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Architectural PRODUCTS

MAY 2008

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PROJECT DECONSTRUCTION

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ARCHITECTURAL PRODUCTS

MARKET OF CHOICE: PRODUCTS FOR MIXED USE & RETAIL

MAY 2008

high tech, but something simple, like the stone panel on metal frame set as a panel). Also, I think we'll be seeing more non-natural materials that look good and hold their color, along with green, sustainable structures that are carbon neutral.

As architectural purists, we might not always like change, but the marketplace demands materials that are lighter, better insulating, thinner and less expensive. If new products can meet the demands of the marketplace, we need to look at how to make those materials easy to install, and work on performance.

SPANN: Eldorado Stone has established long-term relationships within the architectural and design world that have allowed us to better understand their creative needs. We have several new products that have been introduced this year to give the design world additional tools to work with.

GRAZIANO: In the near future you will see thermally-efficient lightweight cladding panels. Light weight and insulating value

are two characteristics that architects—who are increasingly focused on sustainable design—value highly in wall products. These qualities are important because architects are trying to reduce the building's carbon footprint, and they can do this in part by reducing the weight or mass of a component material, foundation or a superstructure. Also, by adding insulation they can reduce energy consumption, again reducing carbon emissions, and also comply with the new, more stringent ASHRAE 90.1 2007 requirements for continuous perimeter insulation (ci).

Blast-resistant wall assemblies, although still in their infancy, are increasing in importance, too. Also, new technologies are being incorporated into the design of the precast concrete mix, itself. Soon there will be lightweight concrete mixes that further reduce the weight of the concrete section while retaining its inherent strength and water resistance.

LEVIN: Not knowing what new technologies are currently being developed

or manufactured, I would like to see "smart technologies" introduced into these materials. Product lines would be able to become larger, lighter, and stronger. Newly composite materials should enhance the life cycle and the sustainability of the building. They should be able to take on new shapes and be manipulated to the new architectural forms that are being generated by architects today.

Could precast stone introduce nanotechnology to manipulate the molecules and allow for the next generation of stronger, light scattering, and multiple coloring of surface materials? We already know that the "first generation" of passive nanomaterials is already incorporated in commercial products like clothing, household appliances and food packaging, as well as coatings and paints. Would it be possible to introduce a precast stone panel that could breathe, pulling moisture away from the cavity behind it, or self-clean or provide better insulating efficiencies, or even provide energy back to the building? This thinking may still be a few years off. □

RIGHT: The Cliffstone profile from Eldorado Stone features flat-planed faces and distinctive textural details. The line incorporates a mix of rectangular and linear stones 1 1/2-in. to 5 1/2-in. high and 4-in. to 22-in. long, with palettes ranging from grayed greens and antiqued golds to pewter and brown. Visit www.eldoradostone.com or **Circle 515**



GREEN BRICKS

Composed of basic ingredients (clay and water), brick has always been an inherently green building material. The same can not be said for the manufacturing process that typically is used to create individual bricks, requiring significant energy



to fire bricks at temperatures as high as 2000° F. To reduce that consumption, Boral Bricks made a number of upgrades and changes to its

plants in Union City, Okla., and Terre Haute, Ind.

Boral executives long have been focused on minimizing waste, reusing sawdust and agricultural waste as a fuel source and body additives. For instance, injecting clay mixtures with sawdust allows the sawdust to activate during the firing process, heating the brick from the inside more quickly and conserving energy.

"We have found that using natural additives can help minimize excess carbon-dioxide released to the atmosphere, which can be hazardous," adds Charlie McNeil, vice president of research and development for the Atlanta-based firm. "The biomass material that Boral uses is releasing the same carbon-dioxide product it would have released naturally, even if it had not been used in our plants."

Adding to those methods at the Union City and Terre Haute plants is Boral's adoption of the EPA's Landfill Methane Outreach Program, which emphasizes the use of methane gas as a renewable energy source. At the two plants, Boral pipes methane from nearby landfills and uses it to generate energy, offsetting Boral's use of fossil fuels gathered by drilling.

"We are proud that Boral has achieved green manufacturing in 20% of our plants," McNeil says. "Brick is naturally green, so it makes sense to utilize environmentally sensitive technologies to create the material, while minimizing negative impacts to the environment." Visit www.boralbricks.com or **Circle 514**.

