DRIVING INNOVATIVE SOLUTIONS FOR THE FUTURE OF ELECTRIC VEHICLES
Our passion for innovation is driven by a desire to create value for our customers. Through the power of collaborative relationships, we shape tomorrow with greater ideas. With our customers, we’ve tested the unknown to innovate products, services, and processes that move every person in the world. We’ve impacted the world with better solutions that drive customer success, and together we’re making the impossible real.

CHARGED FOR THE FUTURE

Electrification is the future. The switch from internal combustion engines to electric vehicles (EVs) is accelerating, powered by advancements in technology, environmental awareness and consumer behavioral changes. The rise of the EV will bring about a broad reset of customer expectations, a flood of new original equipment manufacturer (OEM) designs and many new engineering needs.

Our diverse technologies and highly engineered, innovative solutions are ready to meet the needs of the EV era. From materials to mechanical solutions, we are ready to support our customers in the EV industry.

YOUR COLLABORATIVE PARTNER

We deliver solutions designed to meet your specific needs, continuous process improvements and cost targets. With global manufacturing capabilities, our team delivers consistency and quality around the globe. This commitment to customers is why LORD products are on nearly every car in the world.
We work with our customers to deliver the best thermal management products for complex applications, moving with speed and agility to create highly-engineered solutions for the EV industry to manage heat and increase power density. Our fully customizable thermal management line of CoolTherm® products are used on a variety of electric vehicles and energy storage systems.

**GAP FILLERS**
Our liquid-dispense, cure-in-place gap fillers are used in on-board chargers and battery packs. They provide low stress on components and improve thermal resistance when compared to thermal pads.

**POTTING AND ENCAPSULANTS**
These materials are used in battery packs and electric motors. Our potting and encapsulants facilitate optimum heat transfer due to high thermal conductivity and low viscosity.

**THERMALLY CONDUCTIVE STRUCTURAL ADHESIVES**
Our adhesives provide mechanical rigidity and thermal connection where heat is an issue improving design flexibility by freeing the constraints of mechanical fasteners.

**Applications**

**Motors**
- Increase power density and motor life.
- Decrease temperature up to 50°C.
- Increase power output up to 30%.

**Chargers**
- Improve heat flow from inductors and transformers.
- Optimize performance during charging.
- Extend product life.

**Battery Packs**
- Manage heat during charge and discharge cycles.
- Optimize performance.
Depend on strong, cost-effective coatings to provide insulating barriers around batteries. We offer a variety of coatings suited for different applications, including flame resistant (FR), dielectric, UV-cure and magnet coatings.

02. COATINGS

DIELECTRIC UV-CURE COATINGS
Sipiol® UV-cure coating cures with light in seconds and is well suited for EV battery applications.

Sipiol UV-cure coating is electrically insulative and can eliminate PET tapes and powder coating allowing you to:

• Decrease the risk of a shock-induced delamination of cells from cooling plates.
• Replace traditional adhesive tapes and separators allowing for more cells to be placed in the same space.
• Reduce overall thermal impedance.

Unlike PET film and powder coat, Sipiol UV-cure coating bonds well to thermal management materials. It is customizable and available in tacky and non-tacky versions.

Applications
• Battery cells
• Cooling plates

MAGNET COATING
Compared to traditional plating methods like hydroscopic epoxy, our magnet coating is easier to apply and is less prone to cracking.

Our magnet coating provides good electrical insulation and protects against corrosion and heat. When used in tandem with an adhesive, it can increase motor power density by reducing eddy currents.

Applications
• Magnets
• Cooling plates

FLAME RESISTANT COATINGS
Used in applications where safety, weight and cost are important, Sipiol FR coatings are a flexible and effective choice. These coatings expand when exposed to high temperatures; protecting components from flames.

Coatings are applied in a thin 75 micron layer and can achieve up to 300% elongation, allowing it to flex with expanding/contracting battery cells. When using this coating you can:

• Lower substrate temperatures up to 30%.
• Enable novel designs.
• Replace heavy steel components with aluminum or composites.
• Improve safety while reducing cost and complexity.

Sipiol FR is available in water-based and solvent-based systems and also complements polyethylene terephthalate (PET)-replacement technologies, like Sipiol UV-cure coating.

Applications
• Between cells
• Battery box lids
• Inside & outside battery box housing
• Underside of vehicle chassis
03. STRUCTURAL ADHESIVES

Design flexibility and freedom are vital to create the next generation of EVs. Adhesives enable flexibility in picking substrates and designing joints, eliminating the need for mechanical fasteners.

