Revolutionary Coating Could Target EV Corrosion

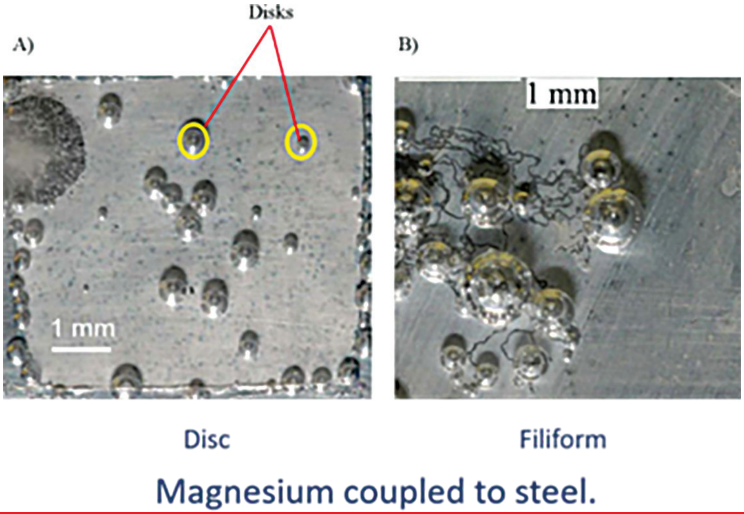
Kerry Cole

When Jon Brasher didn't have a gravelometer available to test the abrasion resistance of his advanced plastisol coating (APC), he reached for what he did have: a 12-gauge shotgun.

This unconventional approach was part of Brasher's broader evaluation of APC—a flexible, chemical-resistant coating he believes is well-suited for electric vehicles (EVs) due to its durability, thermal stability, and performance under extreme conditions such as salt spray, marine exposure, and high-voltage environments.

A gravelometer, or "gravel cannon," is a standard tool for simulating flying road debris. But for Brasher—the president and CTO of Ovante, LLC—that wasn't an option. So, he tested coated panels by firing birdshot at them from 45, 60, and 75 ft (13.7, 18.2, and 22.8 m).

"From 45 feet, I had one or two pellets that embedded, but they didn't go through," he says. "From 60 and 75 feet, there was just light scuffing. So, I knew it would stand up to impact and erosion."



Galvanic corrosion - magnesium vs. steel.

Protecting EVs from the Inside Out

Brasher sees APC as a potential solution to rising concerns over corrosion in EV battery compartments and underbodies—areas often constructed from lightweight, corrosion-prone materials such as magnesium and aluminum.

"What I've been pushing for is its use in battery compartments, because it's so corrosion-resistant and chemical-resistant," he says. "It prolongs the life of the battery compartment, which saves money for owners since battery replacement is expensive."

"Magnesium is lighter than steel and has great strength," he adds. "But when magnesium is in contact with steel, the steel starts corroding the magnesium. APC can coat the magnesium and shield it from the steel, allowing for lighter vehicle designs."

Coatings for EVs must now meet stricter environmental and durability standards. Factors such as lightweight construction, corrosion protection, battery safety, thermal management, and environmental performance all play a role.

APC was developed with these requirements in mind. It is low in volatile organic compounds (VOCs), nonporous, UV-resistant, and remains flexible under stress. It also does not support combustion.

An electric vehicle being charged. Photo by Getty Images.

"It turns to ash and disintegrates," Brasher says. "I wouldn't call it flame-retardant in the traditional sense, but it won't catch and spread."

From Concept to Candidate

Brasher says APC's initial development was as a coating designed to withstand hurricanes and extreme coastal conditions.

"I started playing around with a rubberized PVC," Brasher says. "We made it more UV resistant, more abrasion resistant, and started the process of testing. It went through SWAAT (Salt Water Acetic Acid Test) testing and performed well."

APC is a suspension of PVC resins in a low-VOC (0.3%) plasticizer blend. When heated to 360 °F (182 °C), the plastisol fuses into a flexible, chemically inert

Rusted EV battery system.

coating with high dielectric strength and low permeability. It remains stable in storage and retains flexibility after prolonged UV and chemical exposure.

A low-viscosity primer is applied beforehand to promote adhesion. Dur-

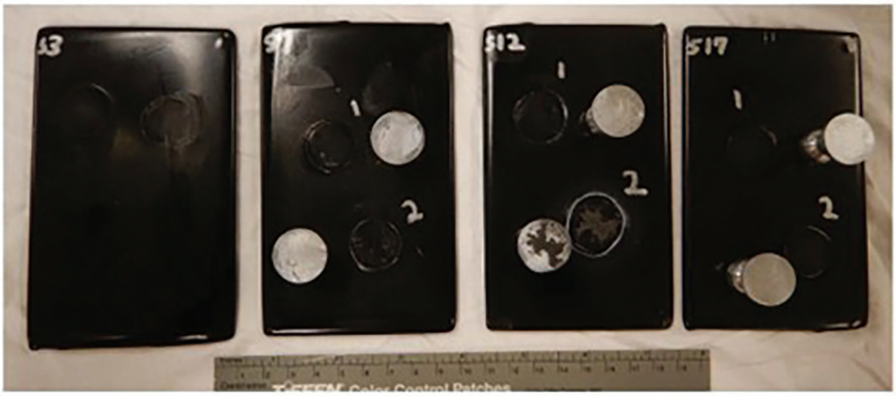
Rusted bolts in battery compartment.

ing curing, the primer melts into the surface and mechanically bonds with the fused plastisol.

