

Press Release

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Henkel at JEC Europe 2014

High-performance adhesives and functional coatings for composites

As market leader in adhesives, sealants and functional coatings, Henkel is exhibiting a range of innovative composite solutions at the JEC covering applications from automotive and aerospace to wind power and machine construction. JEC Europe is the world's biggest fair for composite materials. This annual trade show at Port de Versailles near Paris, France, will be open for business from March 11 through March 13, 2014. Henkel experts will be available at Stand F17 in Hall 7.3 to provide information on the wide range of products and system solutions that the company is able to offer the composites industry.

Composites for the aerospace industry must meet a wide range of requirements. In addition to weight reduction, performance and manufacturing are in focus. With a weight saving of up to thirty percent over current surface films and a minimized pre-paint preparation, the innovative, epoxy-based surface film Loctite EA 9845 LC Aero Henkel exactly meets these requirements. Due to the high proportion of copper particles EA Loctite 9845 LC Aero also provides excellent protection against lightning strikes.

With the application of lightweight parts in aircraft construction constantly on the rise, user-friendly adhesive-based repair solutions for composite components are also gaining in importance for airline operators and MRO's. The maintenance and repair of these complex structures presents the aerospace industry with certain challenges, with various types of damage and their different repair requirements necessitating innovative and high-performance adhesive technologies.

However, under the Loctite brand Henkel offers advanced, ready-to-use adhesive solutions designed to meet a broad range of related demands, from standard adhesive bonding and wet lamination to out-of-autoclave curing and specialty repairs for high-temperature service. Optimum size options in ready-to-use 2-part specialty packaging solutions allow for ease of repair applications that substantially reduce costs for OEM's, MRO's and Airlines.

At JEC Europe, Henkel will be presenting its portfolio of benzoxazine resins, also marketed under the Loctite brand, for injection processes such as vacuum resin transfer molding (VARTM). These products can be stored and transported at room temperature, thus significantly reducing energy consumption. They also offer weight savings of up to 30 percent compared to the conventional metal structures they replace. In production, the lower shrinkage on cure offers further advantages, substantially reducing the stress to which the components are subjected and therefore improving the durability of the finished component.

Sandwich structures have much higher stiffness and strength to weight than laminates, and syntactic core materials are an attractive design option for aircraft sandwich structure. Syntactic core materials are film products which provide an alternative to thin honeycomb for sandwich structures. Under the Loctite brand Henkel offers a range of epoxy films filled with high strength lightweight glass microballoons. These films are used between composite skins and are co-cured to achieve high stiffness with a light weight.

Loctite MAX 3 creates an outstanding quality of finish in composite components for the automotive industry

Lightweight construction technologies are also becoming increasingly important in the automotive industry, where they also help to reduce vehicle weight. This is becoming an increasing necessity in view of the strict exhaust standards now in force and constant pressure to generally reduce fuel consumption and CO₂ emissions. Until now, certain restrictions have existed in the use of lightweight components, as their ability to meet the demands of automobile constructors with respect to cycle time and degree of automation has been limited. In particular, the use of composite components for the outer shell of standard production vehicles has remained a rarity due to the need for reworking the surface prior to painting – always time-consuming and invariably done by hand. Working with KraussMaffei, however, Henkel has now developed a process for the manufacture of glass or carbon fiber reinforced components using the high-pressure RTM process (HP-RTM). This generates a surface of sufficiently high quality to meet even vehicle body requirements. And it has all been made possible by Loctite MAX 3. The newly developed three-component matrix system from Henkel based on polyurethane contains not only the resin and

hardener but also a high-performance internal release agent. This ensures the easy removal of the component from its mold and thus a surface that can be immediately painted or adhesive-bonded. At JEC Europe, Henkel will be presenting the Roding Roadster R1, of which the light and exceptionally strong roof module has been manufactured using this process.

