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Perfecting Precast

Payson Utah Temple project illustrates the fine level of detail that can be achieved with precast concrete.

By Doug Fox
The brand new Payson Utah Temple may be a sparkling beacon to members of The Church of Jesus Christ of Latter-day Saints in South Utah County – as well as passersby who soak in its visual prominence while traveling nearby I-15 – but it is also a shining example of what can be accomplished architecturally with precast concrete.

The recently completed temple – slated for dedication June 7 – not only made grand use of precast panels, but also pushed the process to new limits.

“We have never before asked tradesmen to craft concrete to the level of exquisite finishing and detailing of what was done for the Payson Temple,” said David Fletcher, Principal in Charge for Salt Lake City design firm Architectural Nexus. “Such a precast structure may exist somewhere, but I don’t know where it might be.”

Payson is the fifth finished temple project for Architectural Nexus – the firm is also working on LDS temples in Cedar City and Fort Collins, Colorado. Even so, the Payson temple project stands out from a precast standpoint, for both its volume and detailing.

The 96,630 SF structure sits on a 10.6 acre lot and features some 1,615 individual precast concrete panels totaling 116,876 SF.

“When I’ve suggested this design has pushed the limits of precast, it is not a question about the capabilities of precast concrete to perform well structurally or to keep weather out of the structure and to do the things that a building skin is expected to do,” said Fletcher, noting instead that he’s referring to the amount and level of intricate detail demanded.

“It’s not unusual to see finely crafted woods in buildings, but in order to construct the form work to shape the concrete pieces to what is visible, it required craftsmen and artisans in the setting on an industrial production plant to create that formwork with the same precision that another artisan might create a piece of furniture or cabinetry,” he added.

“It often took a great deal of ingenuity to come up with the means to create the forms for the concrete shapes and profiles so that the concrete could be removed from the forms so that they could be used multiple times.”
Hanson Structural Precast Inc. of Salt Lake City handled the precast concrete process. To increase flexibility, some forms were made of rubber-like materials so they could be peeled away from the hardened concrete without damaging either the finished concrete or the reusable forms.

“The ornate detail and radius shapes presented enormous forming and casting challenges,” said Jim McGuire, Sales Manager for Hanson. “Each shape was analyzed to determine which forming strategy was best suited. Specific materials such as rubber mold inserts were used to achieve certain desired features.”

Looking at a freshly cast panel with multiple conditions, the finisher exercises an artisan touch to provide a uniform exposure that doesn’t take away from the character of the features.
– Jim McGuire

Crafting and preparing intricate and detailed precast concrete pieces, such as those used on the Payson Temple, is something of an art form. The often-tedious process includes construction of the actual forms, casting, and sandblasting away just the right amount of finish to bring out the mixture’s natural hue.

“Looking at a freshly cast panel with multiple conditions,” said McGuire, “the finisher exercises an artisan touch to provide a uniform exposure that doesn’t take away from the character of the features.”

In the case of the Payson temple, the precast process delivered an exterior featuring a slightly sparkly look when the sun shines on it. That is due to a combination of selected white stone aggregates and sand used to make the precast concrete panels. A nationwide search yielded the perfect combination of those components at a quarry in Salinas, Calif.

“Approximately 4,840 tons of rock and sand were shipped from California on rail cars for the precast concrete finish,” said Tim Brown, Project Manager for general contractor Wadman Corporation of Ogden.

Another key part of the process is ensuring that all the concrete panels maintain a consistent appearance. This requires finished concrete to be produced in a highly controlled manner.

“Very precise control of the concrete mixes is required using very sophisticated computer-controlled equipment,”
Fletcher said, “so that it can make precise proportioning adjustments for the volume used in each batch so that results always come out the same.”

**Advantages of Precast**

There are several advantages to using precast concrete. The biggest factors are that it gives the appearance of stone at a much lesser cost and with more flexibility, and it also speeds up the construction process.

“Aside from the cost advantage, precast concrete has the similar benefits as stone with regards to its beauty, durability and permanence,” said Fletcher. “However, it can be fabricated in much larger pieces, which means that erection seems to move quickly once the supporting structure is in place.”

Size definitely matters when it comes to comparing the advantages of stone vs. precast.

“Chiseled stone is limited by the maximum size of individual pieces,” said McGuire. “The detail that is chiseled into natural stone is very labor intensive, and hence, very expensive.”

Architectural precast, McGuire said, can provide large pieces – even radius pieces – that feature details already cast into the surface.

Once casting is complete, the panels are then sandblasted to expose the character of the aggregate and sand mixture, bringing out its color and, in the case of the Payson temple, its sparkle.

“The result is large, intricate precast ‘stones’ that would be impossible or cost-prohibitive to achieve in natural stone that can be erected to the structural framing of the building,” McGuire said. “(It’s) a natural looking, highly refined envelope that is very inviting and inspiring.”

**Payson Motifs Cast in Stone**

According to Fletcher, the temple’s plans called for a more classically inspired design, which incorporated specific themes in an ode to Payson’s history. »
“Decorated motifs were inspired from the historic fruit-growing tradition of the area,” Fletcher said. “An apple blossom motif is interwoven with a leafy vine pattern and is present in the art glass of exterior windows and again in interior art glass of the back-lit ceiling skylights in many of the temple’s major rooms.”

Fletcher also mentioned that a traditional pioneer textile motif having roots in Christian heritage, known as the Delectable Mountain pattern, was woven into many decorative architectural elements throughout the building.

“This pattern was selected,” Fletcher said, “in an attempt to be true to the pioneer heritage of the community.”

As project manager, Brown complimented the professionalism and onsite behavior of all involved in creating this sparkling new Utah County landmark.

“The attention to detail and effort extended by all the trades was excellent and demonstrated the commitment and devotion to constructing the temple with the highest standards possible,” Brown said. “...a team spirit was always found while working through challenges to meet the high expectations.”

Payson Utah Temple

Owner: The Church of Jesus Christ of Latter-day Saints
Architect: Architectural Nexus
GC: Wadman Corporation
Electrical Engineer: GSL Electric
Structural Engineer: Reaveley Engineers + Associates
Mechanical Engineer: Heath Engineering
Lighting Design: BNA Consulting
Precast: Hanson Structural Precast, Inc.
Electrical Sub: GSL Electric
Mechanical Sub: Comfort Systems