



Precast/Prestressed Concrete Institute

Multiple Mixes/Textures

PCI's Architectural Precast Concrete Services Committee explains the options available for expanding aesthetic detailing by combining mixtures and textures



designer's notebook

Multiple Mixes, Textures Add Flexibility—Article V

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Design flexibility is possible in both color and texture of precast concrete by varying aggregate and matrix colors, size of aggregates, finishing processes and depth of exposure. A highly articulated pattern of color and texture achieves a richness of architectural expression in building façades.

A texture may be defined, in comparison with a smooth surface, as an overall surface pattern. The options for textured concrete finishes direct from the mold include the characteristic imprint, or pattern, from a form liner or mold. Other types of textured finishes can be produced by removing the surface mortar to expose the fine or coarse aggregate in the mix, either before or after the concrete has hardened, or by tooling the hardened concrete. As a general rule, a textured surface is aesthetically more satisfactory than a smooth finish.

Combinations of different finishes using the same or different concrete mixes, within a single precast concrete unit, offer excellent possibilities for the architectural use of tones and texture in façade treatments. The use of combination finishes means the designer must make an early decision to ensure that the overall concept allows for the change in finish color and texture. A suitable reveal (that is, some demarcation) needs to be detailed to separate them.

Demarcation Options Vary



Figure 1 Light and deep sandblast with granite and terra-cotta inserts.

The importance of the separation provided by the reveal feature depends on the configuration of the unit on which the finishes are combined. The importance of the separation also depends on the specific types of finishes involved.

For example, a retarded flat surface between ribs spaced widely apart needs a groove or offset. Bushhammering and, to a lesser degree, sandblasting can be stopped fairly easily along specific lines. Other finish combinations require demarcation features.

Two Approaches for Multiple Mixes

There are two approaches for using multiple mixes (two or more different facing mixes in the same panel). With one approach, the first mix is placed within an area bounded by a raised demarcation strip that equals the thickness of the face mix. Before initial set of the concrete, the mold surface around the first cast is carefully cleaned, and the second mix is placed and vibrated. It's important that the second mix be placed and the concrete consolidated prior to initial set of the first concrete mix.

Another approach features a two-stage or sequential casting procedure, which incurs added cost. In this option, one part of the panel, such as a band, is cast first from one mix and, after curing, is then cast into the total panel using a second mix.

Examples Highlight Options

Examples of projects that effectively use multiple mixes and finishes include the project shown in **Figure 1**. It offers a checkerboard pattern of light and deep sandblasted surfaces, which gives the appearance of a buff-colored limestone when viewed from a distance. Projecting terra-cotta medallions are cast in the panels along with a horizontal feature strip of granite.

Ashlar-laid red granite masonry in the project shown in **Figure 2** was simulated using a blend of gray and white cements, red pigment, granite aggregate and surface retarder to expose the aggregate. Limestone was simulated using the same blend of cements, limestone aggregates, pigment and a light sandblast finish.

The precast in **Figure 3** offers a golden hue with highlights of brown and sienna. Alternating surfaces of retarded, exposed-aggregate and acid-etched precast create a subtle variation of textures.



Figure 2 Multiple mixes with retarded and sandblasted finishes.



Figure 3 Retarded and acid-etched finishes.



Figure 4 Form liner and sandblasted finish.



Figure 7 Multiple mixes with acid-etched finish.



Figure 8 Natural stone and sandblasted finish.



Figure 5 Multiple mixes with acid-etched and form-liner finishes.



Figure 6 Multiple mixes with sandblasted and acid-etched finishes.

In **Figure 4**, the use of a lightly sandblasted finish frames the bands of alternating diagonal ribs with a fractured texture. These pieces were cast from a premolded form liner.

There are two colors and two design mixes in the panels shown in **Figure 5**, and all of the concrete is acid-etched. The panels' center band was cast on a liner to resemble stone. The medallions feature the same mix except with a smooth finish, and they were set into the panel when it was cast.

The parking-structure spandrel in **Figure 6** consists of a combination of two mixes with sandblasted and light acid-etched areas.

The panel in **Figure 7** has three mixes, all made with white cement. Bull-noses were cast with gray/green concrete achieved with green pigment and gray aggregates. The light-brown surfaces have a light-brown pigment versus a brown pigment for the medium-brown surfaces, and both used multi-colored, earthtone aggregates. All surfaces have a light acid etch.

German limestone was cast into the precast and the exposed concrete surfaces were lightly sandblasted to resemble sandstone in the project shown in **Figure 8**.



Figure 9 Brick and acid-etched finish.

For the project shown in **Figure 9**, a masonry aesthetic was achieved through the use of carefully detailed precast concrete elements. These combined warm-toned concrete with a light acid etch and brick integrally precast at the plant. Integrally cast clay products such as thin brick, tile and terra cotta create yet another

er range of color and texture .

Visual interest and a unified structure can be obtained by composing harmonious patterns into themes using a palette consisting of the form and rustication lines of the surface, and the texture and color of the precast.