Used to bond everything from closure panels to battery boxes, our adhesives improve the appearance, strength and durability of assemblies. Using adhesives instead of fasteners increases component life through excellent environmental resistance of bonded parts. Urethane and acrylic adhesives make it easier to use plastic and composite materials, contributing to a lightweight vehicle.

COMPOSITES AND PLASTICS BONDING
Our adhesives are suitable for a wide variety of materials and substrates that can bond metals, plastics and composite lightweight materials.

Manufacturers can obtain unmatched bonding performance on metals, and LORD® adhesives are compatible with e-coat and powder coating processes.

HEM-FLANGE CLOSURE PANEL BONDING
Versilok® two-component acrylic adhesives are an excellent option for customers seeking to achieve high dimensional stability of closure panels through low temperature cure.

Our adhesives can simplify your manufacturing process by eliminating or reducing process steps, resulting in substantial cost savings due to reduced energy consumption and labor.

Applications
- Liftgate
- Trunk lid
- Door
- Hood
- Spoiler
- Bumper
- Lithium-ion battery assembly
- Lead-acid battery assembly
Depending on the valve design, the system could have a very low pressure drop between inlet and outlet, resulting in a significantly downsized actuator and pump, further extending the mileage of the car. Additionally, the Magnelok system used in electric poppet valves can increase valve stroke and diameter.

We offer a wide range of custom solutions that can be implemented based on customer requirements including: controller area network (CAN) communication system, on-board diagnostics (OBD) and integrated position sensing.

**Applications**
- Liquid-cooled battery modules
- Electric traction motors
- Regulation of side circuits

**04. SMART VALVES**

EV designs today don’t commonly use smart (electrically controllable) valves with mechanical fail-safe, for energy consumption reasons. This trade-off can now be a thing of the past with our Magnelok™ valve actuation system (MVAS).

**MAGNELOK VALVE ACTUATION SYSTEM**

Compared to traditional valve actuation (thermostats), the MVAS offers very accurate temperature control, even at high operating temperatures.

Magnelok provides a mechanical fail-safe mechanism, enabling the valve to be opened if the motor fails — even if the cable breaks and no power is available.

In some applications, smart valves with a mechanical fail-safe consume a lot of energy because the electric drive of the valve has to work permanently against a fail-safe spring. When a Magnelok system is applied to smart valves, energy consumption is significantly reduced by fixing the return spring to the event of fail-safe.

Magnelok can be integrated in both rotary and linear actuation systems in combination with several valve designs: poppet, linear disc and ball.
05. SENSORS

The EV transportation industry faces the challenge of continuously monitoring the condition of batteries and housings. Our sensor technology is ready to meet these challenges, ensuring safe and reliable vehicles.

WIRELESS SENSOR NETWORKS
From design qualification and production, to real-time vehicle health monitoring, wireless sensor networks are everywhere in the EV world.

Wireless temperature and voltage sensors on EV batteries and components are used as safety systems during manufacturing and testing of EVs. They are used to detect quality defects, determine the crashworthiness of the vehicle and battery systems, and protect test operators. Wireless vibration, shock, and strain sensors are used to characterize and optimize vehicle performance, and to inform structural analysis.

Our wireless sensor networks are easy to deploy and include time-synchronized sensor data aggregation and visualization tools.

APPLICATIONS
- Battery testing & validation
- Vehicle crash testing

INERTIAL SENSORS
Our inertial sensors offer the best real-world dynamic performance under temperature, vibration and shock loads. Using Micro-Electro-Mechanical Systems (MEMS) inertial sensor designs, and individual sensor calibration and tuning, our sensors are able to achieve precise vehicle and component orientation feedback, along with real-time navigation solutions.

APPLICATIONS
- Battery testing & validation
- Vehicle crash testing
Our passion for innovation is anchored by the unending drive to create more value for our customers. These collaborative relationships continue to take us on an innovative journey to create solutions that move every person in the world. We have developed products, services, and processes that move industries forward — and position us all to reach for the impossible. Destined to shape a better tomorrow, we enable your success by making the impossible real.

To serve our global customers, LORD has locations throughout the Americas, Asia, Europe and the Middle East. These locations enable us to provide you with the same uniform quality and reliability worldwide.
LORD provides valuable expertise in coatings and adhesives, vibration and motion control, and magnetically responsive technologies. Our people work in collaboration with our customers to help them increase the value of their products. Innovative and responsive in an ever-changing marketplace, we are focused on providing solutions for our customers worldwide.

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