—Craig A. Shutt, contributing writer

THE PANEL:



VIET T. DAM
Associate, Leo A. Daly,
Phoenix



DAVID SOVINSKI
National Director of Market Development and Technical Services, Intl. Masonry Institute, Annapolis, Md.



GARY C. GRAZIANO, AIA
Vice President, Marketing,
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BRENT SPANN
Vice President of Marketing,
Eldorado Stone, San Marcos, Calif.



JORDAN LEVIN AIA, CDT, NCARB
Associate, Pfeiffer Partners
Architects Inc., Los Angeles



RIGHT: American LaFrance's Office and Warehouse Facility in Summerville, S.C. earned a 2008 Tilt-Up Achievement Award from TCA, in part for its two 51-ft.-tall brick inlay panels, connected by two spandrel panels at the top and eight accent panels at the base.



RIGHT: Burkholder Middle School in Henderson, Nev., was a finalist in the sustainability category of CEMEX's recent 2008 Building Awards. For more on the awards see p. 36.



RIGHT: Highland Oaks 5, a 101,955-sq.-ft. office facility in Tampa, Fla., was another of TCA's 2008 Tilt-Up Achievement Award winners. Tilt-up panels were used to achieve a brick deco look that was durable and economical.

not an ideal situation, but understandable and even a predictable behavior.

Last, we always stress the importance of involving the precaster early, before the job goes out to bid, because precasters can offer cost-saving insights on topics that can quickly become issues in projects. These include panelization, crane sizes, number of picks, site logistics, staging in increasingly congested urban areas, managing trucks in day and night and other execution-related matters that are easy enough to plan for but are very difficult and sometimes impossible to deal with after the fact.

LEVIN: The most common mistake we see, ourselves, as architects, is not insisting on having a mockup of the wall system included in the project specifications. This mock-up will allow both the architect and contractor time to solve many problems prior to permanently implementing it into the project. Even though there is generally a cost associated with a mockup, it will save time and money later, when the contractor understands how to install the wall.

A mockup can clarify issues ranging from block alignment, tooling of joints, correct installation of flashing and damp proofing, to patching and repairing damaged materials. Corner conditions can be reviewed, as well as how to resolve the intersection of dissimilar materials. The mockup becomes a guide for the general quality and craftsmanship of the wall system and, ultimately, it becomes an approved standard for the mason and the entire team for the duration of the construction.

SEIDEL: Another common misunderstanding is the assumption that all Type N or Type S mortars are the same—mortar with

hydrated lime in it makes a better mortar, when it comes to resistance to moisture penetration and extent of bond to the masonry units. Masonry cement mortars are not the same as cement/lime mortars.

Additionally, flashing detail termination points and corners need to be carefully detailed and constructed to prevent a breach in the moisture drainage system of brick veneer. And flashing material used should be durable and have the life expectancy of the building in which they are used.

SOVINSKI: I agree—the biggest mistake with any precast coping is forgetting the flashing. Flashing is very important, and when a dowel is used to connect the panels, a sealant is needed where the dowel penetrates the flashing. It is also important when precast abuts dissimilar materials.

It is also important to watch tolerances, especially where the panels meet, and to coordinate carefully with other materials, particularly around any openings.

And, perhaps the most important tip is to realize that the preparation of shop drawings is a long process, and to start planning early. If schedule is an issue, consider traditional unit masonry.

SPANN: Specifiers need to be aware of the importance of proper substrates before applying the stone. We recommend a flat, dry surface. Wire mesh and a scratch coat of mortar is best to ensure a proper installation. Because our product is lightweight, additional reinforcements and footings are unnecessary. It is an adhered veneer and is meant to be used on vertical surfaces, not horizontal.

Accessories add to the realism of the installation

and can also help divert water with the use of wall caps and wainscoting. Adding corners provides for a fully dimensional look that adds to its believability. Although the veneer is typically less than three inches thick, the use of corners, sill pieces and various other accents can create the look and feel of natural stone.

DAM: Architects do not always get to choose the construction or wall types, because of local means and methods, as well as budget concerns. Different wall types require different wall-anchoring systems. At Ft. McDowell Radisson Hotel and Conference Center, there was a masonry wall so the system was already quite rigid and did not require additional bracing.

We still, however, use real stone in the 2- to 3-ft. zone up from the floor in high-traffic areas. If manufactured stone veneers were damaged for any reason, the concrete interior of the product can be exposed.

ARCHITECTURAL PRODUCTS
What do you see coming down the pike, in terms of product development and applications?