Mold sealers for high-gloss plastic components

Likewise on show at the Henkel stand will be a number of highly efficient Frekote solutions for complex mold geometries. To its customers, the Frekote brand not only represents a range of outstanding mold release agents but also a valuable source of expertise that Henkel has accumulated over the years in the development of customized single-source solutions. And with five decades of research in this field as well, Henkel is able to offer the industry's biggest portfolio of semi-permanent release agents, sealers and cleaners.

The use of Frekote CS-125 mold sealer, for example, reduces the cost of mold manufacture. The product is able to seal porosities in foams or other molding materials, eliminating the need for a mold gel coat. The product creates an excellent, high-gloss surface in the molded component beyond the capabilities of competitor products.

Bonding of rotor blades

Henkel is further presenting a completely new adhesive technology for the manufacture of rotor blades as used on wind generators. The polyurethane adhesives, developed by Henkel and marketed under the Loctite brand, have been tested and certified by Germanischer Lloyd and will be of particular interest due to the fact that they substantially reduce manufacturing time.

Essentially, rotor blade production is divided into two phases. The first is the lamination of two half shells. As a rule, this involves the laying up nonwoven strips of glass fiber reinforced plastic (GRP) in prefabricated molds, and impregnating them with epoxy resin. The components are then allowed to harden and cure in the half shell molds which are heated to a temperature of between 60 and 70 degrees Celsius. In the second stage of production, the finished half shells are bonded together to produce the completed rotor blade. They are then ground and the outer surface is coated to protect it from the influences of wind and weather.

The polyurethane adhesive technology developed by Henkel for this application essentially follows the same principle but makes production significantly faster. The ability of the adhesives to cure quickly and, in the main, without external heating, offers a number of advantages over the previously established epoxy resin

processes, not least of which is the fact that the energy requirement is reduced. For reasons of sustainability and the ever present need for improved cost efficiency in production, this new polyurethane technology is therefore bound to be attractive.

Henkel adhesives for composite components in motor racing

For the global "Formula Student" motor racing competition, students of the Giessen University of Science and Technology are developing composite components in which high-performance adhesives from Henkel perform important structural and safety-relevant functions. Worthy of particular note is a composite development in which the once steel wishbones used in the racing cars are being replaced by composite components.

Aluminum inserts are adhesive bonded inside the composite arms to enable the wishbones to be reliably connected to the chassis and wheel hub. The use of composite materials in combination with this adhesive technology means that the assembly is 56 percent lighter than its steel counterpart. Aside from fuel savings, the advantages include improved torsional stiffness and a greater degree of design freedom.

Henkel's recommendation to the students was to use the single-component gap-filling epoxy adhesive Loctite EA 9514 which offers good impact toughness even at high service temperatures. This solution already has been proven successfully in the third racing season.

During JEC Europe, scheduled for March 11 through 13, 2014, Henkel experts will be available at Stand F17 in Hall 7.3 to provide information on the wide range of products and system solutions that the company is able to offer the composites industry.

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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 16,510 million euros and adjusted operating profit of 2,335 million euros in fiscal 2012. 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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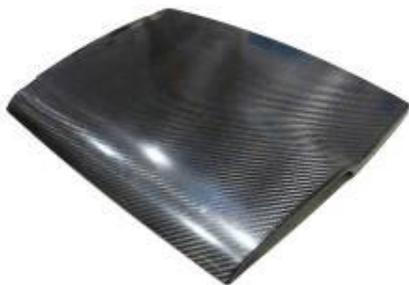
The following material is available:



— Henkel's epoxy-based surfacing film for composites offers honeycombed composites enhanced protection against lightning strike. (Photo: Getty Images)



— As OEM's design and build more lightweight aircraft with composite parts and structures, the need for more user-friendly and proven bonded repair solutions becomes a major focus for airline operators and MRO's. (Photo: Getty Images)



— Roof segment of the Roding Roadster R1.



Henkel's tailor-made adhesives for the wind industry improve quality, enhance production processes and decrease manufacturing costs.



Henkel adhesives used for composite components in motor racing.