Architectural Uses of Texture in Precast

Architect Eduardo Illanes provides examples from projects designed by OZ Architecture to show how combinations of mixes and textures can enhance the appearance of precast concrete architectural panels

My experience with specifying precast concrete architectural panels as the cladding for buildings began 15 years ago. At that time, OZ Architecture was researching exterior materials for a Class A corporate headquarters and manufacturing facility for Pfizer's Valleylab subsidiary in Boulder, Colo. After evaluating various skin materials, we found that precast offered an excellent option. Its flexibility, cost-efficiency and high-quality look fulfilled all of our requirement for a high-tech façade in a large campus.

To incorporate precast into the Valleylab project, we designed a simple flat-panel, with an acid-etched finish as a skin over the steel superstructure. Since then, I have had a number of opportunities to use precast as a viable system in projects, not only as a cladding, but increasingly as the material of choice for a building's superstructure as well.



The award-winning expansion of Pfizer's Valleylab campus features flat sandblasted panels over an exposed steel structure.

Precast Advantages

The flexibility precast offers for textural options makes it a strong contender for many buildings. Not only is it economical, it offers scheduling advantages as well. However, most important is its ability to masquerade as many different materials and forms by altering its texture. This flexibility lets architects use a material they are familiar with without creating a tedious similarity in look.

As an architect concerned with the articulation of building skins, I have found that the precasters in Colorado continue to demonstrate extensive capabilities in creating textural options. Different forms, a variety of aggregates and precast's ability to hold inlaid materials to form a variety of textures offer endless architectural variations. These can be used to the advantage of the building and its overall design.

University of Colorado Biology Building

The Molecular, Cellular and Developmental Biology (MCDB) Building at the University of Colorado in Boulder is one example of how we've used precast as a trim device. Chimneys, windows, cornices, plinths and loggias were constructed from precast. Paired with the campus's design-standard use of narrow-cut, Colorado red sandstone, the limestone-colored precast, cast with minimal texture, offers a visually pleasing and aesthetic counterpoint.



At the Molecular, Cellular and Developmental Biology (MCDB) Building at the University of Colorado in Boulder, OZ Architecture used limestone-colored, acid-etched precast base and trim to provide contrast to the campus' standard Colorado red sandstone. Stone was installed on steel studs after one-piece precast window surrounds were erected.

Research Park Corporate Headquarters

I also used precast to create texture—at a considerable cost savings—in the design of Sybase/Information Connect’s division headquarters at the University of Colorado’s Research Park in Boulder. On this project, there were several issues to be addressed. It was essential to contain costs while still creating a design that met the functional needs of the corporation and the design requirements of the university.

By using precast panels, we were able to maintain the campus’s red-sandstone theme while staying within Sybase’s corporate budget. The panels feature sandstone-shaded brick set into the concrete, stone formliner to articulate the building base and simulated limestone window surrounds.

Because of this approach, the building fits nicely into the surrounding setting of the research campus. Along with a concrete-tile roof, punched windows and third-floor balconies, the brick-set precast let us tie our design to the university’s motif without bowing completely to the campus’s Tuscan design features.



This close-up of panels with integrally cast thin brick, acid-etched window trim and etched red sandstone form finer areas shows some of the detail provided at the Sybase/Information Connect’s project.



Texture and cost-savings are the result of OZ Architecture’s use of a combination of columns and spandrels, as well as integrally cast-in brick load-bearing wall panels at Sybase/Information Connect’s division headquarters at the University of Colorado’s Research Park in Boulder.



The three adjacent buildings constructed for Access Health Inc. feature precast concrete panels colored to complement the mountain backdrop and textured to resemble native Colorado red-and buff-colored sandstone shiners. OZ Architecture's design uses articulation and shadow lines to break up the mass of the panels.

Precast Aids Definition of Features


Precast concrete, by virtue of its textural flexibility, also allows architects to define the various components of a building. The structure's base, middle and top can be differentiated with the precast elements by imitating different natural materials via color and texture.

Our recently completed project for Access Health Inc. offers an excellent illustration of how we use color and texture in precast. OZ designed three buildings for Access Health next to each other that were located on a highly visible hillside.

The buildings' load-bearing skins and structural frame are entirely precast, but the buildings' bases are textured to resemble sandstone shiners, creating the appearance of a strong, solid base. In contrast, the buildings' bodies reflect a softer limestone element, colored to match the buff of the mountains that form a backdrop to the buildings. The precast panels in this middle section are articulated through the use of reveals, rustication reveals and different planes that create large and interesting shadow lines, while helping break up the panels' mass.

The buildings' parapets are articulated to define a strong building top. The concept of making a reference to the stone of the building façade with the use of precast was carried even farther as window and head details were designed to resemble fractured stone.

These examples show only a few of the ways that precast concrete offers an outstanding range

of textures and colors for architects to utilize in building design. Once designers begin to examine the options and evaluate the possibilities in their own projects, they will find a host of other ideas to consider. 

— **Eduardo Illianes, principal,**
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At Quantum research and development facility in Colorado, precast panels were used for their cost-efficiency and durability. The panels' articulation follows the horizontal lines of the ridge behind by using bold reveals and subtle color variations within the panels. To define the strong building base, a stone liner was used to mimic Colorado red sandstone.





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