New Process Evaluates Corrosion Resistance of Diesel Cylinder Liners

*Developments by Federal-Mogul Powertrain help meet dual challenges from fuel with high sulphur content and increasing rates of EGR (Exhaust Gas Recirculation)*

**Burscheid, Germany, 10th April 2017** … Federal-Mogul Powertrain has developed a new process for ranking the corrosion resistance of cylinder liner materials that will enable it to supply even more durable components for the most challenging applications. By enabling direct comparison of different materials and coating processes, the new test methodology allows material development to be specifically targeted at circumstances involving poor-quality fuel and high levels of EGR.

“Higher rates of EGR and the use of high-sulphur diesel fuels present significant challenges for the wear of ferrous cylinder bore surfaces,” commented Gian Maria Olivetti, Chief Technology Officer, Federal-Mogul Powertrain. “Advanced thermally sprayed liners solutions, like our Sprayfit® thin-walled liner, could combine effective heat dissipation with the benefit of a wide range of wear resistant surfaces. However, it remains necessary to evaluate the performance of alternative material choices in a reliable way and we now have a proven process to achieve this.”

Prior to the work by Federal-Mogul Powertrain, there was no recognised procedure for comparing the likely corrosion resistance during engine operation of different materials. The complex relationship between mechanical wear and corrosion means that each must be evaluated independently in order to identify the most resistant materials.

Mechanical wear removes corrosion products to expose an unprotected surface, promoting further corrosion. The corroded surface has inferior wear resistance, which further accelerates wear in a continuous cycle.

Federal-Mogul Powertrain has accurately reproduced the corrosive solutions of combustion products formed inside an engine, including sulphuric, nitric and acetic acids, and used them to carry out a range of tests. These include immersion tests, using a boiling solution of the appropriate composition, and electrochemical investigation at temperatures close to the solution’s flash point, supported by metallographic inspection. The test solution can be controlled to reproduce the properties of a typical sulphur condensate or EGR condensate.
Test results showed the most aggressive corrosion rates occurred through exposure to a sulphur condensate, and its effect on various materials was compared using a conventionally manufactured grade of cast iron as a reference. Corrosion resistance was found to be improved with higher chromium content, but deteriorated as the oxide content (iron oxides, chromium oxides) of the material increased.

“Our test process allows us to identify both bulk materials and surface coatings with the necessary resistance to corrosion and wear for even the most severe liner applications,” said Dr.-Ing. Volker Scherer, Director, Liners, Federal-Mogul Powertrain. “By working closely with our customers, we can from the outset engineer the material properties to withstand the specific challenges of their individual application.”

Federal-Mogul Powertrain will use the results of this development programme to guide future material selections for diesel engine manufacturers through the supply of both finished and semi-finished components.

IMAGES:

Federal-Mogul Powertrain has developed a new process for ranking the corrosion resistance of cylinder liner materials that will enable it to supply even more durable components for the most challenging applications

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Micro-section of Federal-Mogul Powertrain’s proven thin-walled, thermally sprayed, Sprayfit liner

Top: Wire-arc spray low-ox cylinder surface honed
Bottom: Aluminum jacket LDS AlSi12

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Advanced thermally sprayed liners solutions, like Federal-Mogul Powertrain’s Sprayfit thin-walled liner, could combine effective heat dissipation with a wide range of wear resistant surfaces

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About Federal-Mogul

Federal-Mogul LLC is a leading global supplier of products and services to the world’s manufacturers and servicers of vehicles and equipment in the automotive, light, medium and heavy-duty commercial, marine, rail, aerospace, power generation and industrial markets. The company’s products and services enable improved fuel economy, reduced emissions and enhanced vehicle safety.

Federal-Mogul operates two independent business divisions, each with a chief executive officer reporting to Federal-Mogul's Board of Directors.

Federal-Mogul Powertrain designs and manufactures original equipment powertrain components and systems protection products for automotive, heavy-duty, industrial and transport applications.

Federal-Mogul Motorparts sells and distributes a broad portfolio of products through more than 20 of the world’s most recognized brands in the global vehicle aftermarket, while also serving original equipment vehicle manufacturers with products including braking, wipers and a range of chassis components. The company’s aftermarket brands include ANCO® wiper blades; Beck/Arnley® premium OE quality parts and fluids; BERU® ignition systems; Champion® lighting, spark plugs, wipers and filters; Interfil® filters; AE®, Fel-Pro®, FP Diesel®, Goetze®, Glyco®, Nüral®, Payen® and Sealed Power® engine products; MOOG® chassis components; and Ferodo®, Jurid® and Wagner® brake products and lighting.

Federal-Mogul was founded in Detroit in 1899 and maintains its worldwide headquarters in Southfield, Michigan. The Company has nearly 53,000 employees in 24 countries. For more information, please visit www.federalmogul.com.

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CONTACT:

Christopher Foster  
Market Engineering  
+44 (0)1295 277050  
christopher.foster@m-eng.com

Ursula Hellstern  
Federal-Mogul Powertrain Communications  
+49 (611) 201 9190  
ursula.hellstern@federalmogul.com