

SABIC Innovative Plastics helps GM's Chevrolet Volt concept car electrify the auto industry

SABIC Innovative Plastics leverages environmentally progressive materials to reduce weight for improved fuel efficiency

With attention focused on global warming and the increasing cost of fossil fuel, consumers are becoming more receptive to vehicles powered by alternative energy – but do not want to sacrifice style and performance. So when GM designed its Chevrolet Volt concept car, reducing or eliminating petroleum-based fuels was just the beginning. The Volt also had to offer excitement through distinctive styling.

A major focus of the Volt's design was reducing weight to optimize fuel efficiency. To find materials that could provide top performance and design freedom with lighter-weight parts, GM looked to SABIC Innovative Plastics.



Challenge

Achieving significant weight reduction

The Chevrolet Volt, which was unveiled at the North American International Auto Show in early 2007, was designed to run on electricity for short trips, with the option to extend its range with a small gasoline engine. To further reduce gasoline consumption and emissions, GM sought next-generation lightweight plastics that could replace traditional steel, glass and other heavier materials. Equally important, GM wanted to use plastics that minimize environmental impact – through recycling, elimination of halogens and other strategies.

From a design standpoint, GM wanted the Volt to set the automotive industry buzzing. The sleek, muscular styling called for materials with exceptional design flexibility and beautiful surfaces.

The automaker needed a supplier that could provide innovative technologies and the resources and expertise to guide GM's designers on how to optimize these materials.

“Our history and leadership in technology innovation led to this great opportunity to collaborate with GM on the Volt,” said Gregory A. Adams, Vice President for the Automotive business at SABIC Innovative Plastics. “We were able to help GM to develop this environmentally responsible vehicle with outstanding performance, strength, and style. Together with GM, we assembled a joint project team to drive forward the development of this monumental new electric vehicle.”

Solution

High-tech materials contribute to a greener Chevrolet Volt

SABIC Innovative Plastics' resins and newest composite technologies are among the key lightweight materials that helped GM to reduce mass on the Volt. In partnership with Azdel®, Inc., SABIC Innovative Plastics premiered high-performance, lightweight composites made with Xenoy iQ* resins on the Volt doors and hood. The front fenders were manufactured using Noryl* GTX resin. All glazing except the windscreen was made with Lexan* GLX resin and Exatec® coating technology. And the wiring throughout the Volt features ultra-thin-wall coatings made with Flexible Noryl resin to reduce mass.

SABIC Innovative Plastics' fuel-saving technologies showcased on the Chevy Volt include

- Roof made with Lexan GLX resins and Exatec coating technology
- Rear deck lid and fixed side glazing made with Lexan GLX resins and Exatec coating technology
- Doors and hood made with Xenoy iQ high-performance thermoplastic composites (HPPC)
- Global energy absorber and hybrid rear energy absorbers made with Xenoy iQ resins
- Steering wheel and instrument panel with integrated airbag chute made with Lexan EXL resins
- Front fenders made with Noryl GTX resins
- Wire coating made with Flexible Noryl resins

Case Study

Xenoy iQ*, Noryl* GTX, Lexan* and Flexible Noryl resin - GM

Benefits

Weight reduction of 30 – 50 percent and less environmental impact

Amanda Roble, Executive Director for SABIC Innovative Plastics' Automotive business stated, "On the Volt, the fender, window glazings, instrument panel, and steering wheel can each offer from 30 to 50 percent weight reduction. Wire coatings made from non-halogenated Flexible Noryl resin achieves a significant weight reduction compared to traditional wire in automobiles."

SABIC Innovative Plastics materials not only reduce weight for less fuel consumption but, they also create fewer carbon dioxide emissions. For example, Xenoy iQ composite addresses three critical environmental concerns - conserving energy, lowering greenhouse gas emissions and up-cycling or regenerating post-consumer waste such as polyethylene-terephthalate (PET) plastic bottles.

GreenOrder, an environmental strategy firm based in New York, N.Y. that audited the Volt claims, validated that if 3.2 million passenger vehicles of 3,500 pounds were manufactured making the same use of weight-reducing components, greenhouse gas emissions would be reduced by more than 194,000 tons each year - equivalent to the amount of carbon dioxide absorbed by over 48,000 acres of forest. It would also save more than 20 million gallons of oil each year – an amount equal to 30 Olympic-size swimming pools or more than 470,000 barrels of oil.

"GM's commitment to improving fuel economy, reducing vehicle emissions, and developing electrically-driven vehicles is facilitated with SABIC Innovative Plastics' weight-reduction technologies on the Chevrolet Volt concept car. We were able to take mass out of the Volt in order to optimize its overall efficiency," said General Motors' Vice President of Global Program Management, Jon Lauckner. "Through the independent auditor, GreenOrder, we were also able to see clear positive environmental results from working with SABIC Innovative Plastics."

Signature Surfaces* and design freedom

The exceptional surface finishes of SABIC Innovative Plastics resins and composites contribute to the beauty of the Volt. At the same time, the use of plastics instead of glass and metal allowed GM's designers to create a unique concept that was lauded by automotive design experts.

A scalloped hood, high shoulders, and sinewy lines were made possible through select resins. The transparent window glazing components – including the dramatic, see-through roof – give drivers clear vision and improved safety, while enabling complex shapes.

"The distinctive styling of the Volt was the result of allowing the GM design team to explore unique and elegant new possibilities made possible by alternative materials," stated Robert Butterfield, Global Market Director for Design Innovation at SABIC Innovative Plastics' Automotive business.

Details at

chevrolet.com/electriccar/

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