



Press Release

February 13, 2019

Seamless solutions across the entire value chain of battery manufacturing

Henkel is driving e-Mobility forward

Düsseldorf, Germany – As all major automotive OEMs and new players are rapidly launching new electric vehicle (EV) models, Henkel is leveraging its broad technology base and many years of expertise and experience to drive the transformation from traditional engines to electrified powertrains. The portfolio combines existing with new technologies to enable cost-efficient large-scale assembly and lifetime protection of battery architectures.

Strict regulatory fleet consumption and CO₂ emission targets are shaping the challenges of the automotive industry. With hundreds of new EV models being designed and launched at an increasing speed, the integration and protection of batteries and electronic components play a crucial role. With a comprehensive range of technologies and deep know-how tailored to solving these new challenges, Henkel is determined to be the industry's leading full-solutions partner, supporting its customers from design to integration.

For battery manufacturers in specific, Henkel has identified three major challenges. First, as the value per battery kWh continues to be a significant commercial challenge, materials and adhesives applied in the assembly process of hundreds to thousands of cells in the battery pack need to provide high-speed curing and short cycle times. Second, for operational safety, solutions must comply with thermal management requirements as well as the UL94 flammability standard. Finally, to ensure lifetime performance of EVs, the battery pack housing requires technologies that will allow it to be reopened.

“Our innovative adhesive products and engineering services are playing a major role in optimizing the cost-efficient assembly, operational safety and lifetime protection of battery cells,” says Frank Kerstan, Director e-Mobility & Powertrain at Henkel. “We are determined to support our customers at the forefront of e-Mobility with a seamless portfolio of technologies as well as application and process know-how for large-scale manufacturing, all available from a single source.

This is the reason why in 2019 several OEMs are launching a significant number of EV models that have been designed and assembled with Henkel technologies.”



LOCTITE BONDERITE TECHNOMELT TEROSON AQUENCE Ceresit



As shown in figure 1, Henkel's solutions and services are focused on eight integrated key technologies that combine existing with new solutions:

1. Battery Assembly Adhesives:

Henkel offers multiple adhesives that are especially suitable for large scale assemblies of hundreds and thousands of battery cells. For example, Loctite AA 3525 cures on demand with UV light within less than 15 seconds. Teroson MS 9396 is specialized for battery cell-to-cell bonding and battery case sealing. This modified-silane, easy-to-use one-component technology is environmentally friendly, non-solvent and non-silicone based. With proven performance of high temperature resistance up to 100°C and excellent elongation rate of 200 percent it ensures a stable and safe performance of the battery cells.

2. Thermal Gapfiller:

This new and specific developed thermally conductive silicone-free material with 3 W/mK performs under the harshest environmental conditions. Its cure-in-place kinetics guarantees gap stability and robustness over lifetime. The unique rheology allows extremely fast dispensing for reduced processing times, decreased assembly forces and significant stress relieve for the battery cells and modules. Furthermore, the new filler technology with very low abrasiveness characteristics results in less maintenance to the dispensing equipment.

3. Thermal Adhesives:

To ensure safe and efficient thermal management of the battery cells and modules, thermal conductive adhesives such as Loctite UK 6800 and Loctite EA 9794 allow efficient heat transfer to cooling plates. The two-component polyurethane technology of Loctite UK 6800 has a thermal conductivity of 1.9 W/mK. To overcome different coefficients of thermal expansion, it also offers excellent adhesion on different substrates with a shear strength of > 10 MPa and high elongation of 44 percent.

4. Liquid Gasketing:

Henkel also provides numerous solutions to prevent leakages and variations in temperature within the battery pack housing. In order to meet the UL94 flammability standard, Teroson MS 939 FR has proven itself to be a reliable and high-performance technology.

Likewise, Loctite SI 5970 acts as a custom-fit solution when it comes to resistance against oils and other automotive fluids. For the challenge of serviceability, Loctite AA 5884 (Asia: 5883) is a fast, UV light curing



polyacrylate technology that provides sealing reliability by compression while allowing the battery pack housing to be reopened for repair.

5. Battery Structural Adhesives:

The structural integrity of a battery pack is relevant for dynamic load cases and crash performance. Henkel offers high-strength adhesives for aluminum and multi-metal battery frames with two-component epoxy products like Teroson EP 5065 or Loctite EA 9466.

6. Metal Pretreatment:

In the light of commercial challenges, Henkel surface technologies reduce process and maintenance costs resulting from reduced energy and water consumption. Battery housings, typically constructed of aluminum, need to be pre-treated in a cost-efficient way before painting. Henkel offers a variety of OEM approved processes: Bonderite M-NT 400, Bonderite M-NT 160 / 161 and Bonderite M-NT 5200. For mixed-metal applications, the patented Bonderite 2-step process allows energy savings and significant reduction of process sludge.

7. Conductive Coating:

Another key challenge for market success is to improve the charging and discharging performance of lithium-ion battery cells. Henkel has developed conductive coatings to overcome the weakness of the interface at the aluminum cathode. The technologies of Bonderite L-GP EB 012 and Bonderite S-FN 15000 lower the internal electrical resistance and increase the adhesion of the active material to the cathode for Lithium Iron Phosphate (LFP) and Lithium Nickel Manganese Cobalt (NMC) battery cells.

8. Impregnation Service:

Henkel's Loctite Impregnation Solutions (LIS) service leverages the flowability of low-viscosity polymeric resins to fill micro-porosities and voids ("leakers") and permanently seal components, such as aluminum casted battery housings. The company operates 30 LIS Service Centers worldwide, which are fully certified to IATF 16949, ISO 14001 and OHSAS 18001.



