News release

Lotus Wins Award for Engine Research that Delivers 15% CO_2 Reduction

Lotus Engineering, the world renowned automotive consultancy division of Lotus, is celebrating its latest accolade after triumphing at 'The Engineer Technology + Innovation Awards 2008' with another environmentally focused project. The winning project, Project HOTFIRE, developed a gasoline direct injection (GDI) engine concept that reduces fuel consumption by 15% and was named the leading academic collaborative project in the automotive sector.

Project HOTFIRE was made up of a collaboration of engine specialists from Lotus Engineering, Continental Powertrain, University College London (UCL) and Loughborough University, with funding from EPSRC (Engineering and Physical Sciences Research Council). The project studied the potential efficiency gains of spraying fuel directly into the cylinders of a petrol-driven engine, rather than introducing a fuel/air mixture. Due to outstanding early results, the project progressed further with the delivery of a concept-car engine which has been the subject of interest from a number of large manufacturers.

Mike Kimberley, Chief Executive Officer of Group Lotus Plc said: "I am absolutely delighted that our global high technology Lotus engineering division is continually being recognised for leading the industry across a number of advanced technologies which are contributing to the reduction of CO_2 emissions. Project HOTFIRE is an excellent example of an industry and academic partnership producing world-class research for the benefit of the environment and the car buyer."

Kimberley continued: "The most important part of the project is that the technologies developed are available and affordable and as we have already shown, can be easily implemented into next generation models to produce lower emissions."

Geraint Castleton-White, Head of Powertrain at Lotus Engineering said: "The project studied the benefits of homogeneous, early, direct injection for a spark ignition engine, using inlet valve events to minimise throttling losses. Being able to introduce the fuel separately from the air gives you freedom with how you operate the engine, there is no fuel lost to the exhaust, so hydrocarbon emissions are reduced, and you get more efficiency from the engine. It is our dedication to research such as this that keeps Lotus Engineering at the

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forefront of advanced combustion technologies, which ultimately will find their way into engines of the future."

Two single cylinder research engines were designed and constructed by Lotus Engineering, one of which was optically accessed. The in-cylinder geometry of the two engines was identical and features a close spaced direct injection system with a centrally-mounted injector architecture.

The optical version of the engine incorporated a full length fused silica quartz cylinder liner with a full view of the pent roof of the combustion chamber and a sapphire window in the piston crown. This allowed an advanced suite of laser diagnostics to measure air motion, injection characteristics, air/fuel mixing and combustion. This engine was based at Loughborough University for detailed studies of these in-cylinder phenomena.

The second engine was placed at UCL, and was updated to the same engine architecture as the optical engine, to measure emissions and fuel economy. The principle of the investigation was to use early inlet valve closing as a means of controlling the load on the engines, with a minimum amount of throttle, and so gain significant fuel savings. The emission measurements were essential, as any fuel savings could not be at the expense of the exhaust emissions from the engine.

The end application of this project is a direct injection spark ignition engine architecture that does not require stratified lean burn combustion to achieve significant, fuel economy savings of approximately 15%. This ensures that the system can be used over all speed/load ranges and eliminates the need for an expensive lean NOx trap which is usually required when lean combustion is employed.

Early results from this project were so successful that the same architecture was adopted for the Low CO_2 project, a collaboration between Lotus Engineering and Continental Powertrain with funding from the Energy Saving Trust (EST). This Low CO_2 project has successfully delivered a 3-cylinder mild-hybrid engine incorporating the cylinder head design used by the research and this engine has been installed in Opel Astra demonstrator vehicles which demonstrate significant improvements in both performance and CO_2 emissions.

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High-resolution pictures of the Opel Astra Low CO_2 demonstrator can be downloaded from the media centre of the official Group Lotus website at http://www.grouplotus.com/mediacentre. The image library is for registered users only. Members of the press may register for the media centre.

About Group Lotus plc:

The main operating subsidiary of Group Lotus plc is Lotus Cars Ltd, which has two operating divisions – Lotus Engineering and Lotus Cars. Lotus Engineering is an internationally recognised automotive engineering

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consultancy based in Norfolk, UK. Its global facilities include those in Michigan, USA and Kuala Lumpur, Malaysia and offices in Germany and China. Lotus Engineering provides comprehensive and versatile consultancy services to many of the world's OEMs and Tier 1 suppliers, offering a full engineering service from initial concept and project design through development and integration of the complete vehicle to meet all worldwide markets and customers to full production. This includes third party 'niche vehicle' engineering and manufacture worldwide. Lotus Cars builds and sells Lotus sportscars, Elise, Exige and Europa for global sale. The all new Lotus Evora was unveiled at the British International Motorshow in July 2008 and is scheduled to enter the market place in the second quarter of 2009.

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