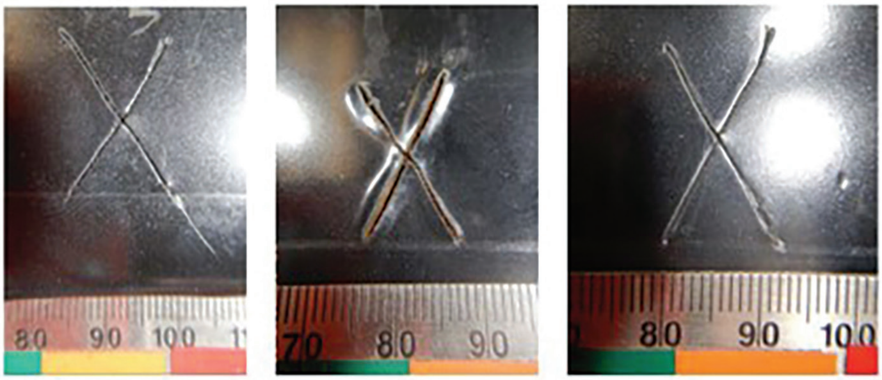
Testing the Limits

To assess the coating's durability, Brasher subjected APC to a series of extreme lab tests, including salt spray, acid immersion, and high-velocity impact simu-

Post ASTM D3170/3170M-14 images by aging protocol. No substrate exposure.



Adhesion pull-off test.



Scribe/creep test.

lations. In one real-world durability test, it was bombarded with 22.4 million pounds (10.16 million kg) of cotton debris at 55 mph (88.5 km/h) and showed no significant degradation.

"After about 16 million pounds (7.26 million kg) of cotton and debris, the coating didn't lose weight—it just compressed," he says. "It didn't wear away; it just got denser."

In another test, APC was alternately immersed in 95% sulfuric acid and water for 90 days to simulate corrosive conditions, such as bird droppings.

"That kind of constant exposure wouldn't happen in real life," Brasher says. "But the coating had only started to thin after months."

In a long-running B117 salt spray chamber test, APC showed no signs of failure over a test period equivalent to 128 years.

"They just needed the room for other experiments and stopped the test," Brasher notes.

Real-World Validation

To independently validate APC's performance, Brasher collaborated with researchers at EPRI (formerly the Electric Power Research Institute), which evaluates coating systems for long-term performance in harsh environments.

"The product Jon is working with is a modified PVC—a type of advanced plastisol coating," says Neal Murray, technical executive at EPRI. "In our testing, we found that, from a dielectric standpoint, it's a very good resistive barrier.

"This coating system performs well not just in atmospheric conditions, but also in subgrade and marine environments," he adds. "That's a critical evaluation, because many coating systems are specialized."

Early testing revealed UV sensitivity, but Brasher reformulated APC with stabilizers. According to Murray, the updated version performed well.

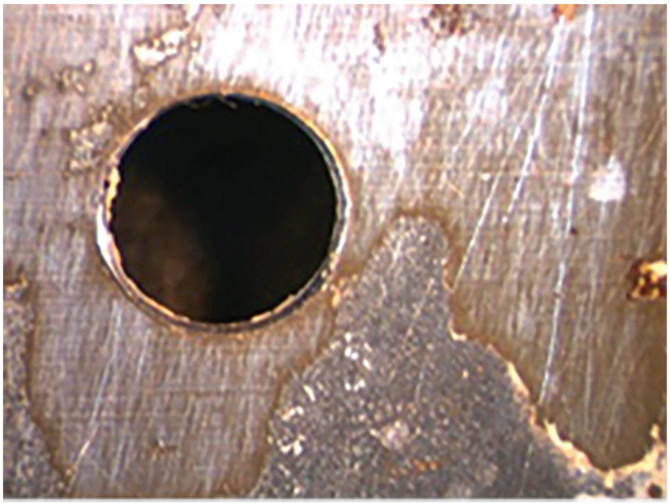
He also notes that APC's thickness flexibility is unusual.

"Most coatings have a dry film thickness of about 10 to 15 mils," he says. "Jon's coating is on the other end—you can apply it at traditional thicknesses or much thicker, depending on your needs."

Competitive Performance

In an EPRI study evaluating over 30 coatings for 50-year lifespan potential, APC was one of only seven to pass the first phase of accelerated aging. Utility companies rated coatings on durability, UV resistance, and application efficiency.

"They started off with about 32 different coatings and subjected them to intensive stress testing," Brasher says. "We ended up in the top two, alongside a Teflon-based system."



On left, after 3,072 hours, APC hurricane tie with coating removed. On right, galvanized tie after 1,008 h. Both samples cleaned with acetone and brush.

APC post and galvanized post after 13 months in the ocean.

APC post after 13 months in the ocean, marine life scraped off with pocket knife.

Whereas the Teflon system required six layers for full protection, APC needed only one.

Key Test Highlights

A variety of lab and field tests demonstrate APC's performance:

- Abrasion resistance: No chipping or wear from gravel impact (ASTM D3170)
- Adhesion strength: Passed pull testing after artificial aging; failure occurred in adhesive, not coating
- Cathodic disbondment: Zero separation under electrical stress
- Salt spray exposure: Over 3,000 hours with no blistering or rust
- Marine test: 13 months on the Alabama coast with no corrosion or biological growth

"It's low VOC, it's not leaching anything into the environment, and it's inert, nonporous, and mechanically tough," Brasher says.

Market Potential

Despite promising lab and field results, Brasher acknowledges challenges in broader adoption—including industry inertia and aesthetic preferences.

"People are used to painting things, but paint doesn't last as long. This coating does," he says. "It would be great to have a test vehicle to put some real-world miles on it and really push the limits. It's been tested extensively in the lab."

For Brasher, the goal is clear: to deliver a lab-tested, field-ready solution for one of the fastest-growing segments in automotive corrosion protection. And whether it's withstanding simulated decades in a salt spray chamber or taking on a shotgun blast, APC has proven it can endure both conventional and unconventional trials. MP