

Heat management

Protecting lead-acid batteries from excessive heat extends component life, reduces the risk of failure and enables greater packaging efficiency

▶▶ A traditional lead-acid battery features in many hybrids as a means to start the IC engine or power accessories such as the lights, but it operates in even harsher under-hood conditions than those found in a conventional vehicle. The additional hardware in a hybrid's crowded engine compartment, such as the power electronics, increases heat input and reduces the flow of cooling air. These factors tend to push up battery temperatures, reducing component life and increasing the risk of premature failure.

To protect batteries from high engine compartment temperatures, new heat-shielding technologies are being developed, such as Federal-Mogul Powertrain's Protexx-Shield 3007. Constructed from a unique combination of materials, Protexx-Shield 3007 provides superior thermal insulation with high resistance to fluid contamination.

"There is a direct correlation between reduced battery life and elevated battery electrolyte temperature," explains Jan Maiden, senior vice president of sealing and systems protection at Federal-Mogul Powertrain. "The higher the temperature and the longer the battery is subjected to it, the greater the damage that is inflicted. By protecting the battery from extreme temperatures, such as heat soak when a vehicle stops after high-speed use, we help our OEM customers reduce warranty issues and provide greater reliability for the consumer."

Independent tests carried out by Federal-Mogul's first series production customer for Protexx-Shield 3007 showed that the electrolyte temperature in an unprotected battery climbed at almost three times the rate of one surrounded by a Protexx-Shield



Electrolyte temperature in an unshielded battery climbs at almost three times the rate of a Protexx-Shield-equipped battery

jacket. In a 100°C environment, an unshielded battery took just 55 minutes to reach 75°C, but this improved to 153 minutes when it was shielded.

Protexx-Shield 3007's insulating properties are provided by a pad formed from Federal-Mogul's QuietShield GRN, which can be optimized for thickness, density and composition. This is encapsulated within a polymer-based scrim to provide a sealed outer surface that prevents absorption of typical automotive fluids. The compound material is then formed into a structure and tailored for individual battery sizes to give optimum fit and insulation. A patent-pending integral hinge arrangement allows the shield to be shipped in a flat condition, saving space and freight cost; it also simplifies installation around the battery.

The Protexx-Shield 3007 also uses a high proportion of recycled content, in line with the Federal-Mogul strategy of developing environmentally friendly products for its customers. The QuietShield GRN constituent is produced from recycled cardboard packaging and other by-products that would normally be discarded at a vehicle manufacturing plant, including shredded Asian cardboard (usually a non-recyclable material).

Prototype sample lead-time has been reduced by using an innovative, flexible manufacturing process that enables the production of battery covers without the use of hard tooling, meaning prototype samples are identical to production parts. Because the material is so easy to optimize for each individual battery, it can be quickly applied to resolve issues in existing vehicles as well as all-new applications.

"Protexx-Shield 3007 is an example of an enabling technology from Federal-Mogul that helps our customers produce more efficient and therefore more competitive vehicles," says Gian Maria Olivetti, senior vice president and chief technology officer, Federal-Mogul Powertrain. "Being able to position a battery in a high-temperature environment without degrading durability assists packaging in crowded engine compartments and allows development of more compact vehicles."

With the first application already in production on vehicles produced by a Japanese OEM for the North American market, Federal-Mogul has further series production launches scheduled in the next year. ©



The Protexx-Shield 3007 insulating jacket protects batteries from high engine compartment temperatures

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