

DuPont™ Zytel® selected for Chrysler Group rocker cover on 4-cylinder world engine



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Photo: DuPont

The rocker cover of Chrysler Group's inline 2.0 and 2.4 litre 4-cylinder world engine, made of DuPont™ Zytel® nylon 66, is vibration welded and reduces weight 40 percent, decreases cost, and simplifies assembly by integrating multiple functions.

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Stevenage, December 2006. The trend toward the use of thermoplastic in engine rocker covers takes a giant step forward with Chrysler Group's new inline 2.0 and 2.4 litre, 4-cylinder world engine that powers the Dodge Caliber, Jeep®¹ Compass and Jeep® Patriot. Manufactured by Bruss Sealing Systems and made of DuPont™ Zytel® nylon 66, the new fully integrated rocker cover reduces weight 40 percent, decreases costs, simplifies assembly by integrating multiple functions and reduces environmental impact when compared with traditional materials such as aluminium or thermoset.

"Clearly the industry is embracing the benefits of thermoplastic in this critical component," said Mike Cuneo, director program management, Bruss North America, Inc., a division of G. Bruss GmbH, Germany, and leading thermoplastic valve cover producer in Europe. Bruss also worked with the team of Chrysler Group and DuPont Automotive on North America's first high-volume thermoplastic rocker cover for the 3.3 and 3.8 litre V-6 mini-van engines. "Though this is the second high-volume application for North America, there are a growing number of programs in development throughout the industry," said Cuneo.

The Chrysler Group, Bruss and DuPont Automotive team brought this component from CAD drawing to commercial launch (art to part) in 12 months. "We tapped the broad global network for experience and harnessed it to shorten the development time and enhance some of the integrated functions," said Cuneo.

"FEA (finite element analysis) alone can't always predict performance," added Cuneo. Using a clear acrylic prototype and Chrysler Group testing facilities, the team was able to see and then optimise oil flow in the air-oil separator. The result is 90 percent reduction in oil pulled over into the engine and burned through the catalytic converter, which significantly reduces tailpipe emissions. The new rocker cover also features an integrated oil return spring valve to return oil to the engine, and heat-staked brass inserts for the ignition towers to ensure speed and accuracy in assembly. The entire chamber of the oil air separator is vibration welded, increasing durability and eliminating the need for additional components.

Bruss selected a global, heat-stabilised grade of DuPont™ Zytel® nylon 66 designed for use in hot oil applications. "The material was critical in the success of this project," said Cuneo. "It retains mechanical properties, notably creep, and resists aging better than nylon 6 resins when exposed to hot air, hot oil and hot water. Additionally, this grade offers high flow to reduce production cycle time."

"We specifically developed this grade of Zytel® nylon 66 for demanding sealed and non-sealed underhood components that have to withstand long-term exposure to a harsh, hot-oil environment," said Gianluigi Molteni, DuPont Automotive Global Powertrain segment manager. Testing involves immersion in engine oil for 3,000 hours (heat aging) at 150 °C. "The material's higher melting point, hydrolysis resistance and mechanical property retention, including creep resistance, enable thermoplastic covers to withstand demanding thermal cycling tests used by OEMs to determine system sealability. "Further we see additional opportunities to replace metal and thermoset in components exposed to hot engine oil as the industry seeks ways to reduce weight and cost while providing performance customers demand," he added.

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