

White Cement Delivers Beautiful, Profitable Mixes

Business-savvy ready mixed producers are looking to this specialty product to increase profits and secure market share

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Business-savvy ready mixed concrete producers are looking to white concrete to increase profits and secure market share. As more customers call for decorative and specialty mixes, they are embracing integral color and jobs that require white cement as a way to increase profits in a lower-volume market. A growing number of ready mixed producers see decorative concrete, white cement and other value-added products as an important segment of their business. In fact, in many areas of the country, value-added mixes are the fastest growing segment of the concrete business, with colored/decorative mixes accounting for more than 35 percent of the concrete sold. The good news is that returns for these specialty projects tend to be much better than standard gray mixes.

Where White Cement Shines

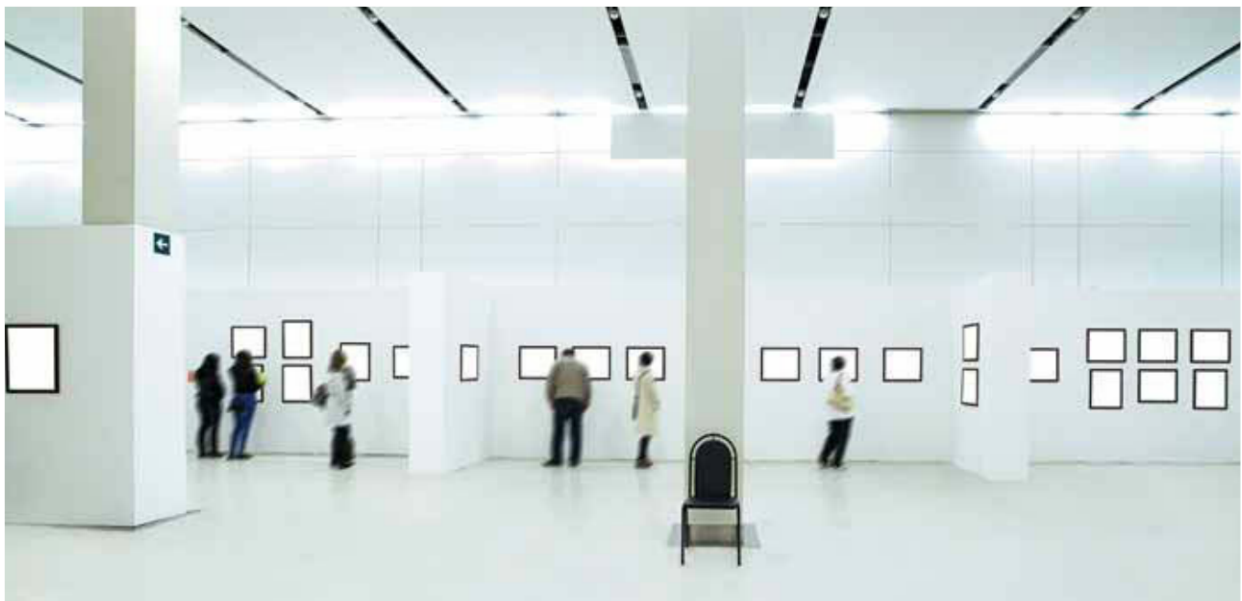
Due to its clean, low-maintenance finish, white cement concrete is often prescribed for health-care, retail, educational and other institutional applications. In addition to vertical applications such as architectural walls and columns, white mixes are being used for decorative flatwork, using colors and textures once thought impossible to achieve. White cement gets specified because it delivers uniformity and bright colors not otherwise attainable. By offering mixes their competitors are reluctant to supply, informed producers are earning significantly higher margins than they would with run-of-the-mill concrete.

Although they can be stained or colored, white concrete projects can also rely exclusively on the color of the cement paste and the fine

aggregate. Light-colored sands and white cement will meet almost any requirement for highly reflective concrete. Owners looking for a bright atmosphere for high-tech assembly, clean rooms, retail and healthcare are big fans of these brilliant finishes. These types of floors pay dividends in energy savings because they require far less artificial lighting to achieve a comfortable level of illumination. Reflective floors combined with natural lighting from skylights or light shelves deliver all around light that eliminates glare and light pooling common with dark finishes.

What's Different About White Cement

White portland cement is essentially the same product as gray, except for the color. Manufacturers of white portland cement use



select raw materials that are low in iron along with carefully controlled manufacturing techniques that ensure a bright white appearance. With a few exceptions, however, experienced concrete producers have little trouble dialing in white-cement-based mixes based on the standard gray mixes they already sell.

White Type I portland cement also tends to have a higher early strength and more rapid initial set time than most gray Type I and Type II cements. Many producers find that treating their white cement the same way they do high-early strength, Type III-based mixes is a good approach.

