



## “Deco-Tilt” with Thin Brick, Block

Tilt-up construction offers added architectural options

BY J. EDWARD SAUTER

**M**any times, owners desire options in building that blend into or enhance an area's existing design theme. Site-cast tilt-up concrete construction has responded to such requirements with a variety of architectural innovations other than simple painting. From aesthetical features such as cornice lines and accent bands, to facade enhancements like thin brick, block, and stone, as well as a variety of textured coatings, architects now have numerous options with tilt-up concrete for creating appealing structures.

### THE THIN BRICK OPTION

One decorative architectural finish that has gained popularity in recent years is kiln-fired brick on the exterior surface of tilt-up panels. Thin brick segments are placed within the panel forms to build a “brick wall” horizontally on the casting bed. A variety of methods are available to secure the brick during concrete placement and create a tooled mortar-joint look. The brick faces are coated with a thin wax for protection from cement paste. This coating is washed off after panel erection. Because it does not contribute to the structural performance of the wall, the brick can be installed under almost any climate or weather condition.

Because the “mortar joint” is actually the underlying concrete panel, the joint can be enhanced with color additives. The brick is also available in several colors, textures, patterns, and sizes, with additional shapes for corners and returns. As with standard brick, thin brick systems can be placed in running- or stacked-bond configurations, with soldier and header courses as well. Such systems see use in a variety of projects, including schools, religious facilities, offices, warehouses, and manufacturing plants. Thus, owners can achieve traditional brick facades at lower costs on faster schedules.

While a thin brick system will enhance the appearance of a facility and can maintain its appearance for many years, it is also highly durable and will remain embedded in the concrete wall. Though thin brick tilt-up systems derive from building applications that originally utilized “lick and stick” epoxy bonding methods, they offer

greater fixity. With the epoxy systems, air and moisture can get between the brick and the substrate, interfering with the brick-concrete bond. Thin brick embedded in concrete, however, has a more permanent bond. Embedded bricks are mechanically bonded to the concrete by keyways grooved in their backs. This configuration resists moisture and air ingress, as well as temperature variations that might interfere with brick-concrete adhesion.

Independent tests have demonstrated that the current system of embedding brick into concrete can develop pullout capacities exceeding 3000 lb (1400 kg) per brick. Testing performed on six composite brick/concrete samples involved a total of 406 freezing-and-thawing cycles. In all six samples, no delamination of brick from the concrete occurred. The strength of the brick/concrete (bond) received an excellent rating.

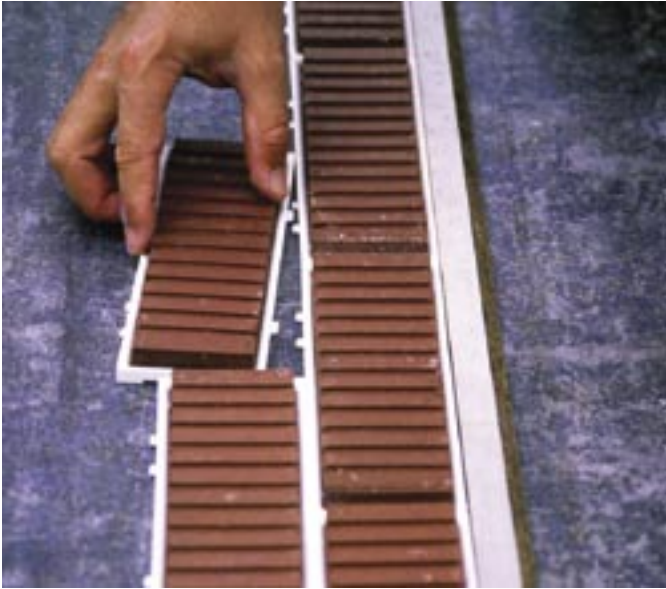
### TIME AND COST

Results from numerous tilt-up projects completed during the last 5 years have shown that adding a thin brick system does not dramatically increase cost or add to the schedule. The construction process is relatively simple. Shop drawings include the brick patterns that, for simplicity, conform to standard brick modules. Crews can then place approximately 100 ft<sup>2</sup> of thin brick facing per hour (9.2 m<sup>2</sup>/h). If considered early in the design phase, brick set-backs, or protrusions, as well as radius designs and brick designs around headers, are easily integrated into a building's architecture. Further, in comparison with conventional brick work, the need for scaffolding, and the occurrence of efflorescence, are eliminated.

### BUILDING WITH THIN BRICK

A recent project demonstrating the speed and economy of thin brick tilt-up systems was the Security Central office building in Centennial, CO—a 2004 Tilt-Up Concrete Association (TCA) Achievement Award winner (see photo on p. 84). The owner requested a brick facade, and the general contractor for the project, Saunders Construction, recommended the use of site-cast tilt-up construction with the Brick Snaps® System by Scott System.

