



Q&A

Adhesives: Structural Solutions for Battery Electric Vehicles

Q Why are structural adhesives important to battery electric vehicles?

A. Crash protection is especially crucial for battery electric vehicles because of the inherent risk to battery and hybrid electrical systems. Structural adhesives help automakers meet stringent crash standards by improving the stiffness of car body assemblies, with up to a 25 percent increase in absorption in metal structures compared with traditional rivets or welds¹.

Q How do structural adhesives help optimize multi-material use for electrified vehicles?

A. Structural adhesives make it possible to join dissimilar materials with the right balance between energy absorption and stiffness. This capability is critical in load-bearing and component parts such as doors, bumpers and beams. Henkel achieves these results by combining high mechanical performance with high impact, peel and shear strength across a full temperature range, from minus 40 degrees Celsius to 80 degrees Celsius¹.

Q What will the next generation of structural solutions entail?

A. Simulation models are influencing the future use of structural solutions in new and exciting ways. First, they provide essential insight into the ideal structural adhesive to overcome thermal expansion challenges. Second, they help us determine the optimal design and placement of structural hybrid solutions to ensure EV battery protection. In a recent study with RLE International, a leading development, technology and consultation service provider, we demonstrated a reduction in body-in-white and closure weight of an e-SUV by 42 kilograms, while achieving all crash performance targets.

Q What materials make up these structural hybrid solutions?

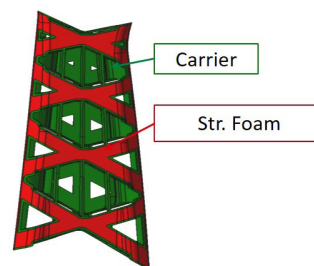
A. The hybrid structural parts are based on a combination of fiber-reinforced plastics (FRP) and specially developed high-performance structural foam. The FRP provides a solid frame carrier that holds the structural foam as it expands in the e-coat oven to create a stiff connection between the hybrid structure and the body-in-white unit.

Q How do these structural foams enable weight savings?

A. We optimize the initial design based on our extensive capabilities to combine engineering expertise with material science. Our adhesive solutions provide lightweight alternatives to traditional rivets or welds, and our hybrid solutions replace traditional heavy steel reinforcements. We then analyze the simulation to look for opportunities to optimize the metal thickness or create ribs for enhanced stability. We look for every opportunity to reduce weight and cost while maintaining safety testing requirements.

Q Do the hybrid solutions offer flexibility to the manufacturer?

A. Yes, automakers that want to use the same platform for an existing internal combustion engine vehicle can replace the traditional metal reinforcements with a hybrid structural solution, instead of undertaking an elaborate redevelopment of the reinforcing elements and the associated high tooling costs.



Henkel's hybrid structural solutions consist of two material components made of a reinforced polyamide and lightweight and high-performing structural foam.

¹ Henkel Structural Adhesives Webinar; September 2018



Brooke Virost is the North American e-Mobility Business Development Manager for Acoustic and Structural Solutions with Henkel Corporation. Her technical experience ranges from managing Henkel's adhesive portfolio in the body-in-white structural industry to leading global launches and supporting multiple OEM platforms. In her role, Virost provides key technical knowledge for the acoustic and structural team on baffles, tapes, inserts and adhesive structural and sealing solutions.