SEIDEL: One major development that the brick industry would like to see is greater consideration of a product's life-cycle environmental value within LEED certification. The U.S. Green Building Council has plans to incorporate life-cycle assessment throughout its LEED program, but architects and designers can currently consider the outstanding environmental impact of materials like brick throughout their entire life cycle.

SOVINSKI: Coming down the pike—smart materials, phase-change materials and stronger composite panels (not just space-age,



ABOVE: Lightweight cladding from High Concrete allowed designers of Symphony House in Philadelphia to use a floating mat foundation rather than a costly caisson to attain seismic performance. Visit www.highconcrete.com or **Circle 516**.

criteria is to establish the minimum requirements for recognition of adhered precast stone veneer in ICC Evaluation Service Inc.

ARCHITECTURAL PRODUCTS:

What are the most common mistakes or misunderstandings you see among designers and specifiers working with these materials?

CRAZIANO: Probably the biggest mistake we see is people continuing to do things the way they've always done them. They have their drawings, and they know what has worked in the past. But the past is a poor predictor of the future, particularly when new technologies are being brought to bear on old problems at an ever increasing pace. Architects are not always aware of the great variety of precast finishes and are often surprised to learn that making a concrete mix is like working with a multi-media painters pallet.

The next mistake is in missing opportunities to optimize

the structure and enclosure. Here again, an integrated design approach can prevent over-design when lightweight cladding is used, because the lighter weight means there are savings to be had in the superstructure and the foundation. The team members really have to communicate and consider the whole system before the design is decided.

Another problem is one of pure physics: that is, the dynamics of thermal transfer, air infiltration and humidity control that can become magnified in energy-efficient projects. One type of wall assembly will work differently in Atlanta than it will in New York, so allowances have to be made so that the dew point falls in the correct location. Along these lines, there is the design condition and then there is real life. For example, a health care facility may have a monitored humidity level, and in order to avoid a failure, operators may set the level higher than the design conditions, introducing more vapor than intended. However, did the designers plan for this? It's



ABOVE, BELOW: Heavy Fleet Corp. Headquarters in Manassas, Va., was another of the Tilt-Up Concrete Assn.'s 2008 Tilt-Up Achievement Award winners. With the objective of constructing a "South Beach" art deco warehouse and distribution center in an industrial park for Heavy Fleet, tilt-up concrete provided the ideal solution. Vertical fins and spires were used to break-up the façade and provide an interesting elevation. Horizontal elements include a painted steel sunscreen/canopy and horizontal reveals. Pineapple Grove precast medallions were applied in recessed areas above the main entrance to architecturally enhance the panels.



outside. This was possible because of the textures and colors of the product—from Owens Corning Masonry Products' Cultured Stone line. In addition, a new product called ProStone addresses today's challenging market with an affordable manufactured stone veneer. Also new to the market is Modulo, a plaster based product for interior applications geared towards the Do-It-Your-Yourself market and our new Fireplace Surround.

JORDAN LEVIN, AIA, CDT, NCARB (PFEIFFER PARTNERS ARCHITECTS) Precast is becoming an option for some building owners because of the rising cost of naturally cut stone.

However, in my opinion, the final building becomes more uniform in its appearance because the mixes used to create the product are uniform, and the product can lose those qualities inherent in stone, like veins, fissures or other natural imperfections. I think imperfections provide another level of detail and interest at a smaller scale. To that end, we have recently incorporated a precast masonry on the California State University Fullerton's Performing Arts Facility that has the aggregate expressed in the face of the block. This provided a more natural feel, where every block is a little different, while keeping the uniform factory measured material. We were also able to use a larger block size which helped the building feel more massive than if we used standard sized blocks.

It is especially important to decide early on which system will work with the selected material and how one wants to express the joints. Are the joints staggered? Do they align? Are they grouted or butted? Fullerton's Performing Arts Center used a traditional cavity-wall system employing standard shelf angles,

with masonry ties to support the façade back to a steel frame with concrete masonry wall infill. What makes the system unique was the introduction of smaller, 4-in.-tall accent bands integrated with oversize 16-in. x 24-in.-tall pieces. Another successful system used to support masonry and terra cotta is the rain screen wall, where the drainage layer is against the supporting wall, allowing the façade to be purely a face, while the moisture barrier is beyond.

ARCHITECTURAL PRODUCTS: What code or standards issues do architects and other specifiers need to keep in mind?

