Cissing and burnishing are very different surface defects, but are two of the few that I have not covered in these articles. I would appreciate suggestions of any other defects, tests, measurements, or phenomena that might interest readers.

Cissing

Cissing is a defect that might be thought of as an old fashioned one that was noted for affecting the brushing of solventborne alkyds and varnishes. Certainly those were the products with which I first encountered the defect many years ago. However, I have been told that the defect currently occurs in waterborne alkyds and, occasionally, in waterborne acrylics and polyurethane dispersions. Cissing can be described as long, very thin craters that occur when a second coat is brushed over the first coat. There usually are several parallel defects that may appear to be brush marks, but usually go all the way to the undercoat. Unfortunately, I do not have a picture of cissing, but Figure 1 shows an example of dewetting that looks somewhat similar, although this was a spray application over a first coat that was contaminated by wiping with a tack rag that had been dipped in solvent. Some authors consider pinholes to be a type of cissing and I once saw a case where there were lines of small pinholes that may well have begun as elongated craters.

Brushing is an excellent means for forcing wetting of a liquid on a surface, so lack of initial wetting is not likely unless the first coat is dirty or greasy. In most cases, cissing is due to dewetting of the second coat. The question is, what causes this to happen? One theory is that there is an incompatible ingredient in the undercoat or, possibly, in the coating being applied, that results in a localized surface tension difference. This would be expected to form a normal, round crater, but the brushing action draws out the incompatible material and greatly elongates the resultant dewetted area. Possible incompatible materials include defoamers, resin gels, dirt, and poorly dissolved or dispersed silicones or other additives.

When cissing occurs in waterborne coatings, it is a good idea to try a few other defoamers, particularly those considered to be more compatible, and see if the defect disappears. Addition of more or a different surfactant and/or a small amount of low surface tension solvent may help improve the wetting ability of the second coat. Use of a rheology modifier may produce better rheology for brushing and flowout.

Burnishing

Burnishing is another word for polishing, but with coatings it means an unwanted increase in gloss or sheen due to scrubbing, spot cleaning, or rubbing/brushing by furniture or even fingernails (see Figure 2). It happens on flat (matte) interior architectural coatings in high traffic areas and tends to be worse with dark colors and where there are small children around. In my home, we solved the worst of the problem by using semi-gloss paint in the kids’ rooms and bathrooms. If a flat coating is absolutely necessary, then make sure it has excellent scrub resistance. A solution where burnishing occurs around light switches is to include a small amount of coarse silica in the formulation. The coarse inert pigment reduces burnishing by reducing the contact area. I have seen examples of burnishing with metal parts coated with dark-colored matte industrial coatings. The solution in one case was to be more careful in packing and shipping so that the parts did not undergo rubbing. Some coated surfaces are burnished on purpose to lower the coefficient of friction to improve slip.