PRESS RELEASE

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Ricardo research highlights technologies to reduce heavy duty truck CO₂ emissions

At the 13th International MTZ Conference on Heavy-Duty Engines – to be hosted on 6-7 November in Cologne, Germany – Ricardo will share the latest results of research into improving efficiency through the use predictive commercial vehicle powertrain control based on an enhanced electronic horizon, and lean-burn natural gas engines capable of achieving Euro VI emissions and beyond

Long haul heavy-duty trucks are an essential element of the transportation mix of the modern, industrial economy, but are also a significant consumer of fossil fuels and emitter of carbon dioxide, accounting for one quarter of the total such emissions emitted in the entire transportation sector. They are also inherently less amenable to the type of electrification and hybridization strategies that are already contributing to reduced carbon emissions and potential long-term sustainability for the light vehicle sector. With the European Commission seeking to cut truck CO₂ emissions by 15 percent compared to 2019 levels by 2025, and 30 percent by 2030, truck manufacturers in the EU market are further focused by the requirement for all newly produced trucks to determine and declare their CO₂ emissions and fuel consumption which comes into effect from 1 January 2019.
The first of the Ricardo papers presented at this week’s conference is the second part of a two-paper series relating to the company’s contribution to the multi-partner Heavy-Duty Gas Engines integrated into Vehicles (HDGAS) project. The Part 1 paper, published at the same MTZ event in 2017, described a Ricardo Integrated Model Based Development (IMBD) approach, using 1D and 3D simulation tools, to identify the most suitable technologies allowing both CO₂ reduction and emissions control capability. The Part 2 paper published at this week’s event announces the summary results of the multi-cylinder testing of a low-pressure positive ignition direct injection (DI) lean burn NG engine and aftertreatment system. The fuel consumption and CO₂ emissions benefits offered by lean burn operation, owing to the improved thermal efficiency, reduced pumping losses and lower carbon content of natural gas, together with emissions performance over the World Harmonised Transient Cycle (WHTC), were quantified in comparison to conventional stoichiometric operation.

The experimental and simulation data presented demonstrates the potential of lean burn technology to significantly lower fuel consumption and total cost of ownership, while offering high viability in terms of payback time in comparison to a conventional Diesel fuelled truck. In addition, the potential differentiation of CO₂ charges for HD vehicles within the EU, alongside the lower cost of ownership is expected to favour market penetration of NG fuelled vehicles.

### Extending the electronic horizon of heavy duty trucks

This second Ricardo paper at this week’s conference relates to the company’s contribution to the multi-partner European IMPERIUM project (IMplementation of Powertrain control for Economic, low Real driving emIssions and fuel ConsUMption). The paper presents a simulation tool that couples complete dynamic vehicle models with an environment model utilizing agent-based traffic micro-simulation. This tool is used to study the CO₂ reductions achievable by using an optimal energy management strategy enabled with dynamic electronic horizon to optimize the operation of both conventional and hybridized heavy goods vehicles.

The results show that the application of predictive energy management control using dynamic preview data of road speed and topology to a conventional vehicle can bring fuel consumption reductions of 5.2-7.7 percent dependent on traffic conditions, with greater relative improvement in heavier traffic. These represent similar levels of fuel consumption reduction to hybridization, with significantly lower on-cost and weight increase to the vehicle.
Optimal powertrain selection for off-highway applications

A third Ricardo presentation at the conference switches the focus to the off-highway heavy-duty sector, helping manufacturers navigate the complexities and trade-offs in the selection of the optimal powertrain solution for each application.

With the broad range of powertrain technologies available – from conventional architectures to hybrid electric and alternatively fuelled alternatives – as well as their increasing sophistication and integration needs, there is no single technology or configuration that will be universally applicable. With so many options to choose from, Ricardo presents a three-step hierarchical methodology that can enable efficient down-selection of powertrain alternatives and optimization of the chosen solution.

By adopting this Ricardo approach, manufacturers should be able to navigate the complexities of available state-of-the-art technologies, and achieve a more optimal selection of powertrain configuration, faster and more efficiently.

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NOTES TO EDITORS:

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