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A consulting firm specializing in:
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LOOK BELOW THE SURFACE WHERE DANGER LURKS

By Bob Cusumano

Experienced painting contractors know that the surface to which they apply their paint must be clean and free of all contaminants. The old adage that "cleanliness is next to godliness" applies to painting. If paint is applied over dirt, chalk, oil and grease, wax or other surface contaminants, then peeling is certain to result.

Unfortunately, making sure that the surface is clean is not sufficient to avoid all coating delamination. There are many peeling situations that develop not at the interface of the paint with the surface, but well below the surface. We'll look at five instances where an unstable substrate has lead to coating failure.

The Able Painting Company had the contract to paint the exterior of a two story oceanfront condominium building. The exterior walls are brick that were previously unpainted since the building was built twenty years ago. Able pressure washes the building with a chemical to remove chlorides, applies the specified masonry conditioner, and finishes the brick with a special coating designed to be applied to brick surfaces. When Able leaves the job, the building looks great. Unfortunately a few months later the residents complain that some peeling is occurring as shown in photo 1. Adhesion tests are performed and at locations where the coating delaminates, the rear of the delaminated material is examined. In all instances, there is brick attached to the rear of the coating as shown in photo 2. The cause of the coating delamination is a cohesive failure of the brick rather than an adhesive failure of the coating to the brick. The coating adhered well to the brick, but chunks of brick have easily broken off. Fortunately, the adhesion tests indicate that areas where the brick is spalling are isolated and that adhesion is good at adjacent locations. Therefore, a spot fix is appropriate. All loose brick material must be scraped off. In some instances, this may result in an abrupt profile change requiring the brick to be resurfaced. Repair of the brick itself was not included in Able's scope of work.

Photo 1

Photo 2

Best Painting Service spray-applied one coat of a fast drying exterior primer and two coats of acrylic satin house paint to the exterior rough sawn shingles. Within weeks, extensive peeling had occurred as shown in photo 3. Examination of the rear of the peeling paint revealed that wood fibers were attached to and embedded in the paint (photo 4). The cause of the peeling was the combination of product selection and application method. Rough sawn wood, especially when weathered, has loosely attached wood fibers on the surface. The use of a slow drying primer, or "long oil", would have extended the drying time which would encourage penetration into the wood establishing good adhesion. However, since it was a quick drying primer, then the act of spray applying would have compromised the adhesion. When a fast drying primer is sprayed, it tends to lay on the surface to which it is applied. The mechanical action of brushing or rolling tends to work the primer into the surface of the wood establishing better adhesion. The two finish coats of acrylic paint exert a large amount of surface stress upon the primer and the peeling resulted.

Photo 3

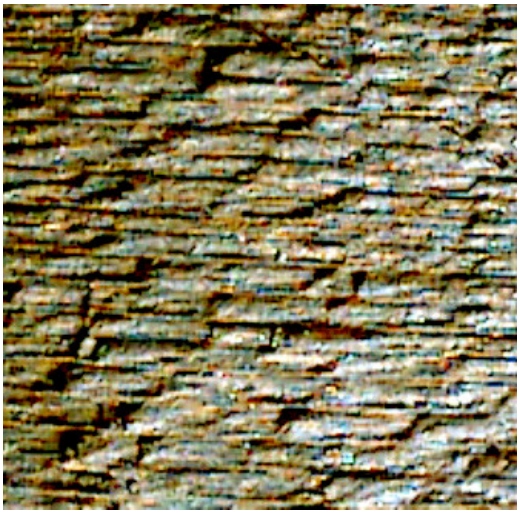

Photo 4

Can Do Painting and Decorating Company has the contract to paint several new apartment buildings. The interior drywall walls are bedded and taped and then receive an "orange peel" texture applied by the drywall contractor. The specifications then state that the painting contractor will apply two coats of latex flat to interior drywall surfaces. After the first building is completed, several tenants move into the apartments. As is inevitable when moving furniture into a residence, some damage to the paint finish occurs. When the residents attempt to wash away scuff marks and blemishes from the walls, they find that the paint actually washes off the drywall. In locations where the tenants have placed tape on the walls, the paint has delaminated. One tenant tried to install wallcovering and it fell off the wall pulling the paint with it. Examination of all of the delaminated material indicated that some of the texture was removed with the paint and some remained on the wall. This is not a paint adhesion problem, but rather a cohesion problem involving the drywall texture. What's occurring on this project is that when water is applied to the painted drywall surface for the purpose of removing scuff marks, it penetrates through the .paint into the drywall texture beneath. The drywall texture is re-emulsified, and the paint literally floats from the surface when it is scrubbed. The cause of the problem is the low cohesion and water sensitivity of the texture. In this instance, not enough acrylic resin was used in formulation of the texture. When the wall covering was applied, the water in the paste wet the texture and the inherent stress of the wallcovering caused delamination.

Dedicated Coatings Inc. painted a new car showroom facility. The concrete floors were acid etched and a concrete stain and sealer system was applied. Soon after the facility was put into operation, there was extensive delamination of the stain as shown in photo 5. Several adhesion pull tests were performed. The test results showed that the stain was well adhered to the surface of the concrete, but when failure occurred, some of the concrete was attached to the rear of the stain (photo 6).

Photo 5

Photo 6

Laitance is a thin layer of new concrete that consists of fine particles at the surface due to the upward migration of water during the placement and curing process. This concrete layer is of low strength and should be removed when surface preparation is performed. Unfortunately, the acid etching performed was not aggressive enough to remove this low strength layer. For this reason, the more aggressive method of shot blasting is often preferable.

These examples all illustrate peeling and delamination problems that occurred not because of poor adhesion of the coating to the substrate, but due to a failure within the substrate. Anytime you suspect that the substrate is unstable, it is recommended that samples be applied and adhesion tests be performed.