

New Coating Technology

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During the late 80s and 90s, the paint industry developed solvent-free, single-coat and water-based technologies to replace many older solvent- and lead-based paints. The regulatory environment that sparked the development of water-based technologies also sparked "alternative" technologies. One particular technology in the alternative area that is demonstrating promise is the technique commonly referred to as "appliqué."

FILM-BASED COATINGS

An appliqué is a wallpaper-like film made of various plastics, with a pressure-sensitive adhesive on one side that is used to bond the sheet or film to the surface being coated. Several companies are developing and marketing this new generation of engineered paint-replacement films and systems: 3M of St. Louis, MO, Integument Technologies of Tonawanda, NY and ORCA Maritime of Norway.

Two of the firms base the appliqué on a generically superior family of plastics called fluoropolymers. Fluoropolymers are commonly sold under well-known trademarks such as Dupont's Teflon®, Ausimont-Solvay's Halar® and Integument's FluoroGrip®.



Rusted areas are easily repaired with appliqué.

BENEFITS

Fluoropolymers are the most inert plastics and can resist the widest varieties of chemicals, with some capable of withstanding temperatures up to 475°F. Their non-stick surfaces prevent filth and grime from building up while diminishing cleaning and maintenance

requirements. They can also be colored and have patterns created in them. The military currently is prototyping camouflaged appliqué.

In many instances, fluoropolymer appliqué can be applied 1) over a traditional paint system in areas where extra protection might be required, or 2) as a preventative maintenance, paint-repair patch. Examples include splash zones on bridges; spill areas on structural steel and tank exteriors where chemicals are particularly aggressive to traditional paints; and metal roofing and building exteriors where long-term protection is required.

Current applications for corrosion control include pipe wrap tapes, films for structural steel beams in aggressive chemical environments, tank exteriors, offshore oil drilling structures, tanker truck and railcar exteriors, and steel building components. One company has even developed a way to modify the surface of the fluoropolymer in plasma so paints and adhesives will stick to it. The modification also permits the films to have a thin layer of metal sputtered on to it to create a flexible clear film that permanently appears to be made of copper, gold, mirror or silver.

This technology significantly advances the use of these materials as a paint substitute to fight corrosion in aggressive environments that produce high corrosion rates, such as the chemical processing industry.

ONGOING DEVELOPMENTS

Recent demonstration projects combined with growing sales in the multi-billion-dollar industrial, military and architectural markets offer an incentive for industry leaders to invest in development projects. Current demonstration projects vary widely, and many are funded by branches of the military. In the last few years the military has invested millions of dollars into developing appliqué for corrosion protection and other mechanical and electrical uses on military structures and vehicles. Most notably is the use of the technology to replace the exterior paint on aircraft such as the

new tilt-rotor V-22 Osprey manufactured by Bell-Textron, and Lockheed-Martin's new F-35 Joint Strike Fighter program, the largest defense contract in U.S. history. Current development includes the use of a fluoropolymer-based appliqué that can withstand extreme temperature cycling from well below -50°F to more than 350°F while withstanding rain and dust erosion at supersonic speeds.

More traditional demonstrations include one in which the film will be used on roadway bridges subject to corrosion attack from salts and acids. Many bridge structures, by their design, minimize the primary limiting factor to this technology—the film's two-dimensional properties. These demonstrations are expected to produce the data necessary to expand these systems into more conventional paint segments. They will also facilitate the development of new tools and techniques to address complex shapes and configurations.

SUMMARY

Appliqué technologies are rapidly growing to fill the needs that industry and regulatory pressures have created. They offer benefits such as no cure time, easy application, no special application equipment requirements, application in less-than-ideal environments, application over marginally prepared surfaces, unlimited shelf life, ability to withstand harsh service conditions, and no hazardous solvents. While physical limitations still require developments, appliqué paint replacement films move the steel and paint industry one step closer to an excellent coating solution. ★

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