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HyBoost demonstrates new powertrain architecture for ‘intelligent electrification’

The HyBoost project vehicle was revealed for the first time today at the Cenex Low Carbon Vehicle 2011 event hosted at Rockingham, UK, demonstrating a combination of high impact, low cost electrical systems which offer the prospect of radical engine downsizing using electric supercharger and energy capture and storage technologies within an otherwise conventional gasoline powertrain architecture.

The HyBoost project has been led by Ricardo in partnership with Controlled Power Technologies, the European Advanced Lead Acid Battery Consortium, Ford, Imperial College London, and Valeo, with co-funding from the UK government-backed Technology Strategy Board.

Together the partners have sought to demonstrate an extremely cost-effective, ultra-efficient gasoline engine in a C-segment passenger car delivering the performance of a baseline 2.0 litre model but with significantly reduced real-world and drive cycle CO₂ emissions, and comparable improvements in fuel-economy. The project deliberately focused upon technologies and systems that are already on the market or are capable of practical production implementation in the near term. Particular focus was placed upon sustainability, avoiding the use of scarce or expensive materials, providing the straightforward manufacturing processes, and offering the high levels of scalability required by the automotive sector. HyBoost thus provides a very practical demonstration of what can be achieved today in terms of CO₂ reduction using a conventional powertrain architecture and available efficiency improving technologies.

The HyBoost concept is based on a 2009 Ford Focus in which a 2.0L naturally aspirated four-cylinder gasoline engine has been replaced with a 1.0L three-cylinder EcoBoost engine. In implementing this 50 percent downsizing by swept volume, the research team has the objective of delivering zero degradation in driveability, performance or acceleration. This is to be achieved through the use of a
combination of technologies including a belt starter-generator to provide regenerative braking and stop/start, exhaust energy recapture through electric turbo-compounding, advanced, cost-effective lead-acid batteries and super-capacitors to provide energy storage, and electric supercharging to provide improved transient response and avoid the pitfalls of turbo-lag that otherwise place a practical limit on the potential for downsizing. A HyBoost demonstrator vehicle, including many of these technologies is being displayed at the LCV2011 event.

Commenting on first demonstrations of the HyBoost project vehicle Ricardo chief technology and innovation officer Professor Neville Jackson said:

“The form of ‘intelligent electrification’ powertrain architecture being evaluated in the HyBoost concept aims to break the previous boundaries of gasoline engine downsizing by implementing a practical mix of technologies aimed at recapturing braking energy and re-using this for supercharging at critical points in the operating envelope. Coupled with well-proven micro-hybridization techniques, HyBoost thus offers the prospect of significantly reduced carbon emissions from a gasoline engine powertrain in a more commercially attractive package than full hybridization, while delivering uncompromised or even better performance. We look forward to sharing the results of this very promising research project in the coming months.”

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NOTES TO EDITORS:

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