

Decorative concrete

Decorative concrete involves concrete structures being used in roles that are not strictly related to concrete's functional elements. Concrete has long been prized for its great strength, especially when combined with steel rebar. Concrete can be used for, among other things, decorative walls, floors and countertops that are both structurally sound but also provide a decorative finish that resembles polished stone and has an extremely low cost for materials.

Forms of Decorative Concrete

Concrete Countertops

Concrete's versatility lends itself ideally to creating rich countertops. Countertops made of concrete can be formed in a fashion that would be impractical in size and scale if made out of rock like granite or marble. Height, coloring and textures can be changed fairly easily. Aesthetic or practical items can be embedded in the concrete such as integral brass rails as pot holders or personal items such as shells, fossils, or mementos of purely sentimental value.

Integral Colorants

Color material is blended with the concrete mix to color the aggregate throughout. Many of the colorants are Iron oxides and can create colors including blacks, yellows, and reds. Greens can be achieved using Chromium and ultramarine can be used to create variants of blue. Some of the compounds used to create coloring are heavy metals (including chromium) and can be released during the grinding and polishing of the concrete. These heavy metals can cause severe respiratory problems and environmental damage.

New advancements in integral concrete color have been developed that do not utilize conventional Iron oxide based pigments that virtually eliminate efflorescence and alkali discoloration using synthetic type pigments called synthetic primary pigments or SYPP.

These synthetic primary pigments are available in liquid emulsion form and are highly concentrated for ease of use and at a tremendous cost savings to users. SYPP is available in all primary colors which include yellow, blue, black, green, white and red. SYPP is also blended with extenders and preservative to create portion control colorant to increase the color offering to virtually any earth tone color which is popular in today concrete finishes.

Stamping

Patterns are impressed into wet concrete slabs or overlays to create textures or the appearance of brick or stone.

Decorative Concrete Applications on Existing Concrete

Acid Staining

Acid staining is not a dyeing or pigment base coloring systems but a chemical reaction. A mixture of water, salts and acid is applied to the concrete surface and later neutralized by a basic solution, of ammonia and water. Although some manufacturers recommend using baking soda and water, this process increases efflorescence and alkali problems once the surface is sealed.

This chemical reaction with the existing minerals in the concrete creates new colors on the concrete surface. Due to inconsistencies in the surface of concrete, acid staining creates a variegated or mottled appearance that is unique to each slab. The thickness of this color change ranges from 1/16th to 1/32nd of an inch. Exterior concrete surfaces may not color as well as interior surfaces because the environment has leached or percolated out the mineral content.

Typical Steps for Acid Staining:

1. Surfaces must be cleaned thoroughly with a mild detergent.

2. A test area is treated first to determine the strength of acid stain required for the desired color. (A weaker solution is tested first and increased in strength until the intended color is obtained.)
3. Acid solution applied to surface with acid-resistant paint brushes, mops, rollers or sprayers.
4. Solution is allowed to react on the surface for a set amount of time.
5. Reaction is stopped with a basic solution and rinsed away with water.
6. Surface is dried and then sealed with a wax, polyurethane or epoxy sealer.

Chemicals commonly used:

- Hydrochloric acid
- Iron chloride
- Sodium bicarbonate

Concrete Dyes

Concrete "dyes" are available in many different forms and compositions. Early concrete dyes consisted of generic printing inks that were dissolved in mild solutions of alcohol as a form as a carrier and applied to concrete surfaces to add a wide array of color to plain gray concrete.

Problems quickly arose when the alcohol based dyes were exposed to sunlight, causing the color to either lighten up or fade out completely. This of course limited alcohol based dyes to interior applications where sunlight or other forms of UV lighting was not exposed to the dye.

Manufacturers later began dissolving the same printing inks in different carriers such as acetone, lacquer thinner and other solvents hoping to achieve increased penetration levels. In addition, UV inhibiting agents were added to new dyes to help with the UV instability issues associated with printing inks and concrete dyes created from those inks. The result was not what was expected. Although UV stability did slightly increase, fading still occurred when the dye was exposed to sunlight.

