Henkel Excellence is our Passion

Press Release

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New-generation polyurethane matrix resin

Lower-weight components for the automotive industry

Leveraging the synergistic combination of matrix expertise, process know-how and an especially tailored adhesives portfolio, Henkel is able to offer a comprehensive range of sophisticated composite solutions for the automotive industry. With the development of its new polyurethane matrix resin, Loctite MAX 3, the world market leader in adhesives, sealants and functional coatings has taken a further important step toward the fully automated mass production of components based on glass and carbon fiber composite technology. In collaboration with KraussMaffei, Henkel has developed a process for the manufacture of composite components using high-pressure RTM (HP-RTM) technology that creates a surface quality good enough for automobile exteriors. The partner network also includes carbon fiber manufacturer Zoltek and the sports car builder and development services provider Roding Automobile. The technology showpiece adopted for the development for this innovative process was a lightweight yet high-strength carbon roof segment of the 950 kg sports car, the superlight Roding Roadster R1.

With weight reduction in modern vehicles having become essential – particularly in the face of strict emission requirements – lightweight construction technologies are constantly gaining ground in the automotive industry as an avenue for decreasing both fuel consumption and CO2 emissions. Performance and efficiency are also criteria that drive development in motor sport. Composite materials based on carbon fibers combine lightness in weight with enormous strength, thus also offering outstanding characteristics in terms of safety and crash behavior. Good mechanical properties such as rigidity in the resin system employed are thus essential, particularly when it comes to absorbing the huge forces encountered in motor sport.

Until now, there have been certain limitations in the use of lightweight components as they are restricted in the degree to which they can meet the requirements of the automotive industry in respect of cycle times and level of automation. In particular, composites have been very rarely used for the external components of vehicles as the requisite post-treatment of the surface for subsequent painting has been too costly and time-consuming, based as it is on manual processes. KraussMaffei – a leading manufacturer of machines for the production and processing of plastics – together with a partner network to which Henkel as a specialist for matrix resins also belongs, has now succeeded in producing in a fully automated process composite components that exhibit a surface quality suitable for immediate painting. This has become possible thanks to the development of Loctite MAX 3: This new, three-component polyurethane-based matrix resin system from Henkel contains not only the resin and hardener but also a high-performance release agent aligned to a self-releasing polyurethane lacquer manufactured by Rühl Puromer GmbH.

“The component quality achieved in this project with Loctite MAX 3 is outstanding. Given the clear trend toward painted carbon components in particular, we see enormous potential for this process being used in conjunction with RTM technology for duplicate industrial production,” says a convinced Georg Käsmeier, Managing Director of Roding Automobile GmbH.

Increased temperature resistance directly after demolding

The polyurethane-based matrix resin technology from Henkel is characterized by significantly faster curing compared to the epoxy resins usually used for the RTM (resin transfer molding) process. Due to its low viscosity, the resin penetrates the fiber material more easily and with less alignment disruption, giving rise to shorter injection times and thus short cycle times in series production. The outstanding toughness of Loctite MAX 3 further facilitates achievement of an optimized component structure. Henkel has also improved the temperature resistance of the PUR resin, bringing Loctite MAX 3 up to a level comparable with that of epoxy resins in relation to this particular property. This high temperature resistance means that the fiber-reinforced composites can be demolded more quickly. With the internal release agent ensuring easy detachment of the component from its mold, the resultant surface is of sufficiently high quality to allow immediate painting and bonding. While enabling manufacture of external and visible components with an outstanding surface quality, this also accelerates the production process, facilitating increased automation and thus mass production.

Flexible inclusion within an integrated concept

For the automotive industry particularly, integration within an overall package is essential for this technology to be regarded as an application solution. Consequently, Henkel offers individually formulated adhesives under the Teroson brand designed to ensure the reliable process integration of the different component materials within the framework of advanced multimaterial concepts. The various elements must be ideally coordinated if the adhesives are to perform to their full potential. “With Loctite MAX 3, we offer a matrix resin system that further increases the feasibility and attractiveness of manufacturing automotive parts from composite materials,” says Frank Kerstan, Global Market Manager Automotive at Henkel AG & Co. KGaA. “We have optimized the properties of our resin so that both painted coatings and adhesives can be applied to the resultant composite surface without the need for any pretreatment.” Complemented by the adhesives portfolio from Henkel, this gives rise to a complete system solution enabling the manufacture and integration of composites in automobiles.

Loctite is a registered trademark of Henkel and/or its affiliates in Germany and elsewhere.

Henkel operates worldwide with leading brands and technologies in three business areas: Laundry & Home Care, Beauty Care and Adhesive Technologies. Founded in 1876, Henkel holds globally leading market positions both in the consumer and industrial businesses with well-known brands such as Persil, Schwarzkopf and Loctite. Henkel employs about 47,000 people and reported sales of 16.4 billion euros and adjusted operating profit of 2.5 billion euros in fiscal 2013. Henkel’s preferred shares are listed in the German stock index DAX.

Photo material is available at http://www.henkel.com/press

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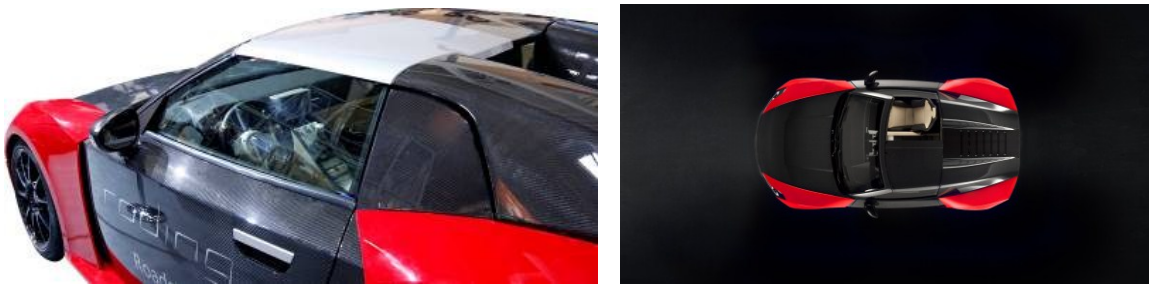
The following material is available:

The showpiece of the project is a carbon roof segment of the Roding Roadster R1. In addition to Henkel, the KraussMaffei partner network includes the companies Dieffenbacher, Zoltek, Chomarat, Rühl Puromer, Alpex, Mühlmeier and Roding Automobile GmbH.



Its low weight of 950 kilograms means that the Roding Roadster offers significant advantages in terms of driving dynamics, vehicle wear and efficiency (photo: Roding Automobile GmbH).