BEST PRACTICE

ENHANCE **STRUCTURAL INTEGRITY, EXPANSION** AND **CURING** WITH **TEROSON® EP 1475**

CHALLENGES

VEHICLE 1: EV SUV ROOF STRUCTURE STRENGTH-TO-WEIGHT RATIO

During the early design phase of an electric SUV, an OEM faced the challenge of reducing mass while increasing structural integrity under specific load conditions. Unlike an internal combustion engine, where the engine is under the hood, positioning the concentrated weight away from the cabin, an EV's battery weight of about 500kg is located under the floor of the passenger compartment. In a rollover event, the battery weight places an immense load on the A- and B-pillar structures.

OEM Consultations with Henkel

After discovering the design issue early in the vehicle development process, the OEM needed a solution that would increase structural integrity and prevent costly recalls and production delays down the road. The OEM consulted with Henkel engineers, who recommended design-in structural inserts in the A- and B-pillars to significantly increase the strength-to-weight ratio (SWR).

VEHICLE 2: ICE SUV D-PILLAR ADHESIVE EXPANSION AND CURING

In preproduction testing of another ICE SUV, OEM engineers found that the expandable adhesive foam of structural insert parts in the D-pillar was not fully cured. The heat and dwell time in the e-coat oven was unable to reach the desired temperature to complete the cure and expansion of the adhesive foam in that area.

OEM Consultations with Henkel

In this case, the OEM needed a fast solution since the vehicle was already in preproduction testing. The OEM reached out to Henkel engineers to request an ADCA-free structural foam that would cure at lower oven temperatures while offering higher expansion than another available material.

Henkel

SOLUTIONS

Henkel proposed solutions for both of these vehicles to meet the OEM targets at a weight significantly less than metal alternatives, using fewer parts than competitor solutions and at a competitive total cost.

VEHICLE 1: EV SUV ROOF STRUCTURE STRENGTH-TO-WEIGHT RATIO

Identifying the A- and B-pillar structural deficiencies early in the design stage, the OEM collaborated with Henkel experts, who offered engineered design and innovative material with structural inserts solutions. The Henkel team's know-how significantly improved the roof crush performance – not only for this EV SUV but also for a second crossover EV SUV in the OEM's vehicle range. Both SUVs subsequently achieved significant crash performance improvements, with "Good" SWR ratings of more than 4.0 in the IIHS Roof Crush Test. Through early consultation, the OEM was able to address their safety concerns efficiently and avoid production delays.

TEROSON® EP 1475

VEHICLE 1:

Developed specially for crash reinforcement applications, TEROSON EP 1475 structural foam's high compression strength helped preserve structural integrity for Vehicle 1's A- and B-pillar cavities in a crash event. As a hybrid injection molded part with an optimally designed nylon carrier, the expanded TEROSON EP 1475 was able to absorb deformation energy and transfer it to the carrier. Lightweight TEROSON EP 1475 structural inserts enabled the customer to achieve required performance at lower weight than a metal reinforcement solution.

VEHICLE 2: ICE SUV D-PILLAR ADHESIVE EXPANSION AND CURING

After OEM engineers identified their ICE SUV D-pillar upper issue during production line testing, they worked with the Henkel team to specify a structural solution that would accommodate their requirements. The same structural foam insert solution used on Vehicle 1 in this case study worked perfectly on Vehicle 2 as well, achieving effective high-expansion structural reinforcement at a low cure temperature.

TEROSON® EP 1475

VEHICLE 2:

In Vehicle 2's D-pillar upper, TEROSON EP 1475 fully cured in 10 minutes at just 140°C, while achieving an expansion rate of up to 300%. Its performance compared favorably to another foam's cure temperature of 150°C and 200% expansion rate. These properties solved the adhesive curing and expansion issues in the production line with no need to increase the oven temperatures or lengthen dwell time.

Integrating TERSON EP 1475 structural foam early during the vehicle design phase is the surest way to optimize its cost efficiency and realize its full benefits. With its numerous placement opportunities, TEROSON EP 1475 allows vehicle designers to capitalize on its other competitive advantages as well – such as improved body-in-white stiffness and better overall NVH performance when combined with Henkel acoustic products.

HENKEL PRODUCT	TEROSON EP 1475
Density uncured	1.3g/cm^3
Density after curing	<0.5 g/cm^3
Expansion rate (free)	300%
Compression strength	>15MPa
Young's modulus	>700MPa
Curing temperature (minimum)	>140°C
Benefits and performance	• ADCA-free • Large gap filling • High crash performance • Stiffness improvements

WHAT PROJECT CHALLENGES ARE YOU FACING? GET IN TOUCH WITH US TODAY ABOUT OUR EXTENSIVE PORTFOLIO OF TECHNICAL SOLUTIONS.

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