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With the thin brick option, segments are placed within the panel forms to build a “brick wall” horizontally on the casting bed



One thin block system, Chameleon Cast Wall, an embedded masonry option, can offer special design patterns, including mosaics or tiling, without complicating a construction schedule

“The owners of Security Central had their hearts set on brick, but like most small businesses, their budget just did not allow for it,” said Jim MacKinnon, Preconstruction Manager at Saunders Construction. “We suggested the use of the cast-in brick after having a wonderful experience with it on our own Saunders warehouse facility. Although challenged with a Colorado winter, the brick-clad tilt-up panels were erected in record time and were significantly less expensive than typical laid-up brick. Also, most people don’t ever realize that it is not full-size common brick.”

Conventional brick was utilized to create a robust entry to the structure. The color of the two types of brick matched, allowing both thin and conventional brick to be used together effectively.

### THIN BLOCK—A NEW TILT-UP OPTION

Given the ingenuity of some industry veterans, the technology now exists for integrating concrete masonry units into tilt-up. It permits architectural concrete masonry units to be placed in the tilt-up forms horizontally, in a fashion similar to that of the thin brick system.

One thin block system, Chameleon® Cast Wall, an embedded masonry option, provides the aesthetics some designers find in masonry, yet capitalizes on the speed and economy of tilt-up construction. Minimal handwork is required, as the block units are embedded in the cast tilt-up wall panel. This technique can offer special design patterns, including mosaics or tiling, without complicating a construction schedule.

The key unit of this system is the “facer,” an architectural concrete masonry unit approximately 2-in.-thick (50 mm) that has been specifically engineered for the application. The “facer” is laid on the forming surface in the desired pattern. Crews then clip together adjacent units for stability, and next seal the joints with sand to inhibit bleed-through of cement paste. Once this is completed, the tilt-up construction process proceeds as usual. As with the thin brick systems, this cast-in production requires minimal cleaning of the masonry facade.

### WIDE SELECTIONS

Because thin block combines the aesthetics of masonry with the logistics of tilt-up, it can provide a wide range of patterns. These include traditional architectural block and stone, as well as diamond shapes and irregular openings that can be difficult to achieve with traditional masonry. In addition, the installation of the system fits the operations of a tilt-up contractor using only an existing crew and established methods.

Like the thin brick, the blocks are also mechanically keyed to their concrete tilt-up wall. The Chameleon

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system was tested recently for pulloff and freezing-and-thawing endurance, and was found to surpass in all requirements. Further, panels exposed to severe weather for 2 years exhibited no significant signs of aging. Like thin brick, durability is not sacrificed for aesthetics. To date, several hundred thin block panels have been completed without paste bleed-through greater than a spot about the size of a dime—this appearing every 10 ft<sup>2</sup> (1 m<sup>2</sup>) at most. The occasional spotting can be removed simply with a wire brush.

Installation of the system can take place between the completion of the formwork and the placement of steel. Once the system has been set, crews can walk and install hardware on it, similar to work on a conventional floor slab. There are also some logistical advantages for the tilt-up crew including: no need to attend to bond breaking; no need for a slab (many panels have been cast on level gravel beds formed on the ground); and near-zero suction.

### THIN BLOCK SCHEDULES

Six experienced tilt-up crews from across North America have installed the system without difficulty. The learning curve for an installation crew is approximately three to four panels. Once past this hurdle, a crew can install a typical panel at a rate of about 25 ft<sup>2</sup> (2.3 m<sup>2</sup>) per worker-hour. This equates to four workers finishing installation on a 20 x 40 ft (6 x 12 m) panel in a day. In contrast, installation of conventional concrete block can go as fast as about 240 blocks per day for a team of one skilled mason and one laborer, equating to about 15 ft<sup>2</sup> (1.4 m<sup>2</sup>) per worker-hour. However, this does not take into account the setup and strike time for the separate masonry crews.

On a recent project in Lee's Summit, MO, Meyer Brothers Building Co., a member of CON/STEEL Tilt-Up Systems alliance of contractors, raised panels utilizing the Chameleon system for its new Business Exchange Building. The tilt-up contractor for the project was very pleased with the results: "Our company likes the Chameleon Wall product because we keep the durability of a concrete wall, but achieve a flatter wall with more crisp lines compared to block," said Tony Turner. "We can achieve a great look with minimal clean-up and simple installation procedures."

To date, these panels were the most complex produced with the system yet. Each one includes several large openings, with 90-degree return pieces along every edge and every jamb. The two identical panels were set back-to-back to show only masonry on both sides. This required precise control so that all openings and all masonry joints would align. This is the first time Meyer



This sample panel, used at a construction demonstration organized by CON/STEEL Tilt-Up Systems, illustrates the Chameleon Wall System's ease of installation, even around panel openings

Brothers Building Co. has used the new architectural option, and members of the construction team learned from Chameleon trainers at the job site. According to company President Roger Meyer, "The panels look great."

Selected for reader interest by the editors.

—Chameleon Cast Wall System, LLC  
**CIRCLE 57**



ACI member **J. Edward Sauter** is the Executive Director of the Tilt-Up Concrete Association (TCA) and the Concrete Foundations Association (CFA). He has held these positions since 1992 and 1993, respectively. Prior to joining TCA, Sauter was CEO of a manufacturer of insulated sandwich wall systems for tilt-up and precast construction. He received a

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