White Cement and Admixtures

Different admixtures will have different chemistries and slump retention packages, and those can be sensitive to changes in cement sources. Concrete producers should consult their admixture and cement suppliers as to which admixtures have a good track record with the cement to be used. Most white cement customers report they do not have to make many adjustments for lignin and naphthalene-based admixtures to get predictable consistent results. However, high doses of some lignin-based admixtures may cause significant delays in set times.

Polycarboxylate-based admixtures are known for providing high water reduction and good early strength development. They come in a wide range of formulas that tend to be very cement-specific in their interactions and mix performance. Consultations with suppliers and doing trial batches can prevent headaches and help establish the right mix. Polycarboxylate admixtures that are formulated to provide extended slump life—so-called “workability-retaining” admixtures—are typically good a match with white cement. Workability and slump retention can also be improved by adding low to moderate doses of hydration stabilizers, which delay hydration activity. These products are preferable to traditional retarders because they have minimum effect on initial strength gain.

SCC and White Cement

Many producers have experience producing self-consolidating concrete (SCC, also known as self-compacting concrete), a highly fluid yet cohesive form mix. White-cement-based SCC mixes can be tricky to produce because the aggregate is often chosen for its looks instead of for how ideal the gradation is. Working closely with the architect and contractor to explain the limitations of a particular aggregate source can pay great benefits. Some will appreciate having their

TEN TIPS FOR HANDLING AND MIXING WHITE CEMENT

1. When adding color, use pigments that conform to ASTM C979, *Standard Specification for Pigments for Integrally Colored Concrete*. Pigment addition rates are lower than with gray cement, ranging from range from a half-pound to two pounds/cwt.
2. Stockpile aggregate for a project to ensure uniformity between batches.
3. When feasible, dedicate a batching operation to white cement project.
4. When producing white cement alongside gray, use a checklist or batching plan from silo to delivery.
5. Conduct visual inspections to make sure silos are empty and clean of residual gray cement or dark-colored SCMs.
6. Cycle dust collection in silo to eliminate any dark gray material.
7. Determine the number of wash cycles for the hopper and mixer necessary to ensure no cross-contamination between gray and white products.
8. “Rock” mixer trucks by loading them with several tons of course aggregate and spinning the drums at high speed to knock any cement residue off of mixer fins.
9. Discuss project expectations with drivers so they know they are handling a special mix that needs to be kept separate from standard gray mixes.
10. Run several hundred pounds of white cement through the screw conveyor, rotary valve or other conveying and batching equipment prior to producing white-based loads.

options explained and will accept the trade-offs between appearance, workability and material availability. For instance, if the job calls for a sandblasted or exposed aggregate finish, a highly flowable mix far short of what many might think of as a true SCC mix might be acceptable. If a very smooth formwork finish featuring the paste of the mix is required selecting course aggregate based on color may not be necessary.

Use of SCMs

The paste portion of a given concrete mix—made up of cement, supplementary cementitious materials, ultra-fine aggregate, water, and any pigment—is the largest predictor of concrete color. Changing any part of the paste—the water content, pigment blend, cement or supplemental cementitious materials—can have a dramatic impact on the color of the mix. This is one of the reasons it is so important to start with clean trucks when transporting decorative concrete mixes.

SCMs therefore have an effect on the appearance of the finished product. SCMs such as fly ash, GGBFS (slag cement), and silica fume are all industrial by-products produced with no regard to color. Fly ash is a combustion by-product of coal-fired power plants, usually with a gray or tan hue and high potential to discolor white or decorative concrete. It is therefore usually not included in white mixes. Generally speaking, slag cements are light colored and a good match with white-based mixes; however, at replacements of more than 20 percent, they can impart

a bluish-green tint, which will usually, but not always, dissipate over time. Slag intended for use with white cement should be pre-tested to ensure it meets the color needs of the job. Silica fume typically imparts a very dark gray color to any concrete although there are sources of white and off-white silica fume.

Several other SCMs, such as metakaolin and products made from ground glass, can have good color control and yield predictable color. As with all materials that affect the all-important paste portion of the mix, careful monitoring of these products will ensure a consistent, reliable aesthetic affect in the finished mix.

Many concrete producers are now using blended cements made with inter-ground limestone. White cement versions of these cements meeting ASTM C595 and or C1157 will have a high degree of color control. Gray versions of these types of cements can be lighter than the portland cement coming from those same mills, but like their portland counterparts they are not typically graded for color.

Just about everyone in the concrete industry recognizes the global shift towards more decorative concrete applications. White cement mixes deliver greater profit than gray. Adding white cement projects to your portfolio makes good business sense! ■

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