

A vertical bar on the left side of the slide with a red, pebbled texture.

Course Title

Integrally Colored Concrete

Course Introduction

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Course Objective

- * Learn the application of integrally colored concrete
- * Learn how color affects concrete properties
- * Learn how concrete is integrally colored

Course Materials

- * Personal computer (PC)
- * Internet browser
- * Internet access

Course Sponsor

* Davis Colors



* Ron Blank & Associates, Inc.



Pre-test

Let's find out what you know
about integrally colored
concrete

What is the typical color dosage (%)?

- A. 5% of concrete volume
- B. 7% of cement volume
- C. 10% of concrete volume
- D. 10% of cement volume

For integral color, when is color added?

- A. After concrete cures
- B. During concrete finishing
- C. Mixed before pour
- D. Sprinkled or dusted after finishing

What, besides pigment, affects concrete color most?

- A. aggregate
- B. Cement-water ratio
- C. Sand + aggregate
- D. cement

Where can colored concrete be used?

- A. Concrete drives/walks
- B. Anything made with concrete
- C. Pavers/block
- D. Tilt-up

Now it is Time To Learn More

- * Let's review the course objectives
- * Learn the application of integrally colored concrete
- * Learn how color affects concrete properties
- * Learn how concrete is integrally colored



Begin The Course

Integrally Colored Concrete

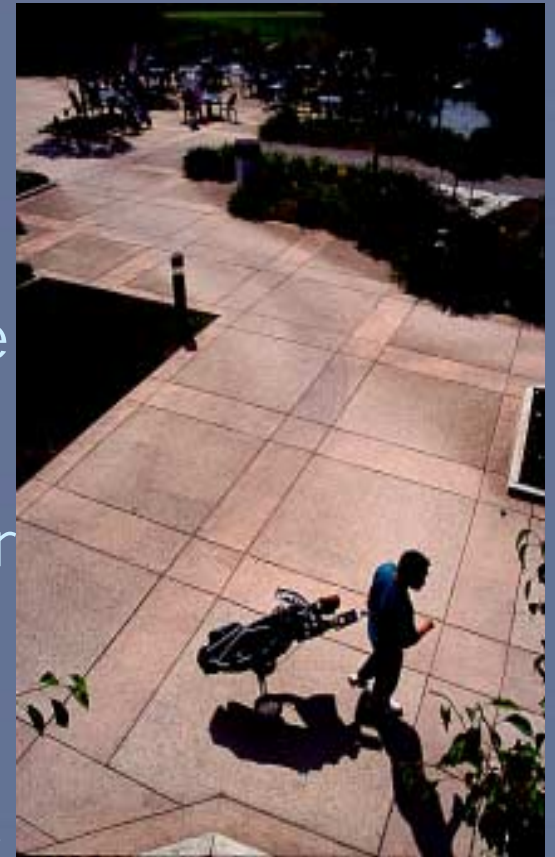
Concrete Can Be Beautiful

- * Gray concrete is so common that few people realize concrete can be colored.
- * Color adds to the aesthetic potential of concrete, transforming it from an ordinary building material into a medium for creative design.
- * Integral color is mixed right into concrete.
- * A vast color palette + custom matches are available.



Colored Concrete Is Practical

- * Colors are easily mixed into any type of concrete and installation is the same as with high-quality uncolored concrete.
- * Integrally colored concrete is durable and has a long service life. The color is permanent and will last for as long as the concrete surface itself.
- * Colors do not fade but the color will wear as concrete wears



Colored Concrete Is Affordable

- * Colored concrete is installed & finished the same as conventional concrete
- * No separate finish or staining is required; reducing costs
- * Excellent alternative to more expensive materials such as natural stone or quarry tile



Use Colors in Buildings

- * Integral colored CMU
- * Concrete walks



Use Colors in Paving



* Integral colored concrete walks

Use Colors in Structures



- * Custom colored cast-in-place concrete structures

Anywhere your Imagination Takes You



- * Stamped concrete paving
- * Pre-cast sculptures

Is Integral Color Limited to Cast-in Place & Pre-cast?

- * No, integral color is an excellent choice for CMU also.

The Color of Concrete Masonry Units

- * CMU - They aren't your grandfather's cinder block anymore. Colors, combined with finishes such as split-face, slump block, or sandblasted or other styles of CMU, make it attractive to use CMU in architectural projects.
- * With integral colors, you don't have to paint for good looks. Integral colors are as durable as the concrete, so you save on maintenance throughout a building's life.



The Colors in Concrete Pavers

- * Renowned for durability as well as beauty, interlocking concrete pavers come in a wide range of shades, blends, and patterns to enhance the appeal of drives, walks, plazas and other hardscapes.
- * Colors withstand deicing salts, fuel spills, and exposure to the elements.



The Color of Segmental Retaining Wall (SRW) Units

- * SRW's are gaining popularity as an economical and practical way to build retaining walls. They can be tinted with colors to complement or blend with the earth tone hues.



The Color of Precast Concrete

- * According to the Precast/Prestressed Concrete Institute, "The proper selection of color, form, and texture is critical to the aesthetic appearance of architectural precast concrete."
- * Exposed aggregate finishes are often used in precast work. Integrally colored concrete provides a background matrix that accentuates the color of the aggregates.



Color of Tilt-Up Concrete

- * No longer limited to use in warehouses and factories, tilt-up offers more design flexibility than once thought possible. Integrally colored tilt-up panels take advantage of the natural appearance of exposed concrete and provide an attractive alternative to painting.