Henkel's comprehensive technology portfolio for EV battery architectures anticipates the needs of OEMs and suppliers from first design and prototyping to large-scale manufacturing of cells, modules and packs. More generally, backed by strong application know-how, R&D test centers around the world and strong strategic alliances (e.g. with RLE International), Henkel is in the unique position to be a partner for its customers' engineering teams. As such, the company is driving the future of e-Mobility by enabling the industry to solve its significant electrification challenges.

Bonderite, Loctite and Teroson are registered trademarks of Henkel and/or its affiliates in Germany and elsewhere.

About Henkel

Henkel operates globally with a well-balanced and diversified portfolio. The company holds leading positions with its three business units in both industrial and consumer businesses thanks to strong brands, innovations and technologies. Henkel Adhesive Technologies is the global leader in the adhesives market – across all industry segments worldwide. In its Laundry & Home Care and Beauty Care businesses, Henkel holds leading positions in many markets and categories around the world. Founded in 1876, Henkel looks back on more than 140 years of success. In 2018, Henkel reported sales of around 20 billion euros and adjusted operating profit of around 3.5 billion euros. Henkel employs more than 53,000 people globally – a passionate and highly diverse team, united by a strong company culture, a common purpose to create sustainable value, and shared values. As a recognized leader in sustainability, Henkel holds top positions in many international indices and rankings. Henkel's preferred shares are listed in the German stock index DAX. For more information, please visit www.henkel.com.

Contact Rosanne Koning
Phone +49 211 7970
Email

Rita Verschuuren
+31 164 317 024
rverschuuren@emg-pr.com

Henkel AG & Co. KGaA

EMG

The following illustration material is available at www.henkel.com/press-and-media.

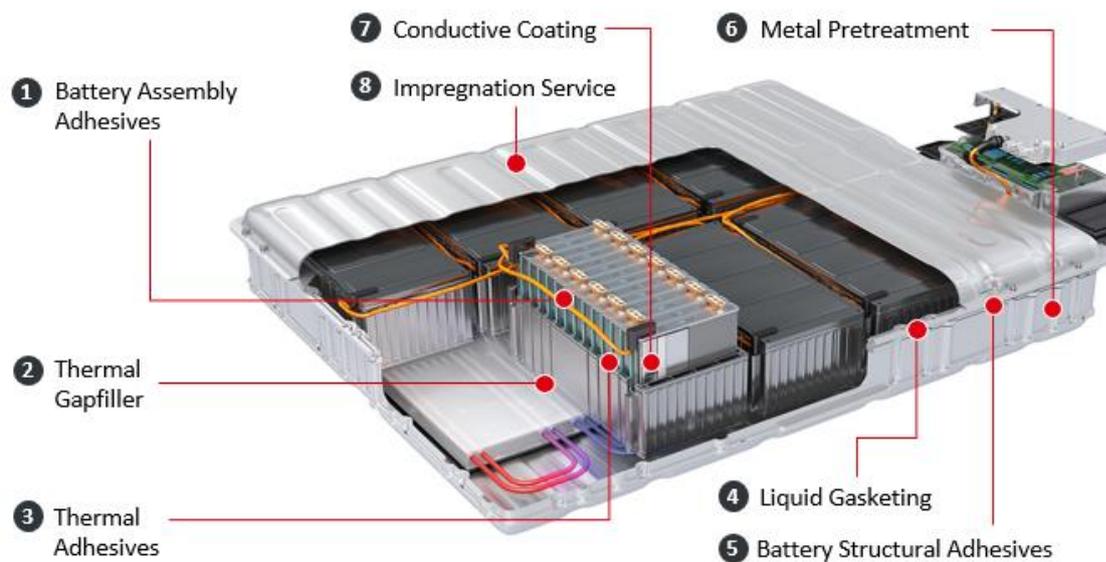


Figure 1

Henkel provides a comprehensive technology portfolio and application know-how for efficient assembly, operational safety and lifetime protection of battery cells, modules and pack.

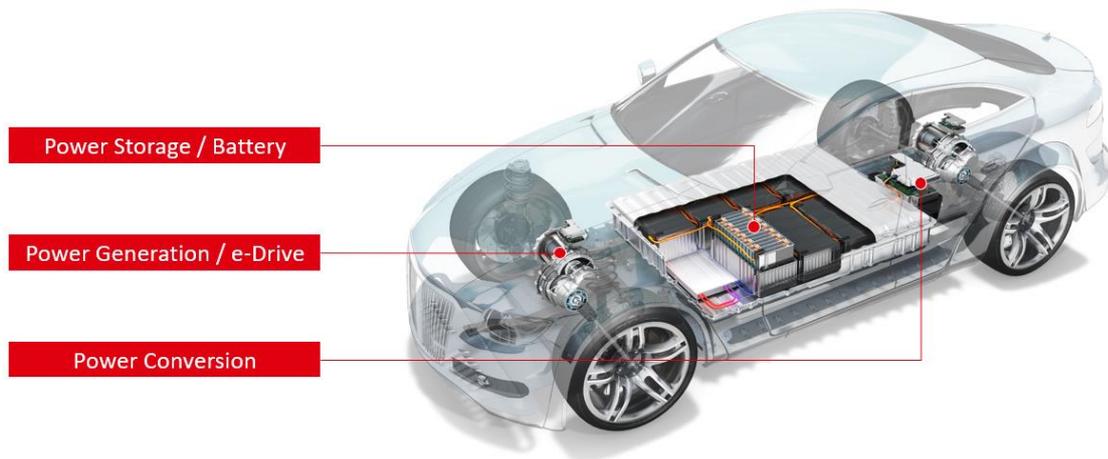


Figure 2

Henkel enables e-Mobility with different matching technologies for power storage systems, power generation systems and power conversion components of electric vehicles.