles**
- No need to re-define the power of Battery EVs and Fuel Cell Vehicles, since the electric drive train hay already been defined in UN-R85.

Purpose:

- WLTP, for P-t-M classification of HEV

Way forward:

- Target should be achieved by a world-wide agreed (ISO) Standard rather than a GTR, UN-R or Recommendation / Mutual Resolution

First Cross Section of Opinions from Questionnaire Survey

KOR

- Net power ratings from current UN-R85 are sufficient but the **power limit** ascribed to the **traction battery** should be **properly considered** and determined.
- Determination of power and torque should be done with a completed vehicle **applying a kind of chassis dyno or power train dyno measurement**

Purpose:

- WLTP

Way forward:

- UN-R85 should be adapted by an amendment / additional module

First Cross Section of Opinions from Questionnaire Survey

CAN

- As CAN is being party of the '98-Agreement, the UN-R85 has not been adopted or applied.
- CAN abstained from voting on phase 1 of WLTP since analysis of the GTR 15 (WLTP) is still ongoing and because stringent light duty vehicle reg. are already in place domestically.
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Purpose:

Way forward:

Planned activities until EVE-16

Next steps:

- Discussion and decision making regarding the approach and procedure respectively

  to be accomplished at EVE-16

- Completion of Feed-back Analysis from Questionnaire Survey

➡ end of June / early July

- Preparation and distribution of a discussion paper in time before EVE-16

➡ August / September

Timeline

updated version 06/2015