Epoxy

Applied over acid stained and/or overlays to seal and protect. Some epoxies are also colored.

Overlaying

Concrete overlays date back to the 1960's when chemical engineers from some of the larger, well known chemical companies began to experiment with acrylic paint resins as modifiers for cement and sand mixes. The result was a thin cementitious topping material that would adhere to concrete surfaces and provide a newly resurfaced coating to restore the worn surface.

Although initial concrete overlays provided a solution to worn concrete surfaces, the fix was somewhat temporary due to the lack of long term performance characteristics of acrylic resins. Although acrylic resins provided good UV resistance, it lacked long term water resistance and adhesion characteristics needed to provide a long term and permanent solution.

Polymer cement overlays consist of a proprietary blend of portland cements, various aggregates and proprietary hybrid polymer resins. The purpose of adding a hybrid polymer resin to the cement and aggregate is to greatly increase the performance characteristics and versatility of conventional cements, mortars and concrete materials.

Unlike conventional cement and concrete mixes, polymer cement overlays can be applied as thin as a single grain of sand or up to several inches thick without fear of delamination or typical product failure. In addition, polymer cement overlays are much more resistant to damage from salt, petrochemicals, UV, harsh weather conditions and traffic wearing.

Polymer cement overlays were introduced over twenty years ago, intended for use as a thin surface restoration material for concrete substrates. With years of successful and permanent applications, polymer cement overlays were introduced into to architectural concrete and commercial flooring industry in the early 80's where it's use has become an

industry norm. To this day, polymer cement overlays are used for interior and exterior applications ranging from:

- Skim Coat/Broom Finish Concrete Resurfacing – Designed to restore and protect damaged, pitted, flaking and stained concrete back to the look of a new concrete surface. This application can even be “broom finished” if desired.
- Concrete Regrading & Leveling – Offers to ability to effectively repair and level concrete surfaces that have settled and become unsafe trip hazards. Regrading from several inches thick down to a feathered edge is possible.
- Thin Stamped Overlays – Similar to conventional stamped concrete, but only ¼” to ½” thick applied over existing concrete or wood substrate of any condition and at a fraction of hassle, cost and application time. The finished look is that of truly authentic tile, brick, slate, stone, wood plank and more.
- Thin Stained Overlays – Quickly becoming the commercial flooring industries most demanded and specified finish. A thin layer of polymer cement is applied over existing concrete or wood substrates and chemically stained with single or multiple translucent colors for a natural looking, elegant and durable flooring system. Optional patterns are often installed with cove type strips, similar to those used in terrazzo flooring.
- Splatter Textures & Knockdowns – The standard for commercial and residential pool deck finishes. Polymer cement is applied to the existing concrete substrate in a moderately textured finish (average of 1/8” thickness) in various patterns. Often times, the texture is knocked down with a trowel to slightly modify the appearance and feel of the finished application.

Polymer cement overlays have been successfully developed, time-tested and used for many permanent applications by contractors, engineers, architects and public works agencies for internal and external applications, above and below grade.

Polymer cement overlays are permanent applications that offer longer life, durability, reliability, flexibility, water and chemical resistance, and optional safety (non-slip) textures that are not only cost effective and time saving, but can also be aesthetically appealing.

Polymer cement overlays are economical because they provide long term, durable renovation without the need for costly and continuous repairs normally associated with deteriorating concrete surfaces. It's fixed once, permanently and beautifully with a minimal amount of time lost, compared to traditional renovation projects.

Polishing

Concrete is polished with grinders and sanding pads of increasing grit (up to 3000) in multiple stages until it has a hard-glassy finish. Polished Concrete is a practical, decorative & economical floor system for any facility. From showrooms to industrial plants, government buildings to retail facilities, dry-polished concrete is quickly becoming one of the fastest growing phenomena to ever hit the flooring industry. Contrary to other temporary surface chemical processes, Dry-Polished Concrete is a mechanical grinding & polishing process that utilizes industrial diamonds & impregnating hardeners and sealers to level, densify, polish & finally seal the floor from within the interior of the floor surface.