SOVINSKI: One of the biggest issues today is the use of adhered veneers, which is being addressed by an ASTM C15 task force. IMI Director of Engineering Diane Throop, PE, chairs that task force, which is looking at how that is going to affect the Masonry Standards Joint Committee (MSJC) Building Code Requirements for Masonry Structures www.masonrystandards.org.

LEVIN: A number of other key issues need to be considered early in the design process. The first are the structural issues of understanding the loads, stresses, deflections, compressive strength, reinforcement and determining the stone's proper thickness. The second consideration is more technical in nature, and includes how the material will react to the elements, including heat and cold, movement, moisture infiltration, flashing considerations, how different materials bond together and how often to provide control and/or expansion joints. The final issue is aesthetics—the architect should keep in mind mortar color, tooling of joints, and what happens to the color of the material when water repel-

lents and/or anti-graffiti coating are applied.

GRAZIANO: A big driver for lighter-weight materials is seismic requirements and poor soil conditions, which are found around the country. Lighter-weight cladding can provide better seismic performance, because there can be fewer columns, reduced superstructure and foundation requirements, so ultimately there's less mass to develop momentum. At Symphony House in Philadelphia, lightweight cladding allowed the project team to use a floating mat foundation rather than a costly caisson to attain seismic performance.

DAM: Manufactured stone veneer is a relatively new and innovative product which does not have its own section in the building codes. As a result, the requirements for manufactured stone veneer are pulled from sections of the code required for other materials. Some requirements come from the adhered veneer section of the code, others from the stucco section, and still others from the general exterior wall covering section.

The requirements from these sections, and others, are compiled along with additional requirements generated by ICC-ES, into the Acceptance Criteria for Precast Stone Veneer AC51. AC51 is a summary of raw materials required, product dimensions, product performance requirements, test procedures, installation instruction requirements and quality control requirements, all of which are created to meet the intent of building code. Once an Acceptance Criteria has been created, it becomes the code requirement for those codes it was written to include. AC51 assures that the product has been tested for reliability, durability, quality and safety. The purpose of this



ABOVE: Physicians Office Pavilion at WakeMed North Healthplex in Raleigh, N.C., was one of the Tilt-Up Concrete Assn.'s 2008 Tilt-Up Achievement Award winners.

ALL FOR TILT UP

When it came to the construction of the Physicians Office Pavilion at WakeMed North Healthplex in Raleigh, N.C., the decision to use tilt-up construction for an 80,000-sq.-ft. office building was an easy one, as the owner was well-versed in the method. However, the surrounding hospital buildings had been constructed on steel frames with brick and EIFS façades, meaning that construction team faced a challenge in matching the structure to those around it. To do this, the architect conceived a design that includes a 14-ft. retaining wall that supports three stories of curtain wall, taking advantage of tilt-up's shear capabilities to overcome structural challenges. Thin brick was applied to the building's façade to match the brick exteriors of the adjacent buildings. A 20-ft. retaining wall with an integral water feature further ties the new building into its surroundings, and demanded considerable precision and coordination from the contractor when connecting it to the existing hospital. The concrete on the retaining walls was left uncoated to allow its natural beauty to be displayed.

Since the reinforcement won't rust, less concrete cover is required, and the panel face can be as little as 1-1/2-in. thick within the overall panel size, or up to almost any thickness and size without significant weight penalties. Next, the backs of the panels may be filled with lightweight foam instead of concrete. This construction still delivers all the required durability, fire and weather-tight performance properties. The resulting panels afford new aesthetic freedom for designers, as they can have dramatic reveals and articulation without costly implications to engineering, erection and other aspects of the project.

Another development that has had significant impact is the adoption of thin brick in precast cladding. Thin brick achieves

the appearance of full brick, but without the additional onsite labor, site disruption and scaffolding, which, in itself, adds cost and risk. At 3/4-in. thick, thin brick is set in 5,000-psi concrete that locks it in place. There is no repointing of low-strength mortar in these panels, and they are virtually impervious, unlike porous brick rain screen. Thin brick aesthetics are advancing to the point that they blend very well with existing brick structures and traditional architecture.

Along with precast cladding, thin brick also can help contribute to LEED points because it is far less energy intensive to produce than full-bed brick and far more efficient to transport.

