Development of integrated cost curves for the European light-duty vehicle market

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### Outlook & next steps

**Status / planning of EU technology analyses**

#### Ricardo potential analysis
- Vehicle classes: B, D, CUV, large N1
- New vehicle class: C segment
- New vehicle class: small N1 vehicle
- Gasoline direct injection and downsizing (stoichiometric and lean-burn)
- EGR direct injection turbo engine
- Atkinson Cycle engine
- P2 and powersplit hybrid
- Advanced diesel technology (updated diesel map and recalculations)
- Advanced transmission technologies
- Manual transmission sensitivity
- NEDC and JC08 (Japan) results

#### FEV cost analysis (phase 1)
- Gasoline direct injection and downsizing
- Automatic and dual-clutch transmissions
- Start-stop hybrid (belt alternator type)
- P2 and powersplit hybrid
- Electrical air conditioning compressor

#### FEV cost analysis (phase 2)
- Advanced diesel technology
- Manual and dual-clutch transmissions
- EGR direct injection turbo engine
- Advanced start-stop technology
- Lightweighting measures

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US EPA results transferred to EU conditions

New work specifically for ICCT
Outlook & next steps

Developing cost curves for EU LDVs

- Ricardo potential analysis
- FEV cost analysis (phase 1)
- FEV cost analysis (phase 2)
- Additional sources

development of individual cost curves for each vehicle segment
Outlook & next steps

Timing

- **February 1:**
  Workshop to show preliminary results from Ricardo and FEV studies and to have a discussion with experts / interested stakeholders

- **February:**
  Release of final reports on Ricardo simulation work and FEV phase 1 analysis

- **March / April:**
  Workshop to show final results from FEV phase 2 analysis and ICCT cost curves for EU light-duty vehicles in 2020/25

- **May / June:**
  Publication of ICCT report summarizing the results
Supporting work
“Pocketbook” EU vehicle market statistics

Webinar on February 15
https://www2.gotomeeting.com/register/486874322
Supporting work
Working papers on various issues

Development of a Worldwide Harmonized Light Vehicles Test Procedure (WLTP)

ICCT contribution No. 3 (focus on inertia classes)

Author: Peter Mock
Date: September 2011
Paper number: 2011-8
WLTP (APPROCE-08)
Keywords: WLTP, inertia class, step-acts

Introduction

The inertia class approach makes use of inertia mass and upper limits for inertia mass during the vehicle testing procedures today. Historically, the weight of a vehicle was represented by hanging rotating inertia mass on a dynamometer. This approach required the use of dynamic inertia content and an upper limit for inertia mass. Modern electronic dynamometers no longer impose these restrictions. As a result, it is now possible to revise existing test procedures and provide more accurate simulation and test combination values to consumers.

The document builds on explanations that were given in the documents WLTP-2009-0004, WLTP-2010-0004, WLTP-2007-0004, and WLTP-2010-0006. It explains the implications of the current inertia class based system and outlines two alternative approaches for discussion within the WLTP working group.

Shortfalls of the current inertia class approach

In 2011 the first time detailed data on EU new passenger car registrations at the vehicle version level was published in the context of the European Commission CO2 monitoring system. This data also contains the inertia mass for each entry. This allows a thorough analysis of the distribution of new vehicle registrations by inertia for the European new passenger vehicle fleet.

As seen in Figure 1, there is a tendency for a higher number of vehicle registrations to fall between inertia class step 2 and step 3. This is due to the mass difference between the two inertia classes. Effectively, a step 3 car is roughly the same size as a step 2 car, only around 30% heavier. The step 2 to step 3 mass difference also affects the percentage of weight difference. Around 2% of registrations are in step 1, 28% in step 2, and 70% in step 3. The step 2 to step 3 mass difference is significant.

When aggregating over all inertia classes, the effect can be quantified more precisely. As Figure 2 demonstrates, about 11% of all registrations are associated with a step 1 to step 3 weight difference of more than 100 kg. In contrast, no data was observed for step 3 to step 4 registrations.

The likelihood of a vehicle having a mass slightly below an inertia class step 1 (10 kg) is much higher than having a mass slightly below an inertia class step 2 (100 kg). This strongly suggests that manufacturers optimize the weight of their vehicles with respect to the inertia mass class steps. In other words, the government should consider new approaches to improve the accuracy of inertia mass classes.

The approach is that there is a strong incentive for manufacturers to reduce the weight of their vehicles to make sure that they “jump” into the next lower inertia class and gain an advantage in terms of CO2 emissions. Such a consideration would be expected.

Approach to stand-alone GPF

The GPF can be included as a separate addition to the three-way catalyst. We can make a preliminary cost estimate based on past experience with the diesel particulate filter (DPF) and the three-way catalytic converter (TWC). The DPF and TWC costs are then added to the cost of the GPF system. The cost of a GPF may be less than the equivalent of the current three-way catalyst.

Estimated Cost of Gasoline Particulate Filters

Authors: Ray J. Moreiras and Francisco Pineda Sanchez
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Paper number: 2011-8
Keywords: particulate filter, cost savings, catalyst
Supporting work
ICCT staff blog

http://www.theicct.org/blogs/Staff
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