Federal-Mogul Powertrain Develops New High Strength Aluminium Alloy Material For Automotive Diesel Pistons

*Improved properties allow shorter piston height and lighter, more compact cylinder block design for lower CO₂ emissions*

**Nuremberg, Germany, 3rd September 2015**... Federal-Mogul Powertrain, a division of Federal-Mogul Holdings Corporation (NASDAQ: FDML), announces that it has developed a new premium diesel piston aluminium alloy, called DuraForm-G91. In benchmarking tests, the new alloy – which will be on display at the IAA show in September – provides between three and five times the component life of established as-cast materials in modern, highly loaded, diesel engines. The increased strength of the new material also supports higher mechanical loads, allowing engines to operate at higher specific power and more efficiently.

The enhanced alloy properties facilitate piston designs with a lower compression height and reduced mass. The resulting benefits of less reciprocating mass and smaller, lighter cylinder blocks contribute to vehicle CO₂ emissions reduction. “This is an example of the enabling technologies developed by Federal-Mogul Powertrain that help our customers to make each new engine generation more compact, lighter and with a smaller carbon footprint than its predecessor,” said Gian Maria Olivetti, Chief Technology Officer, Federal-Mogul Powertrain. “With our materials scientists at the technological forefront of the industry, we are committed to developing advanced new concepts for both aluminium and steel-based pistons for diesel vehicles, offering perfect fit solutions for the various needs of our customers.”

DuraForm-G91’s composition delivers increased fatigue strength, particularly in the high temperature range typically associated with highly loaded diesel pistons. “The improved silicon and intermetallic morphology provides a microstructure with increased resistance to complex thermomechanical loading, while maintaining the required thermo-physical properties, such as expansion, density and thermal conductivity,” explained Dr. Frank T. H. Dörnenburg, Director of Technology, Global Pistons, Federal-Mogul Powertrain.

DuraForm-G91 has been developed using advanced testing techniques that shorten the validation period to production readiness. “We have employed specially designed accelerated
base engine tests combined with ‘engine-like’ rig testing procedures,” said Roman Morgenstern, Specialist, Material Development and Characterization, Global Pistons, Federal-Mogul Powertrain. “Engine-like rig testing combines thermomechanical fatigue (TMF) with high cycle mechanical fatigue (HCMF), which directly reflects the fatigue-critical load conditions seen by automotive diesel pistons in the engine.”

In both engine testing and TMF-HCMF testing, DuraForm-G91 demonstrated three to five times the fatigue life of current as-cast alloys. During isothermal high cycle mechanical fatigue testing at temperatures above 350°C, the improvement was even more pronounced, at over eight times the life.

Additional engine testing has shown wear rates equal to those of the best current aluminium-silicon based piston materials. Extensive casting development trials have been carried out to deliver consistently high material integrity and optimize the casting parameters. With internal engine development testing almost complete, the first sample pistons have been released to customers for evaluation. The technology can be applied to light-duty and heavy-duty diesel pistons.

“Federal-Mogul Powertrain’s technology laboratories have developed world-class manufacturing, engine and engine-like (superimposed TMF-HCMF) bench testing procedures and resources,” said Morgenstern. “These facilities help us to acquire knowledge more quickly and in greater depth, leading to faster and more efficient alloy development.”

Further details of Federal-Mogul Powertrain’s diesel piston aluminium alloy, DuraForm-G91 will be available during the IAA show at stand E21 in Hall 4.1.

**About Federal-Mogul**

Federal-Mogul Holdings Corporation (NASDAQ: FDML) 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, chassis, wipers and other vehicle components. The company’s aftermarket brands include ANCO® wiper blades; Champion® spark plugs, wipers and filters; AE®, Fel-Pro®, FP Diesel®, Goetze®, Glyco®, Nüral®, Payen® and Sealed Power® engine products; MOOG® steering and suspension parts; and Ferodo® and Wagner® brake products.

Federal-Mogul was founded in Detroit in 1899. The company employs nearly 50,000 people in 34 countries, and its worldwide headquarters is in Southfield, Michigan, United States. For more information, please visit www.federalmogul.com.

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IMAGES:

DuraForm-G91 diesel piston material – a new star in the powertrain universe

At high temperatures, Federal-Mogul Powertrain’s new premium diesel piston material, DuraForm-G91, has three to five times the fatigue life of current cast alloys.