Floor plans

Here's how to avoid costly failures when epoxy-coating concrete

by Paul Oman

If there is a trick to achieving a successful coating job it is to understand why coatings fail and how proper surface preparation can prevent those failures.

It's hardly a small issue. Premature or immediate coating failure can cost tens of thousands of dollars in labor and material costs, as well as downtime.

Here is what you need to know.

Why coatings don't stick

There are many reasons coatings fail to stick to their applied surfaces. Unless otherwise stated, let's assume we are dealing with a concrete floor or loading dock.

Dampness: Moisture is a good starting place for a coating failing to adhere. Moisture doesn't just mean water droplets; it could include high humidity. Some coatings shouldn't be applied when humidity levels are high. More obvious sources of moisture include rainstorms during an outside application, standing water puddles on a concrete slab or, even more likely, a damp or saturated surface.

Surface dry doesn't necessarily mean dry. There often is a high moisture content hidden just below the surface. The standard test is to tape a 4 foot by 4 foot plastic sheet to the concrete and see if visible moisture collects under the plastic. You can apply some modern epoxies to wet or damp surfaces, but generally a moisture-rich surface means no possibility of coating.

Moisture flow: Migrating moisture, as opposed to simple standing water, creates a more difficult problem. The common sign of this kind of failure is water-filled blisters. Just a tiny amount of flow pressure under a still-curing coating can ruin the bonding process taking place. There is no good answer here, but rapid-drying/curing coatings have a better chance of working. They can set up and bond before water and water pressure builds to unacceptable levels under the fresh coating.

Greases, oils, etc.: Few, if any, coatings stick to greasy, oily, waxy surfaces. This includes many kinds of plastic surfaces. Oily surfaces are tricky. Just feeling the surface often isn't good enough. Even on what seems like a non-greasy surface, many coatings bead up, leaving behind hollow, coatingless circles or voids. Hosing down, jet-blasting or grit-blasting doesn't guarantee grease removal. Indeed, it will probably stay behind. Greasy, oily

surfaces require a degreasing chemical to remove the film.

Experts suggest washing down the surfaces using a degreaser and a stiff brush. It's wise to make this a standing surface preparation step and wiser still to do at least two degreasing washdowns. However, even simple degreasing or more advanced hot steam and chemical systems may not work completely. Surfaces contaminated with animal fats seem especially difficult to degrease and successfully coat without physically removing or replacing an inch of surface concrete.

Dust/slime/loose rust: It's common to see floor coating samples collected from peeling floors that are dirtier on the underside than on the top surface. The coatings stuck, but to the dust and dirt on the floor instead of to the floor itself. Hosing down the surface to remove loose materials works somewhat, but that also leaves much behind. The same goes for sweeping. The best approach is probably hosing down with as high of a flow of water as possible, followed by compressed air blowing to both dry the surface and remove any remaining wet/sticky dust. A quick, last-minute broom sweep wouldn't hurt. Simply sweeping is at the other end of the spectrum.

The applicator must decide how much time and effort to put into surface dust removal. Contaminants, including salts, can stick to your floor well enough to withstand a hose or brush, yet mysteriously pop off after painting.

Salts: Salts and/or minerals (deposited out on the surface from the curing of fresh concrete or from the evaporation of seawater on concrete or steel) can quickly ruin a coating. For starters, the salts work like dust and other contaminants, getting between the coating and the surface. These cause even epoxy floor paints to peel off easily, despite what appears to be a clean, nicely profiled surface.

Without moisture, salts tend to form crystals, which can interfere with bonding. Experts claim these salts actually perform in a chemical sense like a grease, damaging or destroying bonding. However, it gets worse. Salts attract water both from the concrete and through the coating. The result can be a water-filled blister that spreads and grows mechanically, destroying the coating-to-surface bond.

continued on page 26

In most cases, that's probably OK, but every shortcut raises the chances of problems.

4) The concern about all the bad things various salts can do to about-to-be-coated surfaces is growing as their effects are better understood. On steel surfaces, these salts form ions and corrosion cells that are easy to spot because of the rust. Concrete may have a bigger problem than steel since it is porous and contains minerals to start with.

Several newly developed chemicals and/or processes deal with these salts. Seriously consider using or testing these chemicals. Some applicators now include desalting treatment as a standard step in surface preparation. Often, the recommended method of application is with a waterjet unit, however you can apply some with a brush or roller.

Pre-existing coatings

Most surface-tolerant, modern, solvent-free coatings can be applied over well-adhered traces of a pre-existing coating. "If it ain't broken, don't fix it," may be a completely valid strategy. On the other hand, complete stripping and total surface preparation is the absolute proper approach to take.

Vertical surfaces

Vertical concrete surfaces are less likely to have a grease film or thick layers of contaminants than floor surfaces. They often also have a pre-existing rougher surface, negating the need for blasting a profile into the concrete. Salts and loose/crumbling surfaces, pre-existing coatings or moisture are probably the major problems with coating these surfaces.

Conclusion

Coatings fail for many reasons, but proper surface preparation can often prevent failure. That said, proper surface preparation is often given short shrift to save costs, time or materials.

Because each coating situation is unique, sometimes cutting a few corners causes no problem. It is a gamble played out every day between end-users and the coatings they use. It is one thing to gamble and lose and quite another to fail out of ignorance. ▲

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