

Ask the EXPERT

Planes, Stains, and Automobiles

How OEMs are conquering stain protection with lacquers on vinyl upholstery



John Russell

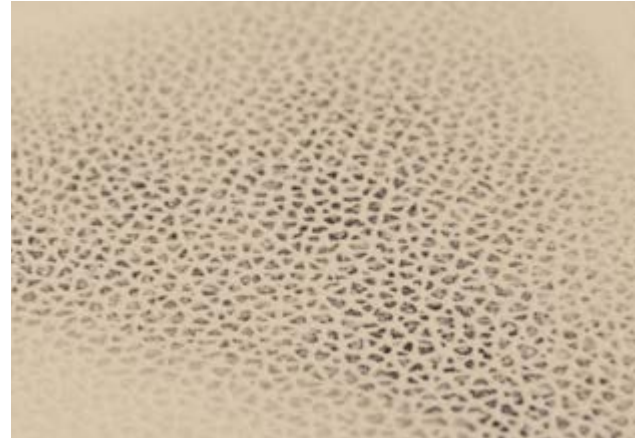
VICE PRESIDENT AND TECHNICAL DIRECTOR, APV ENGINEERED COATINGS

John Russell has 25 years of expertise in the chemical and coatings industry. He is highly specialized in the formulation of advanced chemistries for flexible vinyl, films and textiles. Throughout his career, John has successfully commercialized new-to-market formulations with properties such as anti-graffiti, hydrophobic and hydrophilic functionality and superior weathering characteristics.

Stain resistance on flexible vinyl substrates is a daily topic in the laboratory at APV Engineered Coatings. The type of stain resistance required varies by market and end use. APV takes a customized approach to develop primer and topcoat lacquer systems that provide our customers with the performance properties they desire. Airplane upholstery, automotive seating and mass-transit fabrics are challenged with many unforgiving stains (think foods like coffee, mustard and ketchup to chemicals like cleaners, permanent marker and blue jean dye), challenging the longevity of the fabric in everyday use.

The substrate-to-lacquer relationship

Whether cast or calendered, all flexible vinyl products are not the same. They will vary in plasticizer type and concentration, pigmentation, fire retardants and heat stabilizers used in the make-up. The most important of these differences with regard to stain resistance is the type(s) and amount of plasticizer used in the manufacturing process. Plasticizers will migrate slowly out of the vinyl, which will become less flexible, changing the haptic (feel) of the fabric and, most importantly, providing a pathway for stains to penetrate back into the topcoat and cause permanent stains in the fabric. Materials research and engineering are critical for achieving the equilibrium between substrate and lacquer performance.



Close-up of denim dye stain on PVC automotive upholstery. Photo: APV® Engineered Coatings.

Testing stain performance

How do you know how well a lacquer chemistry on flexible PVC performs against stains? Stain resistance can be tested in a variety of industry-standard and rudimentary ways to identify effectiveness of the finish. It's important to understand its initial effectiveness as well as lifecycle performance prior to commercializing a lacquer chemistry. It's also important to test the key stains the upholstery will undergo when in use.

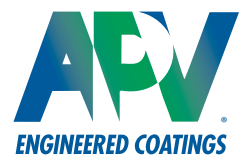
The automotive OEMs have created their own test methods to evaluate a lacquer system's effectiveness in preventing the ingress of denim stains to the fabric. Some tests use dry denim and some use wet (water) denim, and then evaluate the color change on the fabric. ASTM D4966-98 Martindale Abrasion Test is just one example of this type of stain test.

Driven by performance

The industrial fabrics industry has consistently evolved into a performance-driven market where the lifecycle of commodity vinyl is being challenged and functional ingredients are coming under increased regulatory scrutiny. A laboratory meeting about planes, trains and automobiles isn't just a movie reference at APV Engineered Coatings' Akron, Ohio, manufacturing facility. The technical team is always developing new approaches for novel and complex lacquer chemistries that work with the vinyl to protect against some of the harshest stains in the environment.



A close-up photo of Vynguard® lacquer coated fabric with coffee droplets on the surface during a stain performance test. Photo: APV® Engineered Coatings.



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