On the cement side, Essroc Cement Corp. has

introduced TX Active cement, which allows concrete to clean itself through a chemical process called photocatalysis. This process is receiving attention from both researchers and industry experts because of its beneficial effects on air and water purification as well as its antibacterial properties. A second cement, TX Aria, gives concrete the ability to reduce environmental pollution. It creates a concrete surface that interacts with the air to eliminate airborne pollutants responsible for urban organic pollution.

BRENT SPANN (ELDORADO STONE): At Eldorado, we see the cutting edge of technology in terms of mold making, use of coloring techniques and attention to detail when creating our various stone, brick and

adobe product lines. There also have been technological advances in the last five to seven years that have benefited the industry as a whole. Many of the industry's largest players have become involved in the Manufactured Veneer Masonry Assn. (MVMA) to share information and to create quality standards within manufacturing throughout the industry.

VIET T. DAM (LEO A. DALY, PHOENIX): I agree—there is a flexibility to choose new realistic textures and colors that previously was not possible. At the Ft. McDowell Radisson Hotel and Conference Center, the quality of the architecture is complemented through the atmosphere that the manufactured stone veneer walls convey—both inside and

Leaders in the manufacture and specification of stone-alternative façade materials provide their views and address the present and future of façade cladding in this exclusive AP virtual roundtable.

Industry Summit: Precast and Masonry Façades

Moderated by Chuck Ross, contributing writer

ARCHITECTURAL PRODUCTS: What's the latest in architectural precast, engineered stone and masonry materials, and their application on building façades?

DAVID SOVINSKI (INTERNATIONAL MASONRY INSTITUTE): We are seeing more insulated panels in precast concrete, and thinner, lighter panels. The caveat is that as panel dimensions grow, more reinforcement must be added, which often results in additional mass. Beyond panels, architectural precast includes sills, soffits and caps.

For cast stone, there is more variety in sizes, range and appearance, and more manufacturers. That greater variety makes skilled training of craftworkers and education of contractors even more critical, and is part of IMI's mission to keep both prepared for industry changes.

Composite panels are on the rise, for facings on concrete, and non-concrete panels, such as thin stone veneer attached to the honeycombed alumi-

num backup.

Current architectural trends and building technology advances allow for a mixture of materials on a façade. For example, architectural precast elements can be laid in a unit manner, along with traditional masonry laid in place.

BILL SEIDEL (ACME BRICK): We are seeing greater use of a more green friendly brick that meets ASTM C 652 ("Standard Specification for Hollow Brick"). Modular or king-size brick that meet this increasingly common specification have slightly larger core holes and weigh less than traditional brick. This new material has the same performance characteristics as traditional brick, but less energy is used to manufacture and transport it. Another development that is really more of a long-term trend is the use of king-size brick (9 1/2-in. x 2 1/2-in. x 2 1/2-in.) on commercial projects. King-size brick requires 25% fewer units to cover a given area, which

can mean big savings on labor and material. We are also seeing more use of patterning within brick design. Brick's small scale makes the use of different colors within a single façade possible and at a low cost. Acme offers a free design tool called masonry designer that allows an architect to build virtual walls with different brick and mortar colors. This tool is available for download at brick.com.

CARY C. CRAZIAND, AIA (HIGH CONCRETE GROUP): For precast, the most significant recent development is the development of lightweight cladding. Until it was introduced in 2004, the industry had few lightweight cladding options for highly articulated façades, and those were limiting in terms of aesthetics, seismic performance and long-term durability.

The lighter weight is achieved in several ways. First, the steel mesh found in conventional precast is replaced with carbon-fiber grid, which is non-com-

RIGHT: Acme Brick used its more sustainable products in its new headquarters building. These bricks are produced with larger core holes, resulting in lighter units requiring less energy to fire and transport. The company also provides its proprietary Masonry Designer software free at its website. Visit www.brick.com or **Circle 519**.



RIGHT: The Mountain Ledge line from Colorado Stone is now available in precast panels, making installation easier in settings where larger stones are needed for greater width or height. The panels retain the appearance of Mountain Ledge's hand-laid dry-stack set. Visit www.slcoloradostone.com or **Circle 518**.



RIGHT: Johnson Health Technologies' 225,000-sq-ft corporate headquarters complex in Madison, Wis. Recently earned a 2008 Tit-Up Achievement Award from the Tit-Up Concrete Assn. The south façade of the 180,000-sq-ft warehouse boasts an architectural "green wall" attached to the tit-up wall and planted with vines that will eventually fill the 350-ft.-long x 30-ft.-high space.

