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Ricardo and QinetiQ push new boundaries in affordable high performance battery technology for hybrid and electric vehicles

It was announced today that the Reduced cost Li-Ion (RED-LION) project – a two-year collaboration between Ricardo and QinetiQ with part-funding from the Department for Transport under the UK Energy Saving Trust Low Carbon R & D programme – has demonstrated the potential of a new low cost Lithium-Ion cell chemistry and associated flexible battery management system for Hybrid Electric Vehicles (HEVs)

The aim of the project was to develop an alternative Lithium-Ion (Li-Ion) cell chemistry that could be integrated within an HEV using a bespoke battery management system. Following completion of the project, the partners have announced that a battery pack using QinetiQ's new and innovative iron sulphide-based cell chemistry and Ricardo's latest advanced Battery Management System, has demonstrated significant cost and weight reductions compared with the reference Efficient-C full hybrid vehicle.

To prove the potential of the alternative cell chemistry, the RED-LION project set out to replace the battery pack used in the Efficient-C prototype HEV with one using new cells capable of demonstrating suitable material cycle life, capacity, specific energy, rate capability and safety. Custom cells were manufactured and packaged within a bespoke battery pack incorporating many novel features. Ricardo designed the overall battery pack to directly replace the existing unit, developing a new battery management system to manage the iron sulphide chemistry.

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The prototype cells, designed and manufactured wholly by QinetiQ, have been shown to deliver a cycle life of over 1,000 cycles at a limited depth of discharge. The high charge/discharge rate capability shown by the particular cell design would make it suited to both HEVs and low-range Plug-in Hybrid Electric Vehicles (PHEVs). Comparing the performance of the prototype high rate cells with the cells originally used in the Efficient-C HEV, a 20% reduction in weight, on a Wh/kg basis, was achieved.

Furthermore, QinetiQ estimates that significant cost savings are possible in comparison with current commercial production Li-Ion chemistries through cheaper raw materials and a more energy efficient patented manufacturing process.

Another key innovation of the RED-LION project is the new battery management system, developed by Ricardo based on a bespoke architecture, which is fully adaptable to a range of cell chemistries and battery architectures. Ricardo has fully integrated its system into a battery pack containing the QinetiQ cells. The pack includes a number of innovations to improve performance and reduce cost, which are the subject of three Ricardo patent applications.

The project has demonstrated the potential of the cell chemistry within an HEV environment. Whilst the current cell is most suited to HEVs and low-range PHEVs due to its high charge/discharge rate capability, the inherently high energy density exhibited by the chemistry combined with other anticipated improvements, would make it a strong candidate for all-electric vehicles, not least due to its highly attractive cost versus energy-density benefit.

Commenting on the conclusion of the RED-LION project, Neville Jackson, Ricardo group technology director, said:

"By combining a new Li-Ion battery cell chemistry with our innovative battery pack and management system technology, the RED-LION project has demonstrated that an iron sulphide-based cell chemistry is a viable energy storage solution for hybrid vehicle use. Ricardo is pleased to have been able to work with QinetiQ, with the support of the Energy Saving Trust, to deliver these very promising results."

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Mark Roberts, strategic market team director, energy & environment at QinetiQ, said:

“One of the most exciting aspects of this new Lithium-Ion cell chemistry is its flexibility, being customisable for both high power and high capacity applications. Not only could this improve performance in existing HEVs through reduced cell size and weight, but also make all-electric vehicles a more credible proposition by increasing range. And because iron sulphide-based cell chemistry is cheaper to produce than traditional cobalt cells, lower production costs could make hybrid and all-electric vehicles more affordable in the future.”

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NOTES TO EDITORS:

Ricardo plc: With technical centres and offices in the UK, USA, Germany, the Czech Republic, France, Italy, Russia, China, Japan, India and Korea, Ricardo is a leading independent technology provider and strategic consultant to the world's transportation sector and clean energy industries. The company's engineering expertise ranges from vehicle systems integration, controls, electronics and software development, to the latest driveline and transmission systems and gasoline, diesel, hybrid and fuel cell powertrain technologies, as well as wind energy and tidal power systems. Ricardo is committed to excellence and industry leadership in people, technology and knowledge; approximately 70 per cent of its employees are highly qualified multi-disciplined professional engineers and technicians. A public company, Ricardo plc posted sales of £178.8 million in financial year 2009 and is a constituent of the FTSE techMark 100 index – a group of innovative technology companies listed on the London Stock Exchange. For more information, visit www.ricardo.com.

QinetiQ: A FTSE250 company, QinetiQ (www.QinetiQ.com) is a leading international provider of technology-based services and solutions to the energy, defence, security and related markets. It develops and delivers services and solutions for government organisations, predominantly in the UK and US, including defence departments, intelligence services and security agencies. In addition, QinetiQ provides technology insertion and consultancy services to commercial and industrial customers around the world. With over 14,000 employees, QinetiQ operates principally in the UK and North America and has recently entered the Australian defence consulting market.

The Energy Saving Trust: The RED-LION project was part-funded by the by the Energy Saving Trust's Low Carbon R&D Programme on behalf of the UK government's Department for Transport, with balancing contributions made by the participating companies. The Energy Saving Trust is one of the UK's leading organisations set up to address the damaging effects of climate change. It aims to cut carbon dioxide emissions - the main greenhouse gas causing climate change - by promoting the sustainable and efficient use of energy. The Energy Saving Trust is an independent, non-profit making organisation and acts as a bridge between government, consumers, trade, businesses, local authorities and the energy market. It provides impartial information and advice and has a network of advice centres in the UK specifically designed to help consumers take action to save energy.

The Energy Saving Trust's Transport Technology Programmes are part of the UK Governments Powering Future Vehicle strategy, which is funded by the Department for Transport. The aim of the programmes is to support the transition to low carbon transport by providing incentives through grants for the demonstration of innovative low carbon technologies.

UK Government Department for Transport: The Department for Transport's aim is transport that works for everyone. This means a transport system which balances the needs of the economy, the environment and society. The Department for Transport provides leadership across the transport sector to achieve its objectives, working with regional, local and private sector partners to deliver many of the services.

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