**FLOOR MAINTENANCE**
*by Thomas A. Westerkamp*

**Sealing in Floor Performance**

Proper surface preparation and testing goes a long way in determining the long-term performance of floor coatings

As manufacturers continue their efforts to improve the performance of paints and coatings, many of the basics of successfully applying floor coatings remain constant and essential for success. Among the most important of these essential steps is surface preparation.

A closer look at the preparation process and the equipment involved will help managers ensure coating performance.

**Surface preparation**
Extending the life of floor coatings depends so heavily on surface preparation that the best paint contractors will decline to bid on a job if they know the substrate condition cannot be properly prepared. For example, if a below-grade or on-grade concrete floor has been installed without at least a 10 mil vapor barrier and there is considerable moisture beneath the concrete, they know a coating will not last long, no matter what they do to the surface to prepare it.

This step is so important that all reputable contractors perform standard tests to determine if a floor meets minimum conditions for a successful job.

Typical situations that spell trouble for new floors are new concrete not properly dried and old concrete not properly insulated. New concrete requires a drying period, and an average of 30 days is not enough in all cases. Among the factors affecting drying time are: an absence of a vapor barrier; a high water table on below-ground floors that creates hydrostatic pressure; the use of curing compounds; pumped concrete with more water in the mix; and the installation of flooring over concrete before the HVAC system is operating.

Old concrete can produce different problems, especially if the building use has changed from its original intent. For example, if an old warehouse with a concrete floor is converted into condos or offices, a school, or a medical clinic, the owner is setting himself up for a disaster by sealing concrete floors with wood, tile, or seamless paints and coatings.

Many old warehouses are structurally very sound and represent a low-cost way to obtain a shell, but the old warehouse probably never had a vapor barrier installed under the floor. Covering it with anything traps the vapor under the paint, coating, or carpet or tile adhesive that had been escaping into the indoor atmosphere. The moisture mixes with the coating and creates a mess.

How can managers avoid such problems? The American Society for Testing of Materials has developed standards for testing concrete to determine whether it is a satisfactory substrate for the product to be used.

The first standard test is ASTM F-1869, Standard Test Method for Measuring Vapor Emission Rate on Concrete Sub-floor Using Anhydrous Calcium Chloride. A known weight of calcium chloride is placed under a plastic cover for a specific period of time. The chemical absorbs moisture from the concrete and is weighed. The weight gain is converted to pounds per 1,000 square feet per 24 hours, which is the manufacturer’s product rating. For most resilient flooring and carpet, a gain of 3-5 pounds is permissible.

A second standard is ASTM F-2170-02, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In Situ Probes. This test, thought to be a more accurate predictor of future moisture, involves drilling a hole in the slab and measuring the relative humidity. Managers can repeat the test using the same hole without the waiting time after cleaning that is required by using the calcium-chloride test. The actual measurement is compared to the manufacturer’s recommended permissible percent relative humidity to determine the suitability of the substrate.

Pseudo-tests for floors — such as taping a plastic sheet over the floor area and using moisture meters — might indicate the need for further testing. But they are not adequate for the final determination. Experts recommend that only qualified agencies perform vapor-emission tests to ensure independent, accurate results.

In addition to moisture testing and control, other factors play a part in determining the best paints or coatings. Among these factors are floor use — both the amount and type of traffic — and atmospheric conditions, such as the presence of corrosive elements.

**Equipment selection**
Once a floor coating is selected, selecting equipment for surface preparation is the next hurdle to clear. The time and cost for this process are substantial, but they are well worth the extra effort because they can result in additional years of service.

Whether the floor is concrete or wood, the substrate and the paint or coating determine the surface-preparation method. The resulting paint finish quality and durability depend largely on complete and meticulous surface preparation. Essential surface preparation equipment and features are as follows:

**Grinders.** These units grind off dirt and paint, vacuuming as they go. They typically have three-headed, counter-rotating blades, operate in the 2 horsepower range at 400-800 rpm, weigh 150-300 pounds, and have diameters of 15 inches for small jobs and up to 30 inches for large jobs.

**Polishers.** High-speed polishers use a two-step approach — diamond polishing for coating removal, followed by high-speed buffing. The best applications are: finishing wood or new, hardened concrete; restoring old, worn surfaces; and restoring sealers. The resulting finish is a shiny, maintenance-free surface.

**Sand- and shot-blasters.** This equipment uses a mixture of sand or shot and air under high pressure to clean concrete, as well as to remove mastic, epoxy, rubber, and sealer. Typical equipment sizes are 10- to 30-inch-wide paths.

**Ultra-high-pressure water blasters.** An alternative to sandblasting is using water pressure up to 40,000 psi. It eliminates airborne dust, grit and paint while removing paint, scale, rust and coatings from horizontal, vertical or overhead concrete and steel surfaces. A typical hand wand covers a cleaning path up to 4 inches wide.

**Carbide scrapers.** For large jobs, a riding rotary scraper cuts away and removes asphalt, thin-set, epoxy, urethane, tile and carpet mastics, waterproofing, and membrane materials in one step. It uses a three-head rotary and oscillating cutter to cover a 30-inch path and contains an attachment for vacuuming up dust and loose materials.

Workers also can use a variety of hand and portable power tools when working in offices, labs, shops, garages, hallways, and other areas in which the cost or maneuverability of large power units is prohibitive. They are more labor intensive, but they work well for carpet or tile backing and mastic, wood and composite gym floors, parquet, and planked floors. With these tools, a crew of two can strip off old tile or carpet and apply a new surface in a day if the substrate is in good condition.

The right combination of floor surface preparation, moisture testing, and coating selection will yield longer performance life for a facility’s floor paints and coatings at a reasonable cost.