Tilt-Up Coloring Techniques

- * To reduce the amount of color required, tilt-up panels can often be poured with a thin colored face veneer and uncolored concrete used for the balance of the panel thickness.



How is Color Added?

- * One method is to toss disintegrating bags (bag & all) directly into a concrete mixer. Color additives are released deep inside the mixer so pigments disperse uniformly. Disintegrating bags make it easy for Contractors and Producers to color concrete and keep trash out of the environment.



- * Another method is a sophisticated computerized liquid color system that mixes the color & injects the color directly into the mixer
- * For a demonstration of this revolutionary concrete coloring alternative, Contact [Davis Colors](#), the course sponsor.

Tips On Specifying Colored Concrete

- * The keys to successful concrete, whether colored or not, include:
 - * 1. Consistency in materials and craftsmanship
 - * 2. Careful planning and detailing of the project.
 - * 3 Follow industry standards for high quality concrete work.

What Determines the Color of Concrete?

- * The integral color mixes with the cement and water in a mix to produce the tinted cement paste
- * Cement paste coats the sand and aggregate in the mix to create the basic hue of the concrete.
- * Typical dosage is 1% - 5% of cement content.



What Determines the Color of Concrete?

- * Low dosages create subtle hues.
- * Higher dosages create deeper or more intense concrete colors.
- * If dosages exceed 6% of the cement content, color saturation occurs and adding additional color additives will not enhance the concrete color.



What Determines the Color of Concrete?

- * Colors are made from metal or mineral oxides either recycled from iron or refined from the earth. They comply with ASTM C979 - *Pigments for Integrally Colored Concrete* and are specially processed for mixing in concrete and uniform tinting strength.
- * Specially processed carbon black color additives can also be used in concrete which is not air-entrained and is sealed against water penetration.



What Determines the Color of Concrete?

- * The shade of Portland cement also affects the color of the concrete. Portland cement varies from white to gray or buff in color. White Portland cement can be used to produce pastel shades of concrete.
- * These concrete tiles show the effect base cement color has on both colored and uncolored samples. (Top row colored, middle uncolored and bottom is the cement used)



What Determines the Color of Concrete?

- * To a lesser extent, the sand and aggregate color will have an affect on concrete color.
- * Over time, heavy traffic & erosion can wear off the colored cement paste at the surface of the concrete exposing the aggregate.
- * Exposed aggregate can affect surface color.
- * Coordinate the type and color of aggregates to be used when an exposed finish is scheduled.



A Word About Color Uniformity

- * Some customers unrealistically expect colored concrete to be uniform in appearance like a painted surface.
- * It is more realistic to compare colored concrete with handcrafted and natural building materials.
- * As with stone and wood, minor variations in appearance contribute to the material's aesthetic appeal.



Mix Design

- * Colored concrete is available ready-mixed from most concrete producers and contractors. Your concrete producer can help you determine the pigments and dosage rates required to achieve the desired shade.
- * Maximum dosage rate of color should not exceed 10% of weight of cement content. Typical rates are 1 to 5%.
- * Each component of the concrete should be from a single source, uniform in color, and consistently proportioned.

Mix Design

- * Specify a maximum 5" (12.5 cm) slump for all integrally colored concrete work. If greater slump or workability is required, specify the addition of water-reducing or plasticizing admixtures instead of added water.
- * In locations subject to freeze-thaw conditions, specify air content range of 5 to 7% for improved workability and durability.

Mock-Up

- * Use a mock-up on large or complex projects. This will make sure that the techniques and materials used by the contractor will produce the desired appearance.
- * Mock-ups should be constructed a month before start of concrete work to allow concrete to fully cure before final inspection.



Concrete Finishes

- * A wide variety of attractive finishes are possible with colored concrete. A few of the more popular finishes are shown on the following slides.
- * Textured surfaces produce more uniform looking concrete than smooth troweled or formed surface because the roughness of the surface scatters light reflecting off the concrete.



Broomed Finish

- * Made by pulling special brooms across stiff, freshly floated or troweled surface.
- * For variety, broom texture can be heavy or light, or in straight or wavy lines or swirls.
- * Textured surfaces are more slip-resistant when wet than smooth troweled floors and paving.



Exposed Aggregate Finish

- * Aggregate is exposed by “seeding” fresh concrete with aggregate, or by spraying a set-retarding compound on fresh concrete and scrubbing the cement paste from the surface.
- * Aggregate can also be exposed by removing the surface cement paste with a high-pressure water wash, sand blasting, grinding, or bush-hammering. Aggregates can be colored or sparkling, fractured or smooth.



Salt Finish

- * Rock salt is pressed into the surface after finishing. After 24 hours, the salt is washed away with water and a brush.
- * This finish is not recommended in cold areas where water could collect and freeze in pockets.



Pattern Stamped Finish

- * Special stamping tools are pressed into the concrete to create a pattern or texture. There are now craftsmen in all parts of the country who are skilled in the techniques of pattern stamping.



Form Liner Finish

- * Form liners allow endless design possibilities for texture, pattern, and relief. They are available in a wide range of standard patterns as well as custom designs.



Curing Colored Concrete

- * Uneven Curing = Uneven Drying = Uneven Color
- * Colored concrete should be cured with curing compounds specifically recommended for colored concrete. Curing with water, membrane sheets, or non-approved compounds can discolor concrete.



Locating a Qualified Contractor

- * Ask your local Ready-Mix producer for names of reputable concrete contractors
- * Visit www.Concreteconnection.com for a nationwide listing (free site) of concrete contractors



Test Time

Let's find out what you learned
about integrally colored
concrete

Click [Here](#) to take your test