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SOMETIMES IT'S NOT GOOD TO SHINE

By Bob Cusumano

A small southern college decided that it was necessary to repaint the interior of several of its classroom and dormitory buildings during summer vacation. The college has several painters on staff, but because of the large scope of the project, some of the painting work was performed by "in-house" personnel, however contracts were awarded to two local painting contractors to paint other building interiors. The maintenance supervisor had indicated that environmentally friendly paint products that meet or exceed the requirements for Leed certification be used on all building interiors.

The work was completed and ready for the beginning of the fall semester. A few months later, it was determined by maintenance personnel that many wall areas had developed an uneven appearance. A visual inspection of several buildings confirmed that some wall surfaces had a mottled appearance as shown in photographs 1 and 2. At these locations, some wall areas appeared to be flat, while other portions were shiny. Walls in some of the building were unaffected and had an even appearance.

Photo 1

Photo 2

The degree of gloss of the paint that had been applied was measured using a Gardco 60 Degree Gloss Meter in accordance with ASTM D 523, Standard Test Method for Specular Gloss. Gloss is associated with the capacity of a surface to reflect more light than others. Measurements by this test method correlate with visual observations of surface shininess made at the same angle. Gloss measurements are made by comparing the specular reflectance from the sample to that from a black glass standard. Higher numbers indicate more gloss than lower numbers. A wide range of gloss was found to exist on the walls ranging from 5.3 to 17.5.

Samples of the painted surfaces were extracted and examined using a stereo zoom microscope. No contaminants were found to be present on the surface. Under microscopic inspection both flat and shiny samples had similar appearances. The surfaces were then examined with an ultraviolet light. “Black light” will cause petroleum residues to “shine”, but again, no contaminants were identified.

A black cloth was wiped on a portion of the mottled wall that appeared to be flat and photo 3 shows the result. The rubbed spot appeared to be lighter in color and more glossy than it had been originally. Microscopic examination of the cloth revealed that a small amount of material was transferred to the cloth. This procedure was repeated at similar locations with the same result.

Photo 3

A review of the maintenance records showed that two different brands of paint were purchased in two different colors. Fortunately, wet samples of the four paints used were available in the paint shop for testing. Drawdowns of these paints were made on Leneta standard drawdown cards. These cards contain flat and shiny sections in both black and white. After a five day cure, gloss readings of the cards were made on both the shiny and flat areas of the cards. Then, ½ of each shiny and flat area was wiped twenty times with a clean white cloth. Gloss readings were then made on these rubbed portions of the samples.

The gloss reading results were as follows:

Paint 1 Drawdown	Gloss reading
shiny area	10.4
flat area	9.4
rubbed shiny area	10.5
rubbed flat area	9.6
Paint 2 Drawdown	
shiny area	11.3
flat area	9.5
rubbed shiny area	11.4
rubbed flat area	9.7
Paint 3 Drawdown	
shiny area	9.2

flat area	7.5
rubbed shiny area	13.5
rubbed flat area	11.6
Paint 4 Drawdown	
shiny area	9.3
flat area	7.5
burnished shiny area	12.0
burnished flat area	9.3

Based on the observations made and the testing performed, it was determined that burnishing is the cause of the mottled appearance of the paint in some buildings resulting in a difference of surface gloss. Burnishing is a term referring to glossy or shiny spots on a painted surface caused by rubbing, washing, wiping or scrubbing the surface of the paint. This causes the surface to "polish" resulting in a higher sheen than adjacent surfaces. An individual paint's susceptibility to burnishing is based on a number of factors including amount and types of pigment, type of resin, types of colorants used, etc. Burnishing as the cause of the problem is consistent with the observation that the paint originally had an even appearance but was affected by wiping with a cloth, a situation that would develop over time as walls are subjected to cleaning.

Wiping of the drawdown samples with a cloth showed that paints 3 and 4 burnished resulting in a large rise in gloss level. Both of these paints are relatively dark colors of the same brand. Unlike paints 3 and 4, paint 1, which is a light color of the same brand of paint and paint 2 which is the same color as paint 4, but a different brand did not burnish. This is consistent with the field observations made. In this instance, it appears that the colors used and the paint used in combination with each other resulted in the burnishing. The same paint product, but in a lighter color, did not burnish. Similarly, the same dark color, but in a different paint brand did not burnish.

The drawdown samples tested indicate that the gloss level of the paint is different dependent upon the porosity of the substrate; that is, a well sealed substrate will result in a higher gloss level of the finish paint as compared to a porous one. This can be a contributing factor to differences in appearance called "flashing". However, flashing would be immediately apparent, and the uneven, mottled appearance at the college developed over time.

Whenever you are using new products, particularly dark colors, it is wise to make drawdown samples. After the paint cures, rub the samples with soft cloth. If a shine develops, then be aware that a